GÖTTINGER STUDIEN ZUR ENTWICKLUNGSÖKONOMIK /
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Stephan Klasen
Felicitas Nowak-Lehmann (eds.)

Poverty, Inequality and Migration in Latin America

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The causes and consequences of high inequality in incomes, assets, and many aspects of well-being in Latin America have recently (re-)emerged as a central research and policy issue. However, many open questions remain that will be dealt with in the contributions to this volume. First, the linkages between growth, inequality, and poverty in Latin America need further clarification. More analyses at the country and even sub-national level are required to understand these complex relationships and their most important determinants. Of particular relevance is to examine these relationships in the Latin American context of high economic instability with recurrent economic and financial crises, particularly in the 1990s. Secondly, measuring and addressing poverty remains a critical research area, in particular non-monetary including subjective indicators of well-being often tell a different story that needs to be considered when analyzing poverty trends and determinants. Lastly, the poverty/inequality issues need to be considered in an economic environment, where trade, migration, and economic integration are of particular importance. Thus the role of trade and migration in generating, sustaining, or reducing inequalities between and within countries is an area that requires further analysis.

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Introduction

Stephan Klasen and Felicitas Nowak-Lehmann D.

The causes and consequences of high inequality in incomes, assets, and many aspects of well-being in Latin America has recently (re-)emerged as a central research and policy issue. While in previous decades, concern about high inequality in Latin America was, following Kuznets' seminal work in the 1950s, largely focused on the impact of the development process on inequality, the new emerging literature is considering the reverse causality, i.e. the impact of inequality on the development process. Prominent examples of this renewed emphasis are a number of reports produced recently by the World Bank, including the recent World Development Reports on Poverty (World Bank, 2000) and Equity (World Bank, 2005), as well as reports focusing on Latin America, including the 2004 report 'Inequality in Latin America: Breaking with History' (World Bank, 2003) and the recent 2006 report 'Poverty Reduction and Growth: Virtuous and Vicious Circles' (World Bank, 2006). Similarly, academic research has taken on this issue with renewed vigor, as shown, for example, by works of Eicher and Turnovsky (2003), Deininger and Squire (1998), Forbes (2000), among many others.

There are a number of reasons that have led to this re-emergence of inequality as a central research and policy issue in Latin America as well as the new emphasis on its development impacts. First, inequality was and is extremely high in Latin America. As shown in Table 1, Latin America continues to have the dubious distinction of having the highest income inequality in the world, as measured by the Gini coefficient. Using other measures, or other dimensions, of inequality (e.g. assets) would yield similar results. More disconcerting is the persistence of inequality in Latin America across time. In contrast to the hope held out by the Kuznets Hypothesis that inequality will eventually decline with development, it has remained extremely high through the past 30 years and changed little even during episodes of fast economic growth. In contrast to the long secular and large decline in inequality in rich countries that took place between about 1930 and 1970, we have not experienced a similar secular trend in any Latin American country (or, for that matter, in other developing regions, see Table 1). In fact, most evidence points to a small but significant rise in inequality in most developing countries since the early to mid-1980s (Grün and Klasen, 2003; Cornia and Court, 2001). Latin America is no exception although the extent of increases in inequality since the 1980s vary by country and time period and there is some evidence that inequality has declined again in some countries by a small amount in the last few years (particularly in Brazil, see World Bank, 2006). The resilience of high inequality in Latin America to vastly different policy regimes and policy

interventions is remarkable and somewhat disconcerting. Neither the statist development strategies of the 1950s and 1960s nor the liberal market reforms of the 1980s and 1990s have greatly affected inequality, nor have great swings from populism to orthodox market fundamentalism.

Second, inequality is not only persistent in the aggregate, but it is also persistent across generations of individuals as mounting research on the inter-generational transmission of inequality is pointing out (World Bank, 2003, 2005).

Third, the detrimental effects of inequality for economic and human development have become more apparent recently. As has been shown theoretically as well empirically, high inequality not only translates into higher absolute income poverty at any given level of mean incomes, but it also reduces the poverty reducing impact of economic growth (e.g. Bourguignon, 2003; World Bank, 2000; Klasen, 2003). Latin America's very poor progress in reducing absolute poverty in recent decades is thus not only a consequence of its poor growth performance, but also its high inequality (World Bank, 2006).

Fourth, there is growing evidence that high inequality, particularly asset inequality, is detrimental to economic growth itself. While the empirical evidence is still under some dispute (see, e.g. Deininger and Squire, 1998, Forbes, 2000; Klasen, 2003; Banerjee and Duflo, 2003), the evidence is mounting that such a negative effect exists particularly in countries displaying particularly high inequality, with Latin America often being cited as the most prominent example of a high inequality region with a relatively poor growth performance, particularly in the past 20 years. The channels through which this effect is transmitted range from capital market failures that prevent the poor in high inequality countries to invest in human and physical capital or to insure against risk, social and political instability that deter investment, to social conflict leading to inefficiencies, economic and political uncertainties and growth collapses, to name the ones most prominently discussed in the literature (e.g Alesina and Rodrik, 1995; Rodrik, 1998; Deininger and Squire, 1998; World Bank, 2003, 2006).

Fifth, there is growing debate and awareness about the well-being costs of high inequality in Latin America. Given inequality aversion for which there is convincing evidence from Latin America (e.g. World Bank, 2003), high inequality carries a welfare costs which can be sizable (see Grün and Klasen, 2006). Investigations of subjective well-being also point to the welfare costs of high inequality in Latin America. Moreover, since the 1980s, inequality has increasingly been associated with economic insecurity not only of the poor, but increasing sections of the middle class which has strongly undermined social cohesion and increased social and political conflict (Rodrik, 2001).

Sixth, while there was a time where inequality was seen as a necessary evil to promote incentives and efficiency, survey evidence from Latin America clearly points to the fact that inequality is now seen as too high and as unfair (World Bank, 2005, 2006). Of particular concern is here that much of existing

inequality in Latin America is in fact inequality of opportunities, i.e. inequality related to one's origin, race, sex, or parental background, which is seen as particularly reprehensible (e.g. Roemer, 1998; World Bank, 2005).

Seventh, the recent rise of populism in many Latin American countries (including Venezuela, Peru, Bolivia, and Argentina) has partly emerged as a result of the general dissatisfaction with high inequality, high poverty, poor growth, and social exclusion of minorities and marginalized groups. Clearly, inequality and persistent poverty is having a serious impact on political developments.

Lastly, the data and methods to analyze inequality and poverty and its linkages to growth and policy interventions have dramatically improved in recent years. Regarding data, the implementation of standardized regular representative household income surveys in nearly all Latin American countries in the past 10-15 years has enabled researchers to study poverty and inequality levels, trends, and determinants that was impossible in prior years where all that was available were occasional snapshots from a single household survey. This has also enabled an analysis of regional poverty and inequality dynamics which showed that regional inequality is an important driver of national inequality (World Bank, 2006). In addition to regular household surveys, specialized surveys, some using randomized designs, have allowed researchers to study the impact of particular government programs (e.g. Todd and Wolpin, 2005; World Bank, 2004). Regarding methods, there have been great improvements in combining micro and macro data to analyze and simulate the impact of policies on poverty and inequality as well as significant improvements in studying the spatial dimension of poverty and inequality, including the question of spatial poverty traps.

Table 1 Gini Coefficients by Region

	1970	1980	1990	2000
Latin America	59.3	53.0	58.2	59.5
South Asia	35.5	37.2	35.2	40.6
East Asia	32.9	33.3	37.9	41.8
Sub-Saharan Africa	51.8	52.1	56.2	54.6
OECD	37.7	37.5	39.0	40.1

Source: Grün and Klasen, 2006. The data refer to population-weighted averages for a consistent sample of countries (37 countries in total comprising some 75% of the world's population). The data have been adjusted to account for differences in survey design and income concept used.

Clearly, the high and persistent inequality in Latin America is one of the central, if not the central, economic policy challenge for Latin American policy-makers and we have new tools and data at hand to study this issue. So it is not surprising that there has been such a resurgence of interest in analyzing

dynamics and determinants of poverty, inequality, and the relationship of policy affecting them in Latin America.

While this renewed research interest has already generated many new insights, analyses, and policy recommendations, many open questions remain. Among them I will highlight a few that appear to be of particular relevance for understanding inequality and poverty dynamics as well as their policy drivers. First, the linkages between growth, inequality, and poverty in Latin America need further clarification. While the cross-country literature has generated important insights in this area, more analyses at the country and even sub-national level are required to understand these complex relationships and their most important determinants. Of particular relevance is to examine these relationships in the Latin American context of high economic instability with recurrent economic and financial crises, particularly in the 1990s. Second, measuring and addressing poverty remains a critical research area. While there is now good data and analysis on monetary poverty measures, non-monetary including subjective indicators of well-being often tell a different story that needs to be considered when analyzing poverty trends and determinants. Also, developing context-specific poverty reduction policies in Latin America remains a challenge for research and policy analysis alike and more work in this area is certainly still needed. Lastly, these issues need to be considered in an economic environment, where trade, migration, and economic integration are of particular importance. Thus the role of trade and migration in generating, sustaining, or reducing inequalities between and within countries is an area that requires further analysis. In particular, given the increasing migration from poorer Latin American countries to richer ones and to the United States, both the determinants of that migration as well as the consequences for poverty and inequality require further analysis. Similarly, Latin America opened up its economies in the 1980s and 1990s while pursuing attempts to further regional integration. The impact of these trends on inequality and poverty within and between countries remains an area of active investigation.

The papers in this volume were selected from a conference entitled 'Poverty, Inequality and Policy in Latin America' that took place at the Ibero-America Institute for Economic Research in Göttingen, Germany in July 2005 which was funded by the German Science Foundation and co-sponsored by the CESifo research network. In the remainder of this introduction, we briefly summarize the contributions, their relationship to the open questions raised above, and close by identifying open research and policy questions.

The present volume encompasses three main themes. In the first, linkages between growth, inequality and poverty are examined at the regional, national, and sub-national level. In Chapter I.1, Verónica Amarante gives a comprehensive overview of the literature on the relationship between growth and inequality, and presents her own findings on Latin America. She approaches the problem from two different perspectives: first, by examining the effect of income growth on inequality (testing the Kuznets curve), and second, by

investigating the link between inequality and income growth (analyzing the determinants of growth), building on previous research in the empirical growth literature. Amarante uses panel data for 22 Latin American countries and reestimates the Kuznets equation under alternative panel specifications. While a simple cross-section analysis reveals no relationship between growth and inequality, in the fixed effects specification, the existence of a Kuznets curve is confirmed for Latin America and Amarante finds a threshold value of $3,526, above which growth decreases inequality and below which growth increases inequality. Turning to the inverse relationship—her second approach, the relationship between inequality and growth—the empirical evidence from panel studies is mixed and not robust. Pooled OLS and random effects specifications suggest that inequality does not have a significant impact on subsequent growth. When utilizing a fixed effects specification, however, the finding is very different: inequality now has a positive and significant effect on subsequent growth. Amarante additionally finds that in fixed effects models the effect of inequality on growth depends on the level of per capita GDP. For the GMM (Generalized Method of Moments) estimation, inequality and the interaction between inequality and GDP levels lose significance. Amarante concludes that although there is abundant empirical evidence on the link between inequality and economic performance, the results are not at all conclusive and the debate in the empirical literature remains open. A major finding of her study is that the results of cross-sectional analyses cannot be confirmed by panel analyses and vice versa.

The following four papers examine the relationship between growth, inequality, and poverty at a more disaggregated level, either focusing on particular historical episodes in a country or using sub-national data. In Chapter I.2, "Growth, Inequality and Poverty: Some Empirical Evidence from Minas Gerais State, Brazil," Rosa Fontes, Elydia Silva, Luiz F. Alves, and Geraldo E. S. Júnior study empirically the linkage between economic growth and income inequality in towns and microregions of the Brazilian state of Minas Gerais from 1970 to 2000. In order to test the income convergence hypothesis, they perform convergence tests (absolute ß-convergence, conditional ß-convergence, and -convergence) and analyze the role of human capital in growth for the 66 microregions of Minas Gerais. Furthermore, they compare the very rich regions and very poor regions of the state to study the relationship between regional inequality and poverty. Using the -convergence test, Fontes et al. find little evidence of income convergence and inequality reduction over the past 30 years. Most of their estimations reveal a negative and highly significant relation between initial income and the rate of income growth during the period, suggesting that in general, the poorer regions and towns grew more than the richer ones (absolute ß-convergence). Further analyses also confirm that conditional ß-convergence took place, since proxies of human capital played an important role in Minas Gerais income convergence and growth. Despite absolute and conditional ß-convergence the authors also identify "convergence

clubs" among the poor and very poor regions, as well as among the richer ones, leading to different long-term steady states. This tendency shows an inability of the poor microregions to escape from the poverty trap, and highlights the need for public policies designed to overcome this obstacle and permit greater income equalization within Minas Gerais.

In Chapter I.3, "Pro Poor Growth in Colombia 1996-2004" Adriana Cardozo investigates whether economic growth in Colombia has benefited the poor. Based on data from the Colombian household surveys, her study aims at evaluating whether growth in Colombia was pro-poor from 1996 to 2005 by deriving growth incidence curves (GIC) and calculating the pro-poor growth rate (PPGR) developed by Ravallion and Chen (2003). After reviewing the concepts underlying the idea of pro-poor growth as well as of two of the most widely used techniques for calculating it, Cardozo analyzes GICs from 1996 to 1999, 1999 to 2002, and 2002 to 2005 to capture the effects of the economic slowdown, crisis, and recovery periods separately. Her results show that when applying a strict interpretation of the aforementioned methodology, growth in Colombia was indeed pro-poor between 1996 and 2005 given that the PPGR was higher than the mean growth rate (0.94 vs. 0.43). Nevertheless the difference is very small and the methodology does not indicate anything about how great the difference needs to be to conclude that growth was truly beneficial to the poor relative to the non-poor. A more balanced conclusion would be that growth was very low and was not averse to the poor (relative to the non-poor), yielding an almost unchanged incidence of poverty after 1996. Separating the results into smaller periods reveals an even clearer picture. From 1996 to 1999, the economic slowdown affected the poor much more severely than the non-poor. In both urban and rural areas, income fell more dramatically for the extremely poor. Between 1999 and 2002, all GICs have a positive slope, and growth was pro-poor as shown by the PPGR results, which are heavily influenced by a statistical effect of income moving back to the levels observed before the economic crisis. In the period 2002-2005, gains from economic recovery were stronger, and income growth was pro-poor in urban and rural areas as well as for Colombia as a whole. Regional comparisons show that it was only in the Pacific region that growth was clearly anti-poor, while in the others, the results for the country as a whole hold: low income growth rates and small differences between the mean growth rate and the PPGR.

The following chapter also deals with the poverty and inequality impact of an economic crisis. In Chapter I.4, "Crisis and Recovery in Argentina: Labor Market, Poverty, Inequality and Pro-poor Growth Dynamics" Melanie Khamis examines the development of employment, unemployment, poverty, and inequality in Argentina in the period 2001-2004. Using micro-level household data from the official Argentine household survey (EPH), she studies labor market dynamics, poverty, income changes, and pro-poor growth features of the Argentine economy during the crisis of 2001-2002, the early recovery period of 2002-2003, and the later recovery period of 2003-2004. As to the labor market

dynamics, Khamis finds that the economic crisis and the recovery were largely reflected in the general labor market trends: increased unemployment and inactivity alongside decreased employment during the crisis, and the reverse picture during the recovery period. With respect to economic sectors, four emerged as the most dynamic in terms of changes in employment, unemployment, and inactivity: the manufacturing sector; other services; the construction sector; and the trade/retail, restaurants and hotel sector. Poverty and extreme poverty increased substantially during and after the crisis of 2001-2002, and in the period 2002-2003, poverty rates and indigence rates still showed small increases despite the continuation of government programs providing subsidies to the poor (through the Plan Jefes workfare program). A trend toward decreasing poverty and indigence was seen in the period from October 2002 to the second half of 2004. All inequality measures agree that inequality increased in Argentina during the 1990s, whereas they disagree over what happened between 2001 and 2003. Indices that attach greater weight to the bottom of the income distribution find a fall in inequality (Atkinson with parameters 1 and 2, and entropy with parameter 0) since relative incomes of the very poor increased. When using equivalized household labor monetary income or another inequality indicator, an increase in inequality is found between 2001 and 2003. Answering the question of whether Argentine growth cycles have been pro-poor, she finds that the poor experienced a very strong decline (-36.70 percent) in their household income in the period 2001-2002. In the period 2002-2003, their income increased by 7.27 percent and in the period 2003 and 2004, pro-poor growth was even higher at 15.40 percent. It has to be kept in mind, however, that both the growth component and redistribution (through government transfers) are important in explaining poverty and indigence changes for Argentina during the period 2001-2004. The pro-poor features of the early recovery period (2002-2003) were mainly accounted by government transfers (through Plan Jefes), whereas in the later stages of recovery (2003-2004), income increases among the poor were less a result of government transfers than of the pro-poor pattern of growth itself.

Staying with Argentine but covering a longer time period, María Santos examines regional inequality in Chapter I.5 in her paper "Factors Influencing Income Inequality across Urban Argentina". She uses a panel dataset of 38 cities (cross-sections) over the period 1998-2003. The urban agglomerations covered by the survey contain 71% of the urban population of Argentina, and 62% of the entire country's population in the following six statistical regions: Greater Buenos Aires, Northeast Argentina, Northwest Argentina, Cuyo, Pampeana and Patagonia. Santos assesses inequality using four different measures: the Gini coefficient, the Theil 1 and Theil 2 indices, and the coefficient of variation (CV). In the period 1998-2003, she finds a steady increase in inequality over time with a peak in 2002 after the December 2001 crisis and a decline after 2002. However, the overall increase in inequality between 1998 and 2003 is relatively small. Inequality across the six statistical regions (in other words, the inequality

rankings) changed over the period under analysis: in 2003, all inequality measures ranked Greater Buenos Aires (GBA) as the most unequal region, followed by the Northeast and Northwest. In the panel analysis, inequality is explained by labor market characteristics (unemployment rate, returns to education, share of the employed in the secondary sector), human capital assets (proportion of people who completed primary school, secondary and higher education, demographic characteristics (proportion of indigenous households, age distribution of the population) and level of development characteristics (per capita electricity consumption, its square, percentage of population with unsatisfied basic needs). The study finds that unemployment and higher returns to education increase inequality, and a higher share of employed people in the secondary sector decreases inequality. The rate of primary education has a strong inequality-decreasing impact, whereas the rate of secondary education appears to have an inequality-increasing impact. The dependency index has the expected positive coefficient and is significant. The log of per capita electricity consumption, the proxy for GDP per capita, is significant and positive in all cases. And the percentage of people with unsatisfied basic needs is significant and positive for all inequality measures, except for CV. These results suggest that urban agglomerations are more unequal—not just because they are located in a particular region such as the North, for example, but because compared to other cities, they are likely to have a lower proportion of the population with primary education, less developed industrial sectors, and higher unemployment. These regions may also have a high level of structural poverty and dependency, and are affected by the presence of indigenous groups in the local population.

Chapter II moves to poverty analysis and poverty policy. In Chapter II.6, "The Determinants of Subjective Poverty: A Comparative Analysis in Madagascar and Peru", Javier Herrera, Mireille Razafindrakoto, and François Roubaud concentrate on the subjective evaluation of poverty. Recent studies in developed countries have found that subjective well-being is based not only on monetary income and consumption but also on other factors such as employment and health. This paper examines the factors that determine households' subjective evaluation of their living standards through a comparative analysis of data from two developing countries, Peru and Madagascar. In their study, Herrera et al. use a database of first-hand observations to group objective individual variables (households' socio-economic characteristics, environmental and individual trajectories provided by the two panel studies) together with corresponding questions on subjective well-being for both countries. The study confirms how important it is to study the non-monetary dimensions of poverty in developing countries: including these dimensions doubles the explanatory power of the econometric models of subjective well-being. It is interesting to note that overall, the results produced by Herrera et al. confirm the well established findings on determinants of subjective well-being from developed countries and speak in favor of applying a similar methodology in developing countries. Nonetheless, a few significant

differences emerge from this study. First, the data on Peru and Madagascar confirm that there is a positive, significant correlation between subjective well-being and monetary income, but that this correlation is significantly less than 1. In Madagascar, the poorer country, the strength of an association between subjective well-being (SWB) and income is higher than in the middle-income country, Peru. In both cases, other dimensions of well-being (such as health, education and job quality, but also family structures) play a non-negligible role. Furthermore, social interactions and trajectories also affect perceptions of well-being. With a fixed personal income, the average level of income in the neighborhood has a negative impact on SWB, confirming the rivalry hypothesis. Past income has a positive impact in both countries, partly capturing an effect of permanent income. Finally, social capital, social origins, and the ethnic factor (in Madagascar) have a significant impact on the perception of well-being. Apart from these commonalities, which prove the relative robustness of the results, interesting differences between Peru and Madagascar also emerge. Whereas local inequalities play a positive role in the perception of well-being in Peru, they play a negative role in Madagascar. The authors put forward the hypothesis of two different models of mobility and social norms: in the first model (Peru), inequalities are apparently seen as the result of strong social mobility, which is valued highly by the population; while in the second (Madagascar), social homogeneity is valued more highly, being viewed as the basis and/or the result of social relationships.

The objective of Chapter II.7, "Geography, Livelihoods, and Rural Poverty in Honduras: An Empirical Analysis Using an Asset-Based Approach", by Hans G.P. Jansen, Paul B. Siegel, Jeffrey Alwang, and Francisco Pichón, is to develop a conceptual and analytical framework that can be used to simulate and better understand the prospects for growth and poverty reduction in rural Honduras. Jansen et al. employ complementary quantitative and qualitative methods of analysis driven by an asset-based approach. Justifying this emphasis by the high inequalities found in the distribution of productive assets among Honduran households and geographical areas, the authors focus on household assets (broadly defined to include natural, physical, human, financial, social, and locational assets) and the combinations thereof that would be needed to take advantage of economic opportunities. They examine the relative contributions of these assets and identify the combinations of productive, social, and location-specific assets that matter most for raising incomes and taking advantage of the prospects for poverty-reducing growth. They use factor and cluster analysis techniques to identify and group different livelihood strategies, and econometric analysis to investigate the determinants of different livelihood strategies and the major factors affecting income. Spatial analysis, community livelihood studies, and project assessments are also brought in to complement the more quantitative household survey data.

Five key findings with important strategic implications emerge. First, the rural areas of Honduras show significant heterogeneity in terms of asset

endowments. Even areas with high economic potential often suffer from persistently high poverty because the poor simply lack the basic assets needed to capitalize on the existing potential. Second, poverty is deep and widespread in rural Honduras—particularly in the hillside areas, where most households have limited assets on which to base their livelihood strategies. The high poverty density of hillside areas and the fact that some 80 percent of all rural poor are located there should make these areas a main target of national rural poverty reduction strategies. Furthermore, the overlap between high poverty rates and high poverty densities there means that investments in the hillside areas have good chances of reaching significant proportions of the country's rural poor, and a minimal risk of 'leakages'. Third, although agriculture should form an integral part of the rural growth strategy for hillside areas, its potential is limited. Public policies and investments must focus on issues of food security, natural resource security, access to land and forests, infrastructure provision, improved natural resource management, non-agricultural rural employment, and migration in order to foster broad-based and sustainable agricultural growth and to reduce rural poverty. Fourth, there is a need to move from geographically untargeted investments in individual assets toward a more integrated and geographically based approach that promotes complementarities among different measures. A multi-sector investment program is needed to upgrade and improve access to household assets and to generate and foster complementarities. Finally, asset investment programs need to be adapted to the specific needs of regions and households. While some household asset programs should be national in nature, others require local adaptation and should run in tandem with the national measures, but should focus on the specific needs of regions and households. Investment strategies should be formulated on a broad regional basis, but options within regions should be tailored to local asset bases.

The last chapter addresses questions of trade and migration. In the first contribution, Chapter III.8, "Trade versus Migration, and the Role of Diversity: A Simple Analytical Framework", Leonardo Auernheimer develops a theoretical model to explain migration dynamics, which is particularly relevant to explain migration dynamics between Latin America and the US. In it, migration is determined not only by real wage differentials but also by a preference for 'cultural' homogeneity: thus, social interaction factors also play a role. Auernheimer distinguishes four cases of migration equilibria. In the first, no migration occurs, since the gains in real wages for migrants are dominated by the loss of cultural homogeneity. In the second, the migration equilibrium is extremely unstable, being determined by only one (very low) desirable level of migrants in the host country. Backward migration results if this (low) level is surpassed (for example, if migrants face unfriendly treatment) or if migration does not occur due to the host country's cultural unattractiveness to migrants. In the third case, migration is dominated by the wage differential. There is also a unique value for the ratio of migrants to total labor in the guest country, but the ratio is much greater than in the second case, and therefore, migration always

takes place. The most interesting case is the fourth, where the model obtains two equilibrium values for migration: if migration is below the lower equilibrium value, there is no incentive to migrate to the host country, and backward migration would even occur. If migration is above the upper equilibrium value, some migrants would return home because of a feeling of no longer being welcome in the host country. Only if migration remains between its upper and lower equilibrium values would migration take place. The particularly interesting implication of this scenario is that migrants and host country residents will have different preferences regarding trade versus migration. While the host country residents would favor migration over trade, the migrants would favor trade over more migration. It would be well worth considering whether this model can help understand the politics of immigration in the US, with respect to Latin American immigrants.

In Chapter III.9, "South-South Trade Agreements, Location of Production, and Inequality in Latin America", Alessia Lo Turco investigates the impact of the Latin American South-South Agreements (MERCOSUR, CAN (Andean Community) and the CACM (Central American Common Market) on the concentration of production and the divergence or convergence of income levels in Latin America. To examine how Regional Free Trade Agreements (RTAs) potentially lead to concentrations in production she uses panel analysis using a model that investigates the determinants of industry location. Lo Turco finds that production concentration increased in a number of sectors, especially in the Central American Common Market (Costa Rica, El Salvador, Guatemala) and the Andean Community (Colombia, Ecuador). To deal with the issue of inequality, she uses a model based on aggregated data to determine whether the three regional south-south trade agreements have contributed to convergence or a divergence in income levels among the countries involved. A difference-in-differences approach is used to separate the integration effect from the general path of development in Latin America. A central outcome of Lo Turco's study is that MERCOSUR and CACM have led to a divergence in income levels, while the renegotiation of the Andean Pact (CAN) has fostered a convergence.

The chapters in this volume add considerably to our understanding of the dynamics of inequality and poverty in Latin America as well as the scope for policy to address this issue. Nevertheless, open questions remain. The role of migration and migration policies for Latin American economic development will be a subject that will require further scrutiny, both on the theoretical but particularly on the empirical front. The evidence of large differentials in regional development is similarly intriguing but calls for more research to solidify the results, examine the determinants of spatial poverty traps in more details, and study whether these traps have become more or less severe over time. The impact of economic crises on poverty and inequality, at the national and sub-national level, will remain an active area of research as long as Latin America's growth trajectories remain so unstable. Lastly, most research will be needed on the multi-dimensionality and subjectivity of poverty in Latin

America. The experience of the 1990s demonstrates that moderate growth with some income poverty reduction has done little to reduce the social unrest and instability which have given rise to the re-emergence of populism in an increasing number of countries in recent years. Unless the problems of high inequality and poverty, objectively measured and subjectively felt, are addressed, more instability in Latin America is bound to lie ahead.

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I.1 Growth and Inequality in Latin America

Verónica Amarante[a]

1.1 Introduction

Research on inequality and growth has traditionally been carried out under two approaches: one was a direct derivation from Kuznets hypothesis, estimating reduced form equations to test for the relationship between the level of income and inequality. The other has analyzed the determinants of growth (Barro and Sala-i-Martin, 1995) and inequality (Li, Squire and Zou, 1998), inequality being an independent variable. A relatively new strand of literature is trying to focus simultaneously on inequality and growth and overcome the mechanistic Kuznets view, exploring new theoretical links. Whereas Kuznets emphasized the incidence of growth on income distribution, the reconsideration of the relationship between income distribution and economic growth during the nineties is based on the links between inequality and growth.[1] Instead of focusing on the relationship alone, new developments try to explain the links that connect both variables, implying causality from inequality to growth. Among the links pointed out by this literature are the political economy, imperfect capital markets, socio-political instability and endogenous fertility (Barro, 1999; Benabou, 1996). In the framework of this literature, and boosted by the availability of better quality data on inequality and longer time series for a variety of countries, new empirical evidence has surged. Recent panel estimations do not unambiguously yield the negative relationship between inequality and growth that was found when using cross sectional data (Forbes,

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1 After Kuznets', the relationship between growth and inequality was somehow left behind during the seventies and eighties, when neoclassical growth theory, and later on endogenous growth, were in the centre of academic debate. The reconsideration of the topic in the nineties is due to several factors. First, macroeconomic stabilization policies and structural reform in developing countries renewed interest on distributive aspects, because their effects on equality began to be questioned. Secondly, two important economic facts took place: the change in some countries from centrally planned systems to market oriented ones and the reverse in the downward trend in inequality in developed countries (US and many OECD countries) in recent times. Last but not least, the availability of new data sets of higher quality fostered empirical research on the topic.

2000; Li and Zou, 1998), and the debate on the role of inequality is again in the center of the academic discussion. The importance of this issue is given by the fact that the impact of different policies may depend on the underlying process that relates the two variables.

When we consider the Latin American experience, there is a consensus about the disappointing growth performance of Latin American countries from 1960 on (De Gregorio and Lee, 2000, Loayza *et al.,* 2002). Given that Latin America is the most unequal region in the world for the whole period since data is available, the idea that poverty in Latin America could be significantly reduced if income or asset inequalities were not as high has been widely discussed. But recently, there is also a growing concern about the threat that high levels of inequality may be posing on growth potentialities.

This paper summarizes recent developments in the literature related to this topic, and considers the relationship between inequality and growth for Latin American countries. Specifically, we want to analyse/study the relationship between the high levels of inequality and the disappointing growth performance of the region. The analysis is based on the estimation of a reduced form growth equation, including income inequality among the explanatory variables, using a data set for regional countries covering five years averages for the period 1960-2000. The paper is organized as follows: section one reviews the analytical framework for the study of inequality and growth, as well as recent empirical evidence. Section two illustrates recent growth experiences of Latin American countries. It also analyses different dimensions of inequality in the region and focuses on the evolution of income inequality during the past four decades, briefly discussing the role of institutions and structural reforms. Section three discusses previous empirical evidence on the relationship between inequality and growth, highlighting potential weaknesses and focusing on existing research for Latin America. Our methodological strategy and principal results are presented in section four. Finally, section five presents some concluding remarks.

1.2 Analytical framework and empirical evidence

This section summarizes theoretical developments on the relationship between growth and inequality, as well as the main empirical evidence. Following a historical perspective, the traditional vision is briefly presented, and then new developments, which emphasize different channels of connection between inequality and growth, are summarized.

1.2.1 The traditional approach: an overview

The traditional approach to the growth inequality relationship was ruled by the early research by Lewis (1954), Kaldor (1956) and especially Kuznets (1955). These pioneering works were the foundations for the trade-off relationship between income distribution and economic growth, which was expressed in the famous inverted U-hypothesis.

Kuznets emphasised the incidence of growth on income distribution, so it was an argument **from growth to inequality**. Based on Lewis's previous work, he argued that in the development process labour moves from low productivity sectors to higher productivity ones. Low productivity sectors (typically agricultural) have lower per capita income and probably lower inequality, whereas higher productivity sectors (typically manufacturing) have higher per capita income and higher inequality. Total inequality is the aggregation of within sectors inequality. If inequality between sectors is higher than that within sectors, during the economic development process, which implies movement of people from the agricultural to the manufacturing sector, aggregate income inequality initially raises when people move from the low productivity sector to the higher productivity one, and their per capita income increases. During the following stages of development, the size of the low productivity sector decreases, and this leads to an increase in their relative wages, and to more workers in the high productivity sector, with higher per capita income. As a consequence, in this second stage the relationship between GDP per capita and inequality is negative. This was the birth of the inverted U-hypothesis, which was tested by the author using data for five countries. The data set was composed by two developed countries (United Kingdom and USA) and three developing ones (Puerto Rico, India and Ceylon). In his article, Kuznets states that his research is 5% empirical information and 95% speculation. In a later study (Kuznets, 1963), he provided further support for the inverted-U hypothesis. This time data were obtained from eighteen countries, mixing developing and developed ones.

Kuznets himself did not formalize a theory on this relationship, but set an argument that later on was formalized by Fields (1979), Robinson (1976) and Anand and Kanbur (1993). The inverted U-hypothesis brought about a lot of empirical evidence, generated by the estimation of the relationship with cross-country data sets. The view of this relation found many adepts, and was considered a stylised fact (Ahluwalia 1976) or an economic law (Robinson 1976).

1.2.2 New explanations for the growth inequality relationship

The relationship between income distribution and economic growth was carefully re-considered during the nineties. Instead of focusing on the relationship alone, new strands of literature tried to explain the links that connect both variables, implying causality **from inequality to growth**. This

section reviews these new developments, dividing them in the following groups: (i) political economy, (ii) imperfect capital markets and investment in education, (iii) savings, (iv) endogenous fertility, (v) socio-political instability and (vi) other explanations.[2]

One of the mechanisms most commonly used to establish the link from inequality to economic growth is the **political economy** channel. Literature emphasising this channel focuses on two mechanisms: the median voter theorem and the lobby activities. The original median voter theorem was proposed by Meltzer and Richard (1981). They developed a model where the economy is composed by individuals with different income levels and a government that imposes a proportional tax and redistributes tax revenues between people. Income distribution is asymmetric in most countries, implying a median income below mean income. As income distribution becomes more unequal, median income rises far below mean income, so the ratio median/mean decreases. If agents vote on a redistribute/progressive tax system, the theory predicts that results will correspond to the tax rate preferred by the median voter. Preferences for redistributive taxes are inversely related to the voter's income, so higher inequality implies a lower median/mean relation and a higher preferred tax rate. This literature carries a message on the harmful effect of inequality for growth, but in this case the reason for this harmful effect is the fact that higher levels of inequality (ex-ante) are associated with redistributive policies that are distortive to growth. The driving reason is that redistribution is undertaken via marginal taxes that tend to bring down the rate of investment and the rate of economic growth.

Different variants of these models may imply a negative relationship between inequality and growth (Alesina and Rodrik, 1994; Persson and Tabellini, 1994), a positive one (Saint Paul and Verdier, 1993, 1996) or even ambiguity in this relationship (Li and Zou, 1998; Banerjee and Dulfo, 2000), depending on the underlying assumptions, mainly those related to the use of the income revenue.

Other authors have emphasised the role of **capital market imperfections** to explain the growth inequality relationship. Models based on capital market imperfections point out that in the presence of credit rationing investment opportunities depend on personal income and assets. So poorer people will have fewer opportunities to invest on human capital. A redistribution of assets or income from a rich person to a poorer one, which implies inequality reduction, will tend to increase average productivity of investment and will spur economic growth. Capital market imperfections can be due to credit market imperfections or insurance market imperfections, which in turn can derive from asymmetric information and limitations of legal institutions. An example given by Barro

2 A chart summarizing main theoretical channels proposed by the literature can be found in Annex I.

(2000) is the difficulty of collecting defaulted loans with imperfect law enforcement. Among the research on capital market imperfections we find Galor and Zeira (1993) and Banerjee and Newman (1993).

The importance of **savings** as a link between inequality and growth dates back to the influential studies of Keynes (1936) and Kaldor (1956), so this strand of literature is strictly not part of the new developments. Individual saving rates depend on the level of income, if we assume that these rates rise with the level of income, then a redistribution of resources from rich to poor tends to lower the aggregate rate of saving in an economy. By the same token, a rise in inequality tends to raise investment, and so more inequality would enhance economic growth. This reasoning, which was influential some decades later, is somehow of secondary relevance due to the closed economy assumption. Most surveys on the relationship between inequality and growth do not include this channel in a direct way, an exception being Barro (1999), who mentions the saving channel in his review of these links. Nevertheless, we must keep in mind that somehow, two of the channels often mentioned act through the investment effect: capital market imperfection lead to lower investment in human capital, whereas the political economy channel (in its version of distortive taxes) also implies lower investment.

Literature relating income distribution and growth through the **fertility** channel starts out with Barro and Becker (1988) and Becker, Murphy and Tamura (1990). These models are based on the idea that households face a trade-off between quality and quantity when taking their decisions about children. The intuition implied in the recent literature that emphasises the link between growth and inequality through the fertility channel is presented by Perotti (1996) in simple terms. He points out that an increase in human capital of parents has both an income effect and a substitution effect. Higher levels of human capital cause higher demand for children by the income effect, but as the opportunity costs of having children increase, there is a substitution effect that implies lower demand for children. At low levels of human capital, the income effect prevails, but at a sufficiently higher level of human capital the substitution effect prevails, and an increase in human capital leads to less fertility. A redistribution of human capital from individuals with a high endowment to individuals with a low endowment, in case the substitution effect prevails, would imply an increase in the rate of return to education for poor people, so lower fertility. If the demand for human capital were elastic to the rate of return, this would also imply higher enrolment rates. A negative relationship between equality and fertility, and a positive one between equality and investment in human capital, result from this reasoning. This mechanism has recently been formalized by many authors (Galor and Weil, 1996; Dahan y Tsiddon, 1998; Morand, 1999).

Some authors consider that income inequality is tied to **socio political instability,** which threatens property rights and reduces investment. Along these lines, Alesina and Perotti (1996) argue that political instability can lead to lower

growth. They consider that social conflict affects investment through three channels. First, political horizons are reduced, so traditional reputation mechanisms that prevent capital taxing are weak. This leads to an increase in the expected level of factor taxation and eventually prevents investment. Secondly, social conflict generates interruptions in productive activities and so lowers labour and capital productivity, leading to lower economic growth. Finally, it increases uncertainty, so risk aversion leads investment projects to be postponed or carried out in other countries. They argue that this can be a good explanation for the different performance between Asia and Latin America.

Finally, **other explanations** given by different authors to link growth and inequality should be mentioned. Among these possible channels, we can find the size of the market (Murphy, Shleifer and Vishny,1989), the existence of a middle class consensus (Easterly, 2001), the role of institutions and initial conditions (Sokoloff and Engerman, 2000), the existence of "neighbourhood effects" (Durlauf, 1992; Benabou, 1994, 1996) and the importance of land inequality (Deininger and Olinto, 2000).

1.2.3 Empirical evidence

The origins of the empirical literature on inequality and growth can be tracked to the initial attempts of estimating Kuznets curves, meaning the relationship between inequality and the level of income. A wide range of cross country studies look at approximately the same point in time and examine how the pattern of inequality varied when moving from lower income to higher income countries. The usual estimated regression contained income inequality as the dependent variable and per capita national income, with a non-linear specification, as the explanatory variable.[3] Among this research we find Adelman and Robinson (1989), Clarke (1995), Fishlow (1995), Bourguignon and Morrison (1990) and Jha (1996), who estimate this kind of cross-country equations. Most of these works find support for the Kuznets hypothesis, as well as the empirical research undertaken in the previous decades. This led Adelman and Robsinson (1988) to conclude:[4]

"the initial phase of the development process, during which a mostly agrarian economy starts industrialization, is necessarily marked by substantial increases in the inequality of the distribution of income, with a sharply reduced

3 The two main approaches consist on including per capita income and its square on the right hand side of the equation (the inverted-U hypothesis would be consistent with a positive coefficient on income and a negative one on its square) or including per capita income and its inverse (in this case the inverted-U hypothesis would be consistent with both coefficients being negative).

4 Despite finding evidence for the inverted U shape, these regressions indicate that the most important variables are not included, as variation in national income explains only a small fraction of the variation in income inequality; Ros (2000) reports an R^2 of the order of 0.15 to 0.20.

share of income going to the poorest 20, 40 and 60 percent of the population" (Adelman and Robinson, p. 958).

Later on, empirical research on the Kuznets curve tried to estimate the relationship between income and inequality, using panel data, a better approximation for this kind of empirical problem. As Bruno *et al.* (1995) point out, in middle-income countries, like Latin American ones, income is usually the variable used to analyse inequality, whereas in the rest of the countries, including Asian economies, consumption is generally used. Income inequality is generally higher than consumer inequality, so this kind of measurement differences could drive the inverted-U-result when considering a wide set of countries, and could disappear when using similar inequality measures. Previous results from cross-country studies have been questioned by later research that finds that when country fixed effects are included and the model is estimated using first differences, the coefficients on income and its square may become not significant. Fields and Jakubson (1984) show that the estimated curve can go from a statistically significant inverted U to a statistically significant U-shape when fixed effects are included.

Based on panel data, Ravallion (1995) and Deininger and Squire (1998), among others, find no support for the Kuznets hypothesis. When allowing for country specific intercept dummies, the coefficients on income and its inverse lose significance and even reverse their sign. Considering these findings, Fields (2001) concludes that:

"the inverted U-pattern in the cross section has nothing to do with growth per se; what it has to do is with the fact that for particular historical, political and cultural reasons, Latin American countries have higher inequality than other developing countries" (Fields 2001, p. 45).

More recently, and before the debate about the existence of the Kuznets curve was closed, empirical research has centred on the relationship between inequality and growth (that is the change of income, not its level), in the framework of the theoretical explanations reviewed before, implying causality from inequality to growth. Again, cross sectional data was used in the first stages, mainly because of the problems with availability of data. In general terms, results from these estimations show that inequality is harmful to growth in the long run, implying a negative coefficient on the inequality variable. Among this research, studies from Persson and Tabellini (1994), Alesina and Rodrik (1994), Alesina and Perotti (1996), Perotti (1996), Keefer and Knack (2000) are included. The general conclusion is that initial levels of inequality significantly predict the subsequent rate of economic growth, with higher inequality being detrimental to economic growth. In words of Benabou (1996):

"These regressions, which run over a variety of data sets and periods with many different measures of income inequality, deliver a consistent message: initial inequality is detrimental to long run growth" (Benabou 1996, pp. 13).

More recently, cross-country growth equations results have also been questioned by evidence based on panel data estimations. Forbes (2000) argues that there are a number of potential problems with this empirical research: the lack of robustness and the existence of measurement error and omitted variable biases. Her estimations of a growth equation (five year average growth rates from 1966-1995) show that, no matter which panel estimation technique is used, the coefficient on the income inequality variable is never negative, challenging the common belief of a negative effect of inequality on growth.[5] She concludes that in the short and medium term an increase in a country's level of income inequality has a significant positive relationship with subsequent economic growth. Country specific, time invariant omitted variables were generating the significant negative bias in the estimated inequality coefficient from cross-country data.[6] Li and Zou (1998) also find evidence of a positive relationship between changes in inequality and changes in growth, using the Deininger and Squire (1996) data set. Barro (2000) uses a panel of countries and considers average growth rates and average ratios of investment over three decades to capture long run effects of growth, using three stage least squares for his estimation. He finds that for the growth rate, the expected coefficient on the Gini variable is zero, so overall differences in Gini coefficients for income inequality have no significant relation with subsequent economic growth. He states that one possible interpretation of this is that the various theoretical effects of inequality on growth are nearly fully offsetting. He also finds that when the effect of the Gini coefficient on economic growth is allowed to depend on the level of economic development, the coefficients are jointly and individually significant and the estimated relation implies that the effect of inequality on growth is negative for low values of GDP per capita and positive for higher ones. Finally, Banerjee and Dulfo (2000) find that past variation in inequality is related to subsequent growth in a non-linear way. While the linear term is insignificant, the quadratic term is negative and significant. Their results do not support the conclusion that increases in inequality are followed by increases in growth, as argued by Forbes (2000). Indeed, increases in inequality, like reductions in inequality, seem to be associated with a fall in growth.

Summarizing, it can be said that in general terms, recent **panel data** estimations do not yield a clear negative relationship between inequality and growth that was found when using cross sectional data. Therefore, the need to advance in more careful research on the sign and explanation of the inequality-growth relationship emerges as a result of the survey of existing evidence.

5 She estimates the model with random effects, fixed effects and using generalized method of moments (GMM), the method proposed by Arellano and Bond (1991).

6 She suggests as possible omitted variables levels of corruption, share of government spending on basic health care or primary education, quality of public education.

Moreover, empirical evidence on this issue is mainly based on reduced form equations of growth, adding income distribution and some variable related to the hypothesis they want to test on the right hand side. The scarce research that tries to find support for any of the theoretical explanations discussed above is based on cross country data sets and so is likely to suffer from omitted variable bias.[7]

1.3 Growth and inequality in Latin America

1.3.1 Economic growth and income distribution

The theoretical and empirical debate about the relationship between inequality and growth is especially relevant for the Latin American case. The idea that poverty in Latin America could be significantly reduced if income or asset inequalities were not as high has been widely discussed and is fundamental for the study of inequality. But recently, there is also a growing consensus about the threat that high levels of inequality may be posing on growth potentials. The question that has recently been formulated on the role of inequality (*Is inequality harmful for growth?,* Persson and Tabellini 1994) seems particularly important for the region. Although some authors have formulated this hypothesis (Birsdall, Ross and Sabot 1995), focused empirical analysis seems to be necessary in order to assess both the role of inequality on economic growth and the specific channels that explain the relationship between these two variables.

Previous research based on world data sets suggests the importance of distinguishing different regional behaviours (Barro, 2000; Deininger and Squire 1998; Fields and Jakubson, 1994), or recognize the fact that world wide data sets may not yield results valid for less developed countries (Fishlow, 1995; Forbes, 2000). Given the presumption of a connection between high levels of inequality and disappointing growth performance in Latin American countries, this research will try to shed light on this relationship and the possible factors that explain the link. Data on income distribution by country also shows important variation, ranging from 0.625 (Brazil) to 0.44 (Uruguay) according to last figures from ECLAC (2003). Growth rates are also considerable different between countries. So data exhibits enough variation to pose the question whether there is a common relationship between inequality and growth in the region. Moreover, the availability of panel data for the region is crucial to understand this phenomenon, in the light of recent controversies on empirical evidence reported in the previous section. This section briefly presents the main facts that arise when considering the economic situation of Latin America during the last four decades: high levels of inequality and a lack of dynamic growth performance.

7 A chart summarizing empirical findings is presented in Annex 2.

Growth performance has been considerably divergent in different regions of the world during the last decades. There is a consensus about the disappointing growth performance of Latin American countries from 1960 on (De Gregorio and Lee, 2000; Loayza *et al.,* 2002)[8]. Average growth rates in the region have been lower than the world ones for the whole period up to 1990, but clearly the eighties were particularly bad years. The "lost decade" deepened the gap between the region and the developed world; only two countries in the region (Colombia and Chile) were able to reach positive growth rates. Even when economic growth became positive during the nineties, it did not recover the levels prior to the debt crises.

Inequality is probably the strongest feature of Latin America as a region; it permeates several dimensions of economic and social life.

The study of inequality in Latin America from 1960 on faces an important problem related to data, as no systematic statistics existed for many countries up to the 70s. This section summarizes the evolution of inequality in the region and considers its different dimensions based on existing research[9]. Table 2 presents the evolution of the Gini coefficient on income for different regions of the world.

The region's relative disadvantage is present since data has been available, Latin America is the most unequal region in the world[10]. Londoño and Székely (1997) point out that not only does Latin America have the highest inequality level in absolute terms, but that it is much higher than expected given the level of development of the region. They estimate the "excess inequality" and argue that, in 1995, the region registered a Gini coefficient that was 25% higher than what one would expect given its GDP per capita. This estimation may be subject to criticism, as it implicitly assumes the existence of some kind of Kuznets relationship; nevertheless it is illustrative of the regional situation. Londoño and Székely interpret poverty in the region, to a large extent, as a distributive problem.

Székely and Londoño (1998) point out that, on aggregate terms, macroeconomic expansion during the 70s took place jointly with an

8 Some authors even point out that a misleading optimistic view about the region prior to the debt crisis (1982) can be obtained when considering weighted averaged growth rates, because among the best performers were the biggest countries of the region, Mexico and Brazil, which explain 25 and 30% of regional GDP respectively.

9 This section is based on Gasparini (2003), Justino, Litchfield and Whitehead (2003), Londoño y Székely (1997), Londoño y Székely (2000), Székely y Hilgert (1999).

10 Szekely and Hilgert (1999) argue that Latin American household surveys severely underestimate inequality because they do not include information on the richest sectors of society. But even with these failures, they argue that inequality in the region is mainly the consequence of income concentration among the top deciles.

improvement in income distribution. Apparently this decade was characterized by an expansion of the incomes of the poor and the middle classes at the expense of the richest population. Several countries in the region experienced equalizing changes (Mexico, Colombia, Peru and Venezuela among others) while others showed stable distributions. Only in the southern cone (Argentina, Chile and Uruguay) inequality increased during the seventies (Gasparini, 2003).

The eighties were a lost decade not only in terms of growth, but also in terms of equality. Most countries increased their income inequality, and this is mainly explained by higher concentration in the top decile, according to Londoño y Szekely (2000).

After carefully analysing a set of household surveys for different Latin American countries, Székely (2001) argue that there is no country in the region where income inequality improved during the nineties, despite the moderate economic growth. The increasing trend that inequality showed during the 80s continues in the 90s, although the authors point out that there seems to be a slight deceleration in deterioration. Lack of improvement on distributional aspects during the nineties is attributed to the fact that individuals located at the lower tail of the distribution do not seem to have benefited from growth to the same extent as other sectors of the population. Gasparini (2003) somehow disagrees with Szekely (2001), as he points out that this study overlooked the two most relevant distributional changes in the region: the large increase in inequality in Argentina and the distributional improvement in Brazil. Decrease in Brazil's inequality was small and did not change its position as the most unequal country in the region. The author also states that, if instead of considering simple averages, a population weighted average Gini coefficient was computed for the region during the nineties, it would show a small decrease because of the positive performance of Brazil and Mexico and the stability of Colombia, the three most populated countries in the region. Analysis of inequality during the whole period shows that both the level and the change of overall inequality are mainly due to differences within rather than across countries. A slow convergence in per capita income has occurred among countries in the region, so the increase in inequality is due to disequalizing changes in the income distributions within countries. The author stresses that less unequal countries have performed worse on average than more unequal ones. While inequality increased in Argentina, Uruguay and Venezuela, which are economies with low levels of inequality, it has not changed or even become more equal in Brazil, Colombia, Mexico and Panama. The standard deviation for the distribution of the Gini coefficients in the region fell substantially in the last decade, from 6.1 to 4.6. This implies that the region has become even more homogenous in distributional terms.

1.3.2 Other dimensions of inequality

Income inequality is just one aspect of inequality. Social, cultural and political aspects do also play an important role in the region. Justino, Litchfield and Whitehead (2003) analyse the multidimensional aspects of inequality, pointing out the importance of inequality in employment conditions, access to land and physical assets, use and access to social services and access to political power in the region. With regards to health care, education and social security benefits, inequalities are determined not only by the access, but also by the quality of these services. These inequalities are mainly dysfunctional[11] and arise as a consequence of political connections, inherited wealth and power and discriminatory acts. The authors also argue that race and ethnicity are among the most important correlates of inequality in Latin America. With regards to political inequalities they point out that, despite an appearance of pluralism and even ideological discord, dominant elites concentrate political power, and this is accentuated by the low organisational capacity of poorer groups. Justino and Acharya (2003) point out that social and political policy decisions are most of the times determined by the interests of elites. Following Frances Stewart's work, they emphasize the importance of focusing on groups, rather than on individuals, to understand inequality, as they argue that the group dimension of inequality is very high in Latin America.

The importance of asset inequality for the region, and its potential effects on economic growth have also been analysed in Birdsall and Londoño (1997). They find that higher initial income inequality is negatively associated with long-term growth, but once that variables measuring initial asset inequality (land distribution and human capital) are included, income inequality itself is no longer statistically significant. So, according to these authors, what really matters is asset distribution in the region.

Gasparini (2003) analyses non-income measures of inequality, including health status, crime victimization, political influence and access to basic services. He stresses that in health status, the region is highly unequal by international standards, and probably the same happens with political influence, although information is weaker in this area. Cunningham *et al* (2003) find that educational attainment is unequal by race and gender. Accordingly, wage differentials between racial and ethnic groups are driven more by productivity related characteristics than by differences in the returns to those characteristics. Two characteristics are most responsible for the wage gap: inequality in education and racial and ethnic disparities in urban-rural residence. Nevertheless, national wage inequality is mostly explained by within group differences, instead of between group ones.

11 They consider as dysfunctional inequalities those that do not arise as a result of rewards to risk taking, enterprise, skill acquisition and saving but as a consequence of lack of opportunities and social and political exclusion.

Justino and Acharya (2003) argue that the tax system, unequal initial opportunities and various forms of discrimination are among the factors that determine high and persistent inequality in the region, so regional inequality is mainly dysfunctional. The prevalence of regressive tax systems is related to the existence of weak governments influenced by elites. Macroeconomic crises and high inflation also explain the weakness of the tax systems in the region. The importance of unequal initial opportunities is illustrated by the fact that returns to higher education have been very high for a long time. This reveals the relative scarcity of human capital and suggests that the acquisition of human capital may be closely related to family and community connections. The authors quote different research pointing to a high intergenerational transmission of inequality in Latin America. Neighbourhood effects tend to reinforce these mechanisms. The authors also suggest that discrimination, especially against indigenous people, may explain inequalities between different groups. The persistence of high inequality is related, according to these authors, to the fact that inequality is considered undesirable but politically tolerable. Civil society in the region has been concerned about other issues other than redistribution, mainly security and fiscal stabilization.

1.3.3 The role of institutions

The importance of economic and political institutions to understand the persistence of high regional inequality has been stressed in a number of recent papers (Engerman and Sokoloff, 2002; Acemoglu and Robinson, 2002). With a historical perspective, Sokoloff and Engerman (2000) compare the evolution of European colonies in North and South America. Whereas in the beginning North America was of relatively marginal economic interest when compared to the Caribbean and Latin America, nowadays it is clear that US and Canada have proved to be far more successful in economic terms. Traditional explanations for these facts have highlighted differences in the security of property rights, levels of corruption, structures of the financial sector, investment in public infrastructure and social capital, and even the inclination to work hard or be entrepreneurial. But the evidence of wide disparities among economies of the same European heritage led scholars to explore the role of factor endowments in the consolidation of paths of economic and institutional development. Although the role of factor endowments has been previously stressed, thise new vision emphasizes how the different environments of the European colonies may have led to societies with different levels of inequality, stressing the evolution of institutions that consolidated this inequality. Departing from previous explanations that emphasize the importance of exogenous differences in religion or national heritage in the formation of institutions, they suggest that initial conditions could have had a significant impact on long run paths of institutional and economic development.

Economies of scale in the production of sugar and other crops, jointly with their intense use of slave labor supply, led to an extremely unequal distribution of wealth and human capital in countries dedicated to this type of production (Cuba, Barbados, Jamaica and Brazil). This determined the evolution of institutions that protected the privileges of the elites and restricted opportunities of participating in the commercial economy for the major part of the population, even after the abolition of slavery. Other categories of colonies are the ones rich in mineral resources (like Mexico and Peru), where natives survived the contact with colonizers. In this case elite families acted as representatives of the Spanish government, and their power was protected by restrictive immigration policies applied by Spain to their colonies. The third group of colonies is integrated by the actual United States and Canada. They did not have a substantial population of natives nor a comparative advantage in the production of crops, so their development was based on workers of European descent who had relatively high and similar levels of human capital. The abundance of land and low capital requirements made it possible for adult men to operate as independent proprietors.

These initial conditions in the distribution of wealth and power were reproduced by government policies and other institutions that developed in the colonies. The authors argue that elites in societies which began with greater inequality were able to influence the choice of legal and economic institutions in their favor.[12] Such biases in the path of institutional development may explain the persistence of inequality in the long run in Latin America.

1.3.4 Structural reforms and their impact on income inequality

The impact of structural reforms on inequality has also generated debate. Many researchers have tried to assess the impact of different reforms on inequality. This section summarizes some of the results.

Morley (2001) presents the expected results of reforms on theoretical grounds. The effects of trade openness on inequality have been widely discussed in economic theory. The liberalization of the capital account integrates the local and international capital markets, bringing local interest and profit rates closer to world ones. If this induces an inflow of foreign capital, the distributional effects are ambiguous. Wage to profit ratios should rise because of the rise in capital to labor ratio, so a potential progressive effect can be found. But if capital and skilled labor are complementary, the skill differential will rise, with a regressive effect. The behavior of domestic owners of capital also counts. If the demand for foreign exchange was excessive under capital controls, reforms should cause a capital outflow with the opposite results. Besides, opening the capital account

12 In this regard, they examine the institution of public primary schools, which was widely developed in North American since colonial times. They also analyse the role of land ownership and the extension of the franchise.

shifts the balance of power in favor of capital holders, as both government and labor are forced to accept arrangements favorable to capital owners in order to attract foreign capital. Financial reforms are supposed to increase private savings and investment, with a progressive result, although the distributional effect is probably small. Tax reforms shifted the tax burden away from the wealthy and towards the middle and lower classes, with a regressive effect. Finally, the expected impacts of privatizations are ambiguous, as they depend on three aspects. First, if the sales price of the assets of the state owned enterprises is less than their true market price, there is a transfer from taxpayers to buyers. Second, the effect on costumers depends on the previous situation. If publicly owned utilities subsidized their customers by selling below costs, the elimination of the subsidy could have progressive or regressive effects depending on who the customers were. The third effect is the impact on labor demand and employment. As employment in public enterprises followed frequently political objectives, privatization implied job destruction. Morley (2001) suggests that privatization is likely to have mainly hurt the middle class, which represented both the main users of subsidized services and their main employees.

Based on an econometric estimation of the predictive power of the reform indexes over changes in inequality, Morley (2001) concludes that in the aggregate, reforms seem to have a regressive effect on distribution, but the effect is small and marginally significant. This result hides the fact that different reforms had different effects on inequality. He finds that trade reform has no significant effects, tax reform is unambiguously regressive (shifting the tax burden away from the rich), and opening the capital account is unambiguously progressive. These last two results are, in his opinion, the more robust.

Berry (1998), based on the study of nine countries in the region, concludes that in every case except for Costa Rica and Colombia, reforms took part jointly with an increase in inequality. Contrary to the expectation, trade reform did not narrow wage differentials, but these were increased in the period, suggesting that the region's comparative advantage is not in unskilled labor.

Behrman, Birdsall and Szekely (2001) analyze the effects of trade and financial liberalization on poverty and income inequality. They use the reform indexes proposed by Lora (1997) and rely on first-difference econometric estimations to test the impact of reforms. They also construct different inequality measures apart from the Gini coefficient, using micro-data for a wide set of countries. They find that financial liberalization seems to have positively affected inequality (meaning an increase in inequality), whereas commercial liberalization does not seem to have a significant effect. They also find that the other reforms (tax reform, international financial liberalization, and privatization) do not seem to have affected income inequality in the region, but volatility and inflation do affect inequality positively. They also argue that trade liberalization seems to have multiple effects with different signs, that tend to

cancel out on the aggregate. Financial liberalization implies greater capital inflow, and is therefore associated with a decline in the price of capital, which is relatively scarce in the region. If capital and skilled labor are complementary factors, this reduction in the price of capital generates higher demand for skilled labor, and this causes the increase in inequality.

Spilimbergo, Londoño and Szekely (1999) and Londoño (2002) explore the relationship between inequality and trade openness. They find that, empirically, there is not a close link between these variables; differences in trade openness only explain a minor part of the change in inequality. Nevertheless, inequality seems to be closely related to geographical factors. They find that trade openness is associated with higher inequality, for given factor endowments, but the effect depends on the relative abundance of each type of factor. Inequality increases in countries well endowed with skills and declines in countries abundant in physical capital and land. The effect of opening on inequality in the region is modest, as Latin America does not have a high level of unskilled labour relative to the world. Londoño (2002) concludes that inequality in the region is associated, not with trade openness, but with the slow accumulation of capital (human and physical) in relation with the world.

1.4 Empirical evidence on the relationship between inequality and growth in Latin America

Low growth performance combined with high levels of inequality has implied that the region was not able to reduce poverty significantly. On these grounds, inequality has been identified as a major problem for Latin American countries. The re-discussion of the theoretical relationship between economic growth and inequality, and the new empirical evidence on these issues, have generated new interest in the role of economic inequality, questioning the economic wisdom of continued high levels of inequality in the region (De Janvry and Sadoulet, 2000). This section reviews existing empirical evidence on the relationship between inequality and growth in the region, and presents new empirical evidence based on a panel data base for 1960-2000.

1.4.1 Previous evidence

A number of papers that analyze the role of economic growth and inequality with a long-run perspective found that poverty and inequality have been closely linked to the economic cycle in the region, rising during recessions and falling during recoveries (Psacharopoulos *et al.*, 1993; Iglesias, 1998). Considering only the last two decades, Székely and Londoño (1998) found that inequality increased in the eighties, during recession, and went on increasing during the nineties, when economic growth took place. This suggests that the pro-cyclical pattern may have been broken during recent years.

Research on the theoretical links between inequality and growth is not abundant. Most studies analyze changes in GDP per capita and changes in inequality across countries, looking for correlation as evidence of a relationship. Most research considers changes in poverty and inequality during globally defined historical periods broadly associated with growth or recession, without considering countries idiosyncratic phases of growth and recession. An exception can be found in DeJanvry *et al* (2000), who carry out a detailed analysis of episodes of growth and recession specific to each country in the region. They define 48 spells in twelve countries, classified into three groups according to Gross National Income per capita growth (GNI pc): early growth (spells with positive GNI pc before reforms), recession (spells with negative GNI pc) and late growth (spells with positive GNI pc originated after the reforms). Their results indicate that growth only reduces urban poverty if the initial levels of inequality and poverty are not too high. They also find that there is an asymmetry in the effect of changes in income on poverty, and this may lead to misleading conclusions since the overall relation between income and poverty is principally obtained through spells of recessions . Another important result refers to the relationship between inequality and growth: growth was always ineffective in reducing inequality, both under early and late growth. They also find that the services sector has been crucial in reducing both urban and rural poverty. They stress the need to attack inequality through direct policies, as growth alone might not be able to reduce inequality.

Previous studies that use econometric models to estimate the relationship between income or growth as independent variables and inequality as dependent variable are scarce. Morley (2001) estimates the following equation:

$$Gini_{it} = a_i + b_i Y_{it} + c_i / Y_{it} + d_i Z_{it} + e_i R_{it} + f_i S_i + G_i T_i Y_{it} + h_i T + \varepsilon_{it}$$

where i denotes country, t denotes year, a is a regression constant which may vary across countries, Y is income, Z is a vector of variables such as inflation, land distribution and education, R is an index of reform, S is a vector of dummies which reflect various sample characteristics, T is a trend variable. He estimates this Kuznets equation under alternative specifications: fixed effects, random effects, urban and nationwide samples and so on. The general model explains between 85 and 97% of the total variance of Gini over time and across countries. The coefficients on income and its inverse are negative and significant in the fixed effects specifications, indicating that there is a stable and identifiable relation between income and inequality in the region, displaying the inverted-U shape. The hypothesis of a single Kuznets curve common to different countries is rejected.

He also finds that a high percentage of workers with primary school have a large and regressive effect on the distribution, and that increasing the share of university graduates in the adult population is progressive. The effect of expanding university education is lower than that of reducing the size of the group with primary education, suggesting that a bigger distributional impact is

obtained by spending in reducing the size of the group with low education. The estimations also show that high inflation is regressive, and that sample characteristics have a significant effect on the level of the Kuznets curve.

Morley also finds that reforms have had, on aggregate, a small regressive effect, but the effect of each component is different. Trade reform was regressive; whereas opening the capital account has been progressive (capital inflow produces lower profit rates and increases the demand for labour, causing a progressive effect). Tax reforms were regressive as they shifted the tax burden away from the rich. Another finding from this research is that the Kuznets curves for the high income countries tend to get flatter over time, and the low income curves are getting steeper, meaning that growth is getting less and less progressive. The author suggests that the impact of growth on inequality is likely to be more regressive in the futures, indicating the need to undertake specific policies. Finally, Morley (2001) estimates the same regression using as dependent variable the change in the Gini coefficient, finding that changes in inequality are negatively related to changes in income. So inequality falls during recovery and rises during recessions.

García and Furquim (2001) evaluate the relationship between income inequality and economic growth in Latin America, based on a 13 country panel, from 1970 to 1995. They estimate an equation for per capita product, relating it to the savings rate, the demographic growth rate, the technological innovation rate and the depreciation rate, and adding the Gini index. The coefficient for the Gini index is positive and significant at 5%, showing that, according to the author's words, for the sample of Latin American countries, higher concentration of income allows a larger per capita income. They also estimate a traditional growth equation, under the following procedure: first they estimate the convergence equation, without human capital. Then they add average schooling, and finally, they add the inequality index. They find that the coefficient associated to inequality is positive: income inequality has positively affected the rate of economic growth of the sample countries. According to their estimates, a 0.10 increase in the Gini index (from 0.4 to 0.5, for example) is associated with a very high growth rate of per capita income for the countries of this sample: 15.6% in five years. In a later paper, García, Bandeira and Furquim (2002) present a growth model where economic reforms promote capital effectiveness, increasing both growth and income inequality as effective capital productivity grows faster than labour effectiveness. They find that positive and significant inequality coefficients on income and growth equations become insignificant when economic reform indices are included. According to the authors, this suggests that there is no direct "causal" relation between inequality and growth; economic reforms would be the proper mechanism which explains both growth and inequality trends.

The short review presented in the above paragraphs indicates that there is no strong evidence about the relationship between income inequality and economic

growth. Evidence on this relationship is contradictory and moreover, research on the potential links between inequality and growth seems to be at a very early stage.

1.4.2 Methodology

Until the development of panel data methods, growth equations were traditionally estimated using cross-country data sets, based on an equation like the following:

$$y_{it} - y_{it-1} = \alpha + \delta y_{it-1} + \beta X_{it-1} + \varepsilon_{it} \quad (1)$$

where y_{it} denotes the logarithm of per capita GDP, and is included as a lagged variable on the right hand side (convergence hypothesis) and X_{it-1} denotes a vector of country specific time varying variables that affect growth. Under the assumption that the error term is independent of the explanatory variables, this equation was commonly estimated by Ordinary Least Squares (OLS). But the disturbance term captures the effect of unobserved time invariant and time variant country characteristics, so it can be decomposed in a country specific time-invariant effect, u_i, and a time variant disturbance, e_{it}.

$$\varepsilon_{it} = u_i + e_{it} \quad (2)$$

Equation (1) can be re-written as:

$$y_{it} - y_{it-1} = \alpha + \delta y_{it-1} + \beta X_{it-1} + u_i + e_{it} \quad (3)$$

so the estimation of the parameters of (1) by Ordinary Least Squares (OLS) will be biased and inconsistent as the term u_i, which accounts for unobserved country specific factors that both drive growth and are potentially correlated to the explanatory variables is not considered in (1). This problem is named as omitted variable bias. Either first differencing or the inclusion of fixed country effects will eliminate the bias that arises from time-invariant but country-dependent omitted variables, and indeed constitutes the main reason for using one of these techniques.[13]

Fixed effects estimates are calculated from differences within each country across time. A traditional formulation implies the inclusion of dummies that represent time invariant country omitted variables (u_i) and estimating the equation by OLS. This method is known as Least Square Dummy Variable Approach (LSDV).

If, instead of assuming (2), we consider that the regression model given by (1) has a two-way error component disturbance, that is the disturbance term is

13 This methodology does not completely eliminate omitted variable bias, as it does not control for omitted variables that change over time, but it improves cross-country estimations.

formed by unobservable country effects μ_i, unobservable time effects λ_t, and a remainder stochastic disturbance term e_{it}, we have:

$$\varepsilon_{it} = \mu_i + \lambda_t + e_{it} \tag{4}$$

In this formulation, λ_t is country invariant and accounts for any time-specific effect that is not included in the regression. If μ_i and λ_t are assumed to be fixed parameters to be estimated and the remainder disturbances are stochastic with e_{it} ~ IID (0, σ^2), then we have the two way fixed effects error component model. In this way, under the assumption that all regressors are independent of e_{it} for all i and t and that $e_{it}s$ are not autocorrelated, the following equation can be estimated by OLS:

$$y_{it} - y_{it-1} = \alpha + \delta y_{it-1} + \beta X_{it-1} + \mu_i + \lambda_t + e_{it} \tag{5}$$

This fixed effects model suffers from a large loss of degrees of freedom because of the inclusion of time and country dummies. The effects of time invariant and individual invariant variables are not estimated.

The loss of degrees of freedom of fixed effects models can be avoided if the μ_i can be assumed random. In this case, μ_i ~ IID (0, σ^2) and e_{it} ~ IID (0, σ^2), and the μ_i are independent of the e_{it}, for all i and t. Additionally, the X_{it} are independent of the μ_i and ε_{it} for all i and t. In this case, the model is estimated by Generalized Least Squares (GLS). Random effects are consistent only if the country-specific effects are uncorrelated with other explanatory variables.

The issue of whether to use fixed or random effects, specially in growth equations, has generated debate. Some authors argue that individual effects should always be treated as random, but on the other hand there is no justification for treating the individual effects as uncorrelated with the other regressors, as assumed in the random effects model.

Probably, the question of whether to use fixed or random effects is particularly relevant in growth equations if the number of countries in the panel is large relative to the time dimension of the panel, as the inclusion of dummy variables reduces the degrees of freedom. This argument could favour the random effects model, but it must be kept in mind that it is very likely that country-specific characterstics are correlated with other variables if country effects represent omitted variables. This has led many authors to prefer the fixed effects model. In our case, where a non-aleatory sample of countries is included, it seems more appropriate to consider fixed effects by countries when choosing between this two alternatives. If we believed that our sample cross sectional units were drawn from a large population, it would be reasonable to prefer the modelization of individual or country specific constant terms as ranomly distributed across cross sectional units. Nevertheless, we report different estimations but prefer the fixed over the random effects model.

The estimation of (5) using panel data methods does not solve all the problems, as it may present two kinds of econometric problems. First of all, the

underlying relationship is dynamic in nature, and is characterized by the presence of a lagged dependent variable among the regressors. If the error terms are autocorrelated this may lead to important biases in the coefficient of the lagged variable which will then be automatically correlated with the error terms.

The second problem is the presence of endogenous regressors, due to the problem of reverse causation. In our case, for example, we can not discard that growth rates do not determine inequality. The assumption of strict exogeneity may lead to biases and inconsistency even in the panel data estimatons. Another potential source of persistence over time is the presense of heterogeneity among individuals.

Several solutions have been proposed for this problem, usually using GMM methods (Arellano and Bond, 1991; Arellano and Bover, 1995). The most extended is Arellano and Bond (1991), that suggests an alternative estimation technique that corrects for the bias introduced by the lagged endogenous variable and permits a certain degree of endogeneity of the other regressors. It is based on the Generalized Method of Moments (GMM) where all variables are considered in first differences to eliminate the country specific effect, and all possible lagged values of each of the variable are used as instruments. The basic idea is to write the regression equation as a dynamic panel data model, take first differences to remove unobserved time invariant country specific effects, and then instrument the right hand side variables in the first differenced equations using levels of the series lagged two periods or more, under the assumption that the time-varying disturbances in the original levels equations are not serially correlated. The method is known as first differenced generalized method of moments.[14]

Two assumptions must be satisfied in order for this estimator to be consistent and efficient. The first assumption is that the error terms are serially uncorrelated, that is $E(\varepsilon_{it}, \varepsilon_{is}) = 0$ for $t \neq s$. The second assumption implies that x are weakly exogenous, that is $E(x_{it}, \varepsilon_{is}) \neq 0$ for all $s \leq t$, and zero otherwise. Then lagged values of x can be used as instruments. We also report results using this econometric technique.

The estimations presented in this paper are based on panel data covering a wide range of variables, including income inequality, for Latin American countries in the period 1960-2000. Economic variables (GDP per capita, exports/GDP, etc.) come from the World Development Indicators, World Bank. Data on income inequality stem from the World Income Inequality Dataset,

14 Another solution proposed to deal with lagged endogenous variable bias is the correction proposed by Kiviet (1995). He developed a corrected within estimator that substracts a consistent estimator of this bias from the original within estimator, assuming serially uncorrelated disturbances and strongly exogenous regressors.

UNDP. Data on schooling is taken from the Barro-Lee data set. The data contains periods of five years.

1.4.3 Results: Kuznets curve

Equations (6) and (7) were estimated in order to assess whether the level of income and inequality are related, in the fashion proposed by Kuznets. As mentioned, one of the most common criticisms to cross-countries estimations of Kuznets curves is that results can be driven by the choice of the sample. Especifically, the inclusion of Latin American countries, mainly middle income countries with high levels of inequality, may yield the inverse U shaped result, as suggested by the loss of significance of the estimation when including dummy variables to distinguish Latin American countries in world wide data sets. The two more common specifications of the Kuznets curve (using income and its quadratic expression, or alternatively using income and its inverse) are as follows:

$$Gini_{it} = \alpha_i + \beta_i * Y_{it} + \phi_i * (1/Y_{it}) + \delta_i * Z_{it} + \varepsilon_{it} \quad (6)$$

$$Gini_{it} = \alpha_i + \beta_i * Y_{it} + \phi_i * Y_{it}^2 + \delta_i * Z_{it} + \varepsilon_{it} \quad (7)$$

There are different possibilities that can be tested:

i) if a Kuznets curve holds with equality of coefficients across all countries ($\alpha_i=\alpha$; $\beta_i=\beta$; $\delta_i=\delta$).

ii) if countries differ from each other by some structural parameter, but once it is controlled for, they exhibit a universal Kuznets curve ($\beta_i=\beta$; $\delta_i=\delta$).

The first of these possibilities, i.e. the estimation of the Kuznets curve based on cross sectional data, does not yield significant results. Estimations using fixed effects panel data show the existence of a Kuznets curve, using the two more common specifications (income and its quadratic expression, income and its inverse). Results indicate that around 65% of total variance of inequality over time and across countries is explained by the included variables. The F value for the hypothesis of fixed effect being zero allows rejection, suggesting that country effects are essential in the link between income and inequality. These results coincide with previous evidence on the existence of a Kuznets type relationship (Morley, 2001; Furquim and García, 2001).

For the second specification, the estimation indicates that the relationship between inequality and income is positive for values of GDP per capita below 3,526 (1985 US dollars). The following chart presents those countries and periods above that threshold, corresponding to a negative relationship between income and inequality. Above the threshold of 3,526 US-$, growth has reduced inequality.

1.4.4 Results: the relationship between growth and inequality

Following the common practice in the literature, we estimated a basic growth regression including as dependent variable the average growth rate of GDP per capita for a five year period. The right hand side variables are GDP per capita (log) in the beginning of the period, exports as a fraction of GDP, and consumption as a fraction of GDP. The Gini coefficient was the independent variable.

The basic regression (1), using pooled OLS estimations, suggests that inequality does not have a significant impact on subsequent growth in our sample, whereas exports do have a positive effect on subsequent growth, and government consumption a negative one. Panel data estimation using random effects (2) yields the same results. The inclusion of fixed effects changes our results regarding inequality, as now the Gini coefficient does have a positive and significant effect on subsequent growth (3), and so helps to understand differences in economic performance among Latin American countries. Again exports have a positive impact on subsequent growth, whereas government consumption exhibits a negative sign. The Hausman test performed to test whether fixed or random effects are more appropriate, suggests that the correct specification corresponds to fixed effects estimation. Finally, estimation using the Arellano-Bond methodology do yield similar results (4), except for the loss of significance of exports. This first evidence is in line with that reported in Forbes (2000) and Li and Zou (1998) for a world data set, as it implies that inequality may have been favorable for subsequent growth in Latin American countries.

These results may have a theoretical foundation, since as Forbes (2000) argues, theoretical papers that predict a positive relationship between inequality and growth (Saint Paul and Verdier, 1993) have received less attention because of the negative sign of the relationship reported by empirical research based on cross sectional data bases.

Nevertheless, in his research for a world data set, Barro finds that the expected coefficient of the Gini variable on the growth rate is zero, so overall differences in Gini coefficients for income inequality have no significant relation with subsequent economic growth. He states that one possible interpretation of this is that the various theoretical effects of inequality on growth are nearly fully offsetting. He also finds that when the effect of the Gini coefficient on economic growth is allowed to depend on the level of economic development the coefficients are jointly and individually significant and the estimated relation implies that the effect of inequality on growth is negative for low values of GDP per capita and positive for higher ones. A possible interpretation of this result involves the idea that credit market constraints would be more serious in poorer countries.

Following Barro's strategy, we included an interaction term between inequality and initial GDP per capita in the fixed effect and GMM estimations[15]. Results change dramatically, the coefficient of inequality changes its sign, suggesting that the level of inequality has a different effect on growth depending on the level of GDP per capita of the countries. For the GMM estimation, inequality and the interaction of inequality and the level of GDP lose significance.

If we believe in fixed effects results, the impact of inequality on growth depends on the initial level of income. For poorer countries, the effect of inequality on growth is negative, whereas for richer ones there is a change in the sign of the coefficient. So even when restricting the sample to Latin American countries, where we have less variance than in a world data set, results found by Barro (2000) seem to hold.

1.4.5 Sensitivity analysis

Many authors have emphasized the need for careful analysis of existing empirical evidence on these topics, as inequality may be measured in an inconsistent manner. In effect, inequality can be measured using gross income, net income or expenditure. As Knowles (2003) points out that lack of comparable data usually leads to the use of mixed data, and this can lead to biased results. As he remarks, when testing different hypotheses about the link between inequality and growth, the definition of the measure of income to include (gross or net) will depend on the hypothesis that we are trying to test. In general terms, when considering data on net distribution of income (that is after tax distribution of income) or distribution of expenditure, it is more appropriate to test whether redistribution has effects on growth. In this research, we tried to construct a consistent data base. For each country, all observations are referred to the same income variable and unit of reference (household or person).

Results do not change with the exclusion of any particular country of the sample, with the exception of Ecuador. The exclusion of this country of the sample does not change the signs of the estimations, but the significance is considerably reduced: the Gini coefficient and the interaction between Gini and the level of GDP are significant only at 80% .

With respect to variables, this kind of regression generally includes some measure of human capital. These variables, alternatively measured as female and male years of schooling at the beginning of the period, average years of schooling of the population, percentage of population with secondary school, etc. do not yield significant results for this sample.

It has also been argued that the potential channels that may link inequality and growth may operate both in the short and in the long run (Forbes, 2000;

15 We followed this strategy only for these two estimation techniques as they seem to be the most suitable for the kind of model we are estimating.

Knowles, 2003), as investment and savings may be affected in short periods of time. Empirical studies that focus on short run correlations find a positive impact of inequality on growth (Forbes, 2000; Li and Zou, 1998). In our case, the initially detected positive impact disappears once the different levels of GDP from countries are taken into account. This result is similar to that found by Barro (1999) for a world data set, although he uses ten-year periods. When ten-year periods are considered for our data, the significance of inequality is lost. Both for the pooled estimation and for the panel estimation using random effects, the impact of inequality is negative in the long run, but not significant. With fixed effects the impact of inequality on long-run growth is positive but not significant, although when the interaction between inequality and GDP is included the sign of inequality reverses (that is becomes negative) but is still not significant. These results suggest that, in any case, the potential impacts of inequality on growth seem to operate in the short run, but are not significant to explain long-run performance of Latin American countries.

These considerations suggest that more research on the robustness of these results should be carried out. Specifically, more efforts in improving the quality of data on income distribution should be made, and tests on the sensitivity of results with respect to the consideration of different measures of inequality should be undertaken. This research sheds some light on the robustness of the results obtained. In that sense, the proposal of Bourguignon (2003) of using microeconomic data for the study of this issue seems promising, as micro simulations techniques may help to understand specific country cases.

1.5 Final comments

The potential link between inequality and economic performance has led economists to focus their attention on distributional aspects, trying to assess the underlying process that relates both variables. Empirical research on this relationship, based on reduced form estimations, is really abundant, going from cross-sectional evidence to more recent research based on panel data techniques. Unfortunately, results are not conclusive at all, and the debate in the empirical literature is open. Whereas most cross-sectional studies find a negative impact of inequality on growth, estimations controlling for country fixed effects suggest that an increase in the level of income inequality in a country may enhance growth in the short and medium run. Finally, some authors suggest that the contradicting results can be explained by the common practice of estimating linear models, when the true relationship might be non-linear.

This paper analyses the relationship between inequality and growth for Latin American countries, using different specifications and econometric techniques. Both fixed effects and GMM estimations suggest a positive impact of inequality on economic growth. But the introduction of an interaction term between the

level of GDP and inequality changes significantly these results. Fixed effect estimation suggests that the level of inequality has a different effect on growth depending on the level of GDP per capita of the countries. For the GMM estimation, inequality and this interaction variable lose significance. These results are not conclusive, but shed light on the need for further research on this issue, testing different specifications and econometric techniques.

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Tables and Figures

Table 1 GDP per capita growth rate

	1961-1970	1971-1980	1981-1990	1991-1999
East Asian and Pacific	2.76	4.52	6.06	5.24
OECD	4.29	2.63	2.50	1.32
Latin America and Caribbean	**2.55**	**3.36**	**-0.80**	**1.39**
Middle East and North Africa	2.83	3.87	0.40	1.28
South Asia	1.74	0.66	3.47	3.00
Sub-Saharan Africa	2.64	0.79	-1.15	-0.62
All countries	3.34	1.90	1.43	0.86

Source: WDI

Table 2 Income distribution (Gini coefficient).

	1960	1965	1970	1975	1980	1985	1990	1995
OECD	0.40	0.37	0.38	0.37	0.36	0.36	0.36	0.37
Latin America and Caribbean	0.52	0.50	0.54	0.54	0.52	0.55	0.55	0.56
North Africa and Middle East	0.50	0.47	0.50	0.49	0.41	0.47	0.39	0.35
Sub-Saharan Africa	0.52	0.51	0.56	0.44	0.42	0.46	0.53	0.45
South Asia	0.39	0.37	0.37	0.38	0.38	0.39	0.36	0.30
East Asia and the Pacific	0.40	0.38	0.36	0.40	0.39	0.40	0.40	0.38
Formerly centrally planned ec.	- . -	0.31	0.28	0.27	0.32	0.31	0.33	0.42

Source: Justino, Litchfield and Whitehead (2003)

Table 3 Kuznets curve. Dependent variable: Gini index. Fixed effects

Specification 1	Coef	T stat	Coef	T stat
GDP p/capita	-0.420	-2,09	-0,39	-1,95
Inv. GDP p/ capita	-25.375	-2,10	-25,53	-2,15
Schooling			-0,01	-2,16
Constant	7.039	2,25	6,85	2,23
Sigma_u	0.086		0.098	
Sigma_e	0.048		0.047	
Rho	0.763		0.812	
Specification 2	Coef	T stat	Coef	T stat
GDP p/capita	0.810	1,92	0,84	2,03
GDP p/capita squared	-0.052	-1,92	-0,05	-1,95
Schooling			-0,01	-2,13
Constant	-2.654	-1,61	-2,86	-1,76
Sigma_u	0.079		0.090	
Sigma_e	0.048		0.047	
Rho	0.726		0.781	

Table 4

	Period
Argentina	1960-2000
Brazil	From 1976 on
Barbados	From 1966 on
Chile	1996-2000
Mexico	From 1981 on
Trinidad and Tobago	From 1976 on
Uruguay	1960-2000
Venezuela	1960-2000

Table 5 Inequality and growth relationship. Dependent variable: GDP pc growth

	OLS		Random		Fixed		GMM	
	Coef.	T stat.	Coef.	T stat.	Coef.	T stat.	Coef.	T stat.
GDP pc initial	0.11	0.25	0.06	0.13	-4.17	-3.52*	-13.04	-4.06*
Gini	**0.02**	**0.57**	**0.03**	**0.70**	**0.09**	**1.91****	**0.09**	**1.85****
Exports	0.03	1.87**	0.04	1.98*	0.06	2.10*	0.05	0.65
Gov. Consump.	-0.22	-3.22*	-0.24	-3.39*	-0.27	-3.03*	-0.28	-2.21*
Constant	1.62	0.37	1.81	0.39	30.96	3.40*	0.67	1.91**
R^2	0.09		0.17		0.28			
Number of observations	118		118		118		75	
Number of countries	22		22		22		21	

*significant at 95%

**significant at 90%

Table 6 Inequality and growth relationship. Dependent variable: GDP pc growth. Fixed effects

	Fixed effects				GMM			
	Coef.	T stat.	Coef.	T stat.	Coef.	T stat.	Coef.	T stat.
GDP pc initial	-4.17	-3.52*	-12.13	-3.18*	-13.04	-4.06*	-16.70	-2.76*
Gini	**0.09**	**1.91****	**-1.22**	**-2.03***	**0.09**	**1.85****	**-0.51**	**-0.48**
Gini*GDP pc initial			**0.17**	**2.19***			**0.08**	**0.56**
Exports	0.06	2.10*	0.06	1.98*	0.0472	0.65	0.05	0.67
Gov. Consump.	-0.27	-3.03*	-0.26	-2.98*	-0.284	-2.21*	-0.29	-2.41*
Consumption	30.96	3.40*	92.48	3.14*	0.672	1.91**	0.65	1.79**

*significant at 95%

**significant at 90%

Table 7 The relationship between inequality and growth for different countries

Positive relationship	Negative relationship
Argentina	Bolivia
Brazil	Colombia
Barbados	Dominican Republic 1960-1980
Colombia 1980-2000	Guatemala 1960-1975
Costa Rica	Guyana
Dominican Republic 1980-2000	Honduras
Ecuador 1975-2000	Nicaragua
Guatemala 1975-2000	Paraguay 1960-1970
Jamaica	Ecuador 1960-1975
México	
Panama	
Peru	
Paraguay 1970-2000	
El Salvador	
Trinidad y Tobago	
Uruguay	
Venezuela	

Table 8 Summary of theoretical links between inequality and growth

CHANNEL	AUTHOR	EFFECT OF INEQ. ON GROWTH	INCLUDE EMPIRICAL TESTS?	COMMENTS
Political economy (median voter theorem and lobby activities)	Alesina and Rodrik (1994)	(-)	Yes (c –s)	Higher ineq. leads to claim for redistribution (political channels). If distortionary taxes are imposed, the result is lower investment and growth. Different models (introduction of utility function and government consumption, or public education to redistribute) lead to positive effect of ineq. on growth.
	Persson and Tabellini (1994)	(-)	Yes (c-s)	
	Saint Paul and Verdier (1993)	(+)	No	
	Li and Zou (1998)	(+)	Yes (p-d)	
Capital market imperfections	Galor and Zeira (1993)	(-)	No	Heritage determines opportunities to invest in hc. Rich and poor families, with imperfect capital markets and indivisibility of investment in hc. Inequality leads to low levels of human capital investments by some agents (leading to segregation in occupations) without any compensating increase in the investment of others, and thus reduces growth.
	Banerjee and Newman (1993)	(-)	No	

CHANNEL	AUTHOR	EFFECT OF INEQ. ON GROWTH	INCLUDE EMPIRICAL TESTS?	COMMENTS
Endogenous fertility	Dahan and Tsiddon (1999)	Ambiguous (parameterisation)	No	Income and substitution effect of higher hc on fertility. Low levels of hc: income effect prevails. A redistribution of human capital would imply an increase in the rate of return to education for poor people, so lower fertility. Higher enrolment rates. Negative relationship between equality and fertility, and a positive one between equality and investment in human capital
	De La Croix and Doepke (2001)	(-)	No	
Socio-political conflict	Alesina and Perotti (1996)	(-)	Yes (c-s)	Income inequality increases social unrest, this instability leads to lower investment (unsecured property rights) and disruption of productive activities, and lower growth
	Benhabib and Rustichini (1996)	(-)	No	
	Keefer and Knack (2000)	(-)	Yes (c-s)	

CHANNEL	AUTHOR	EFFECT OF INEQ. ON GROWTH	INCLUDE EMPIRICAL TESTS?	COMMENTS
Savings	Kaldor (1956)	(+)	No	Inequality leads to higher savings (capitalists or riches save more) and higher growth
	Galor and Moav (2003)	(+) industrial times (-) modern times	No	Growth engine changed. The effect depends on the relative return to human and physical capital. Inequality is good for the accumulation of physical capital, but harmful for the accumulation of human capital.

CHANNEL	AUTHOR	EFFECT OF INEQ. ON GROWTH	INCLUDE EMPIRICAL TESTS?	COMMENTS
Other	Murphy, Shleifer and Vishny (1989)	(-) (internal market)	No	Successful industrialization depends on large internal markets supported by a wide middle class.
	Easterly (2001)	(-) (based on Sokoloff and Engerman 2000)	Yes (c-s)	Commodity endowments predict the middle class share of income and the middle class share predict development (investment in hc).
	Deininger and Olinto (2000)	(-) (asset inequality)	Yes (p-d)	Access to assets is the real determinant of inequality and growth
	Bénabou (1994)	(-) (neigh. effects)	No	Small differences in education, preferences, etc. lead to high degrees of stratification, and consequently persistency in income and education inequality. City stratification can be highly inefficient leading to lower growth.

Table 9 Summary of empirical evidence on the relationship between inequality and growth

	Cross-country	Panel-data
Income (level)-inequality	***Inverted- U*** Adelman and Robinson (1989) Clarke (1995) Fishlow (1995) Bourguignon and Morrison (1990) Jha (1996)	***No pattern*** Fields and Jakubson (1984) Ravallion (1995) Deininger and Squire (1998)
Income (growth)-inequality	***Negative relationship*** Person and Tabellini (1994) Alesina and Rodrik (1994) Alesina and Perotti (1996) Perotti (1996) Keefer and Knack (2000) Birsdall and Londono (1997) (asset inequality) Knowles (2003) (using data on expenditure inequality) ***Not significant or ambiguous*** Knowles (2003) (using data on gross income)	***Positive*** Forbes (2000) Li and Zou (1998) ***Not significant or ambiguous*** Barro (2000) (+ or – depending on GDP level) Banerjee and Dulfo (2000) (non linear) ***Negative*** Deininger and Olinto (2000) (asset inequality) Panniza (1995) (for US areas)

I.2 Growth, Inequality and Poverty: Some Empirical Evidence from Minas Gerais State, Brazil

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2.1 Introduction

The Brazilian economy has one of the highest income inequality indices in the world. According to Paes de Barros et al (2000), in Brazil, the average income of the richest 10% of the population is 28 times higher than that of the poorest 40%. For comparison, in Argentina it is 10 times, in Costa Rica 13 times and in France 5 times higher. Brazilian growth did not benefit all classes, and inequality has been increasing since the 60s. While the richest 10% earn 48% of total income, the poorest 10% earn just 0.8%.

The inequality problem is also evident in the Brazilian regional income analysis. Minas Gerais is a rich and dynamic state with 300,000 km^2 divided into 10 different regions, 66 microregions and 853 towns. It is located in the developed southeast part of the country and is responsible for 10% of Brazilian GDP. As with the rest of Brazil, its dual economy exhibits both prosperity and poverty, as well as social and economic heterogeneity.

This paper empirically analyses economic growth and income inequality in Minas Gerais towns and microregions from 1970 to 2000 using the income convergence hypothesis. Convergence tests such as Barro and Sala-i-Martin (1992), σ-convergence, Drennan & Lobo (1999) and Quah (1993) are performed, and the role of human capital in growth is analysed for the 66 microregions of Minas Gerais. A comparison is also made between very rich regions and very poor regions of this state to study the relationship between regional inequality and poverty.

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Previous research has shown that regional inequality is a reality in Minas Gerais as a whole, a state comprising both rich and poor regions. The σ-convergence test, however, shows little income convergence and inequality reduction over the past 30 years.

A negative and highly significant relation between initial income and the rate of income growth during the period analysed is obtained in most estimated equations, whether the data sample is related to the 10 regions of Minas Gerais or its 853 towns. This suggests that, in general, poorer regions and towns grew more than the richer ones in the past decades. With respect to Minas Gerais' 66 microregions, the results are mixed.

Further analyses have confirmed that conditional convergence seems to prevail, since proxies of human capital played an important role in Minas Gerais' income convergence and growth. Quah and Drennan and Lobo tests suggested that the regional economies of Minas Gerais tend toward different steady states. A significant number of microregions and towns tend to stay at low income levels in the long run. Public policies are needed that focus on poor and very poor regions, microregions, and towns showing low growth behavior such as the Jequitinhonha/Mucuri region and Januária and Araçuai counties.

In the following, we present an overall view of the state of Minas Gerais. Section 3 contains the theoretical models and the analytical procedures. Section 4 presents the results and Section 5 concludes.

2.2 Overall View of Minas Gerais State

Minas Gerais has 10 planning regions, 66 microregions and 853 towns, with a high rate of production, income, and population concentration. According to Fundação João Pinheiro (FJP, 2001), in 1999, the Central and Sul de Minas regions were responsible for 58.5% of Minas Gerais GDP. 110 towns were responsible for 79.6% of production, and the other 743 for 20.4%.

The Central region, where the capital Belo Horizonte is located, presents the highest *per capita* production, industrialization and income rates, as well as the highest number of rich towns, opposed to the Jequitinhonha/Mucuri and Norte de Minas regions, which have the worst income, productivity, population, schooling, and health indicators.

With respect to population, the state average is 30.1 residents/km², while the Central region has 76.8 residents/km² and the Noroeste de Minas region has only 5.3 residents/km².

In 1999, average *per capita* GDP was around R$4,904.58, being R$6,408.49 in the Central region and R$1,735.73 in the Jequitinhonha/Mucuri region.

With respect to regional production, the Central region has the highest GDP (R$39,471,814,000.00), corresponding to 45.6% of total state production, while

Jequitinhonha/Mucuri has only R$1,695,927,000.00, and Noroeste de Minas R$1,631,627,000.00, which corresponds to 1.9% and 2.0% of total production, respectively.

Sourced data from Fundação João Pinheiro reveals a huge income inequality among the 66 Minas Gerais microregions in 2000. While the poorest microregion, Araçuaí, had a *per capita* GDP of R$1,486.98, the richest microregion, Ipatinga, had a *per capita* GDP of R$11,414.05, more than 7 times higher than Araçuai.

For Minas Gerais towns, the *per capita* income inequality is much worse, with Chapada do Norte having a *per capita* GDP of only R$758.01, while Umburatiba has R$68,576.50, which is 90 times higher than Chapada do Norte *per capita* GDP.

The huge income inequality between planning regions, counties and towns in Minas Gerais motivated this paper. The intention here is to see if there is any trend towards increasing or diminishing disparity and whether growth does in fact contribute to decreasing this inequality. Most of the previous research on this topic found a slight and slow reduction of income inequality in Minas Gerais, but at a level incapable of exerting a positive impact on all counties and regions.

2.3 Theoretical and Empirical Models

2.3.1 β-Convergence Tests (Barro e Sala-i-Martin, 1992)

In analyses with cross-sectional data, the β-convergence hypothesis is traditionally tested by a simple linear regression model where the *per capita* income growth rate is estimated as a function of the initial *per capita* income of the region using the Ordinary Least Squares method. The basic equation used is expressed by:

$$\frac{1}{T}\ln\left(\frac{y_{i,T}}{y_{i,0}}\right) = \beta_1 + \beta_2 \ln\left(y_{i,0}\right) + \mu_i \qquad (1)$$

where $y_{i,0}$ and $y_{i,T}$ represent the *per capita* incomes of the initial and final periods, respectively; T corresponds to the number of years between the initial and final periods of the sample observation; and μ_i is the random error.

The left-hand side of equation (1) refers to the *per capita* income growth rate. A negative correlation between the growth rate and the initial *per capita* income ($\beta_2<0$) indicates that there is absolute β-convergence[1].

One of the problems with the absolute β-convergence test is that regression (1) assumes that all the geographic units under analysis have the same level of *per capita* income in steady state, and that the differences observed in the current levels of *per capita* income are due only to short-term deviations in the regions' stock of *per capita* physical capital compared to a steady state. However, the regions may exhibit differences in human capital and other geographic, structural, and institutional characteristics that affect the income levels in the steady state. Consequently the estimates of equation (1) are biased due to the omission of relevant variables to explain the regional growth rates.

When equation (1) is modified to include other regional characteristics important in the economic growth dynamics, absolute β-convergence gives way to conditional β-convergence. This hypothesis states that each region has its own level of *per capita* income in the steady state, determined by its peculiarities in terms of preferences and technologies, and that the *per capita* income of a region tends to grow more quickly the further it is from its level of steady state. Equation (2) is the base for the conditional β-convergence test:

$$\frac{1}{T}\ln\left(\frac{y_{i,T}}{y_{i,0}}\right) = \beta_1 + \beta_2 \ln\left(y_{i,0}\right) + \delta X + \mu_i \qquad (2)$$

where X represents a vector of regional variables, such as the stock of human capital and other geographic, structural, and institutional characteristics. These variables are generally included in the value of initial income at the start of the sampling periods.

Conditional β-convergence is indicated by a negative ratio between the *per capita* income growth rate and its initial value ($\beta_2<0$) after controlling for regional differences in terms of the variables included in X (with $\delta\neq0$). It is emphasized that the occurrence of conditional β-convergence does not mean that the regional inequalities in terms of *per capita* income are diminishing or that they tend to disappear over time (Sala-i-Martin, 1996). On the contrary, it means that the economies tend toward equilibrium in the long term where, because they present different steady states, the regional disparities will persist. Regions with a low stock of human capital, for example, should present a low level of *per capita* income in the steady state compared to the regions with a high stock of human capital.

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1 The convergence speed (β) is obtained from the expression. Therefore the $\beta_2 = 1 - \frac{e^{-\beta T}}{T}$ calculated in this way should be interpreted as an approximation, because the relationship between β_2 and β is not linear.

2.3.2 σ-Convergence Test

σ-convergence consists of observing the dispersion of the GDP per inhabitant in the towns in each group in successive years. The sufficient condition for σ -convergence is that a fall is detected in this dispersion. σ -convergence can be tested by the coefficient of variation analysis (CV), given by the ratio between the standard deviation and the arithmetic mean of the GDP per inhabitant of the towns. Zero values for CV mean perfect equality in the income distribution among the microregions or towns.

2.3.3 Drennan and Lobo Test (1999)

The test for (absolute) β-convergence proposed by Drennan and Lobo (1999) examines the hypothesis of independence between two events, A and B, which are defined as a function of the initial *per capita* income and its growth rate[2].

Event A depends on the ratio between the *per capita* income of the microregion (or town) and the *per capita* income of the state in period t. The result A_1 is observed when this ratio is less than one and the result A_2 when the ratio is greater than one. That is,

$$A_1 : \frac{Y_{i,t}}{Y_{MG,t}} < 1 \tag{3}$$

$$A_2 : \frac{Y_{i,t}}{Y_{MG,t}} > 1 \tag{4}$$

where Yi represents the *per capita* income of the microregion (or town) i; Y_{MG} is the *per capita* income of the state.

Event B depends on the ratio between the *per capita* income growth rates of the microregion (or town) and the state *per capita* income growth rate between periods t and T (T>t). B_1 results when the ratio is less than one, and B_2 when the ratio is greater than one. That is,

$$B_1 : \frac{G_i}{G_{MG}} < 1 \tag{5}$$

$$B_2 : \frac{G_i}{G_{MG}} > 1, \tag{6}$$

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2 The conditional probability of occurrence of the event B is: $p = P(B|A) = \frac{P(B \cap A)}{P(A)}$. A Z test is performed on the following hypothesis H0: P(B | A)=P(B); HA: P(B | A)≠P(B) and the statistic is calculated by the expression: $Z = \frac{p - \pi}{\sigma} = \frac{P(B|A) - P(B)}{\sigma}, \sigma = \sqrt{\frac{p(1-p)}{n}}$, where n is the number of observations.

where G_i is the *per capita* income growth rate of the microregion (or town) i; G_{MG} is the state *per capita* income growth rate.

The absolute convergence hypothesis establishes that the economies with *per capita* incomes lower than the mean state income would grow at greater rates than the set of the whole state, while economies with *per capita* incomes greater than the state mean would grow at lower rates than the state. The conditional probability test is applied to four possible results:

B_1A_1: regional income growth less than the state income growth, and initial regional income less than the state income.

B_1A_2: regional income growth lower than the state income growth, and initial regional income greater than the state income.

B_2A_1: regional income growth greater than the state income growth, and initial regional income less than the state income.

B_2A_2: regional income growth greater than the state income growth, and initial regional income greater than the state income.

If the independence hypothesis between events A and B is rejected, there will be evidence in favor of the β-convergence hypothesis.

2.3.4 Quah Test (1993)

Quah (1993) analyzed the process of *per capita* income convergence using probability models based on Markov chains. The geographic units are classified in K strata of *per capita* income and the performance of *per capita* income of the regions is described by an infinite sequence of vectors of state probabilities p(0), p(1),...p(t)..., and a matrix of transition probabilities among states (M). A vector of state probabilities (p(t)) represents the distribution of the regions among the income strata, that is, a component of vector p(t) represents the probability $p_i(t)$ of a region belonging to the income strata i in period t, where $\Sigma_i p_i=1$. The elements of the transition probability matrix (M) indicate the probability $m_i(t)$ of a region belonging to income strata i in period t changing to income strata j in the period t + 1, where $\Sigma_i m_{ij}=1$ (that is, the sum of the elements of a line from M is equal to 1).

A Markov chain describes a stochastic process for discrete and finite cases (in the present context, the income strata), with the property that the probability of changing from one state (income strata i) to another (income strata j) in the next period is independent of how the chain reached the current state. That is, the percentage distribution of regions among the income strata at a determined point in time only depends on the same distribution in the immediately previous period.

Assuming that the transition probabilities do not change over time we ordered them as a matrix transition of K order:

$$p(t+1) = p(t)M = p(0)M^t \quad (7)$$

where: p(t) is a vector line 1 x k whose elements are the probabilities $p_i(t)$ and M^t is the product of t identical M matrixes.

An important aspect in income convergence analysis is the long-term performance of the regional *per capita* income distribution. Assuming that, after many periods, the vector of state probabilities p(t+1) is equal to the vector p(t) and also independent of the initial state vector p(t), this vector would be, thus, a long-term equilibrium vector, which can be called a vector of probabilities in steady state, p. That is, the steady state vector (if it exists) is the vector p, so that:

$$p = pM \tag{8}$$

The vector p (1 x k) characterizes the probable long-term distribution of the inter-regional *per capita* income and does not depend on the initial distribution of the regions among the income strata but depends only on the transition probabilities matrix. Once the M matrix has been found, the distribution limit of the regional *per capita* income is the vector p that solves the expression (8), with the additional restriction that the sum of vector p components is equal to 1.

A crucial step to implement the Quah test is to obtain the transition probabilities matrix, M. However, it should be pointed out that the choice of the income strata number is arbitrary and that results may be sensitive to the M matrix used. Quah (1993) considered five relative income stratas (k = 5). Ferreira (1999) performed two exercises using data from Brazilian states, using k = 5 and k = 6, corresponding to relative income strata.

2.4 Main Results

This section will present and discuss results of the empirical convergence tests carried out for the microregions and towns in Minas Gerais State from 1980/2000. Prior to this, however, the performance of *per capita* GDP in Minas Gerais planning regions will be examined.

2.4.1 β-Convergence Test for Minas Gerais Planning Regions

The state of Minas Gerais has 10 planning regions: the Central Region, Triângulo Mineiro, Zona da Mata, Rio Doce, Sul de Minas, Centro-Oeste Region, Noroeste de Minas, Alto Paranaíba, Norte de Minas and Jequitinhonha/Mucuri. Figure 1 shows the *per capita* GDP logarithm of the Minas Gerais planning regions between 1985 and 2000. In spite of the distance that still separates them, there is an apparent trend toward convergence of these regions' incomes.

Figure 1 shows that the Jequitinhonha/Mucuri and Norte regions had a considerably lower *per capita* income than the rest of the state throughout the

period, and furthermore that they are far from catching up, especially Jequitinhonha/Mucuri. The latter region is the poorest in the state and was far behind the other regions throughout the period, remaining relatively poorer, which indicates, as already demonstrated by Alves and Fontes (1998), that this region is moving to a lower *per capita* income level than the other regions. This emphasizes the need for governmental action to invigorate its economy.

The Noroeste de Minas region attracts attention because of its impressive growth, which is higher than the rest of the state. It was the third poorest region in 1985 and far behind the others, but by 1999, it had already overtaken Zona da Mata and by 2000 was the fifth-richest region in the state.

The Central and Triângulo de Minas regions remain in a superior position and, although the other regions have approached somewhat, the Central region seems to be moving toward a higher *per capita* income level than the others.

It is also interesting to note the performance of the Zona da Mata region, which showed a tendency to fall slightly behind the others, reinforcing the idea that this region is in relative economic decline.

The general tendency of the Minas Gerais planning regions toward convergence is confirmed by Figure 2, which shows a negative and significant relationship between incomes in 1985 and the income growth rate in the period 1985–2000. This figure is divided into two parts. The first part considers all the regions but the second excludes the Noroeste region, considered as an outlier. In both parts the results are similar and indicate convergence of the *per capita* income levels. However, in the second figure, the regression fit better and the R^2 value increased considerably although the convergence speed decreased.

Therefore it can be concluded that the planning regions tend to converge. However, this convergence occurs more slowly when Noroeste de Minas region is not considered.

2.4.2 β-Convergence Test for Minas Gerais Microregions

First, the linear regression test proposed by Barro & Sala-i-Martin (1992) was performed for the Minas Gerais microregions and results were mixed.

The first regression was estimated for 66 Minas Gerais microregions for the period 1985–2000. The income growth rate (*per capita* GDP) was considered as a dependent variable and the initial income (GDP in 1985) as an explanatory variable. Figure 3 shows the results of this test.

The income considered presents a negative and significant relationship, at the level of 1%, with the income growth rate. This means that, in general, the poorer microregionsgrew more than the richest between 1985 and 2000. That is, the absolute β-convergence hypothesis of *per capita* income would be accepted as true for the Minas Gerais microregions. The adjusted coefficient of determination is 44%, the convergence speed is around 2% and the half-life is

approximately 29 years. That is, Minas Gerais microregions would take around 29 years to reduce the income disparities that exist among them by half.

However, the same regression was estimated for the period 1980-1996 (Table 1) with 63 microregions and excluding three that were very different from the others. In this setting, the income variable presented a positive sign at α = 10%. From this result one could infer that there was no absolute income β-convergence for the 1980-1996 period and that the microregions with more *per capita* GDP grew more than those with less.

When considering human capital[3] as an explanatory variable and testing for conditional β-convergence, the results suggest that human capital is an important variable for the growth of Minas Gerais microregions. Table 2 shows the results after estimating equation 2.

With human capital in the equation, the income variable is negative and significant at α = 10% and the *per capita* stock of human capital in 1980 is positive and highly significant (1%). The convergence velocity is low and the half-life is 126, meaning that it would take 126 years to reduce the distance separating the poor microregions from the richer ones by half. Although human capital is important in reducing inequality, there seem to exist other factors that need to be equalized in order to accelerate the convergence process.

The next table (Table 3) shows the results of the same conditional convergence test excluding the capital region of Belo Horizonte, since it has quite different conditions from the other regions. The income variable is negative and significant at α = 5% and the human capital variable has a positive sign and is significant at α = 1%. The convergence velocity increases and the half-life drops to 81 years. The disparity is then considerably less when the Central region is not considered.

Both physical and human capital are important in determining the growth rate of Minas Gerais microregions. When only physical capital is considered, there is no clear evidence of convergence among these microregions.

However, when human capital is taken into account, the results change. For Minas Gerais State incomes to converge over the long term, it is necessary first to achieve a human capital equalization since microregions with more human capital tend to have higher growth rates.

3 The human capital statistics can be obtained from Instituto de Pesquisa Econômica e Aplicada (IPEA). They represent the expected present value of annual income (discounted with the 10% rate per year) associated with population's schooling and experience in the age group from 15 to 65 years. The stock of human capital is the result of the difference between income from the labor market and the prediction of income achieved by a worker without schooling or experience.

2.4.3 β-Convergence Test for Minas Gerais Towns

The results obtained for towns showed that the conditional β-convergence hypothesis fit their growth process better in the period 1985–2000.

Figure 4 shows graphically the results found in the absolute β-convergence test carried out for 756[4] towns. According to this test, the absolute β-convergence hypothesis was accepted. The variables considered carried positive and significant coefficients at the level of 1% significance. Therefore, it can be said that for Minas Gerais towns, generally, the poorest towns grew more than the richest in the period under study. The coefficient of determination was 34%, the convergence speed was close to 4.8%, and the half-life was approximately 14.5 years.

The conditional β-convergence test included as explanatory variables the illiteracy rate, the mean number of years of schooling, and life expectancy at birth used as proxy for the town's human capital in 1985.

Life expectancy at birth, which represents the level of health of the labor force, was not significant.

The illiteracy rate carried a negative and significant coefficient (α = 1%), compared to the dependent variable of *per capita* GDP growth rate. That is, towns with lower illiteracy rates grew more. When this variable was included, the adjusted coefficient of determination increased to approximately 36.5%, the convergence speed increased to 6.34% and the half-life decreased to approximately 10.93 years.

The regression that included the variable mean number of years of schooling performed similarly to the previous ones. The coefficient calculated for this variable was positive and significant at the level of 1%, so that towns with a higher mean of years of schooling grew more than those with less schooling. In this regression, the coefficient of determination increased to about 36%, the conversion speed to 6.3%, and the half-life decreased to 10.87 years.

The relationship of *per capita* GDP and the GDP *per capita* growth rate in 1985 was negative and significant, at the level of 1%, in all the regressions estimated for Minas Gerais towns.

These results suggest that although the poorer towns generally have grown more than the richer ones, the conditional β-convergence hypothesis is more suitable to explain their growth process, since the growth rate is affected by the stock of human capital. That is, if differences among the towns' human capital stocks were overcome, they would then equalize more quickly, as can be seen by the reduction in the estimated half-life.

As the accepted hypothesis was conditional convergence, it cannot be expected that the towns are moving toward the same long-term steady state.

4 For the data to be homogeneous, the towns were regrouped according to their division in 1985.

Minas Gerais towns will probably have different *per capita* income levels in their steady state, which will be investigated in our further discussions.

2.4.4 σ-Convergence Test for Microregions and Towns

Table 4 shows results of the σ-convergence test. This table presents the coefficient of variation of the *per capita* income of Minas Gerais microregions and towns. These results indicated that there was an income σ-convergence process within the state. That is, the level of inequality among the towns and microregions decreased.

The microregions' income inequalities increased in 1990, 1992 and 1993 compared to 1985. However, from 1992 onwards, there was a constant and gradual reduction in these inequalities, and in 2000 the lowest coefficient of variation and, consequently, the best level of equalization among the economies was reached.

The towns showed a reduction in the level of inequality during the 1990s compared to 1985. Analyzing the annual performance of this decade, one could observe some oscillations around this reduction trend, with the lowest value observed in 1998 and a slight increase in the two following years.

The results obtained from this test suggest that, although income distribution in the state was still very unequal, it has been tending to decrease in the last few decades. The existence of σ-convergence also confirmed the existence of β-convergence since the second is a condition for the first. Thus it can be stated that the poorer towns and microregions generally grew more than the richer ones from 1985 to 2000, so that inequalities in *per capita* income among them decreased.

The tests presented up to now have shown the general trends in the state and also the tendency of Minas Gerais economies to approach one another, leading to a decreasing degree of inequality among them. However, these tests did not reveal whether all the economies considered were following the same trend or whether some were excluded from the process. They also did not reveal whether the reduction in inequalities could be expected to continue or whether a certain level of regional disparity would probably persist. The two following tests, besides giving a general vision of the state economy, allowed predictions to be made of the long-term steady states of the microregions and towns.

2.4.5 Drennan and Lobo Test for Microregions and Towns[♣]

In this test, the microregions and municipalities were divided into four groups, where each group represents the particular growth dynamic to be studied.

The division of the microregions into groups is shown in Table 5, where the events that happened most frequently were A_1 and B_1. This means that, in 1985,

♣ Town in the meaning of the Spanish word 'municipalidad'.

there were more microregions with *per capita* GDP below the mean than above it; and in the period considered, most showed growth below the mean. Because of this, A_1B_1 was the most common group, which is a cause for concern since it indicates that initially poor regions that became relatively poorer diverged downwards and distanced themselves from the mean state income.

Most of the microregions in group B_2 were originally in group A_1. The microregions that form the A_1B_2 group (upward convergence) are those that were initially poor and had converged to the state mean. The microregions belonging to group A_2B_1 also converged to the mean so that, in contrast to group A_1B_2, their convergence was downwards, that is, they were relatively richer but grew less than the state mean. The microregions that diverged upwards belong to group A_2B_2, that is, they became relatively richer than the other microregions in the state.

From the performance presented by each one of the microregions, the probabilities of occurrence of each group can be calculated and the hypothesis test on the independence between the income growth rate in the period and the initial income of the microregions can be formulated. Table 6 shows this test and presents the results.

According to the value obtained for Z test, the independence hypothesis between the *per capita* GDP growth rate of the microregions from 1985 to 2000 and the initial *per capita* GDP was rejected, at the level of 1%, for all four groups tested in favor of the absolute β-convergence hypothesis. This means that the *per capita* GDP growth rates of the microregions depended on the initial *per capita* GDP, in all four groups. That is, within each group studied, the poorer microregions generally grew more than the richer ones.

Although the hypothesis of independence between the growth rate and initial income was rejected in favor of the absolute β-convergence hypothesis in each group, this result demands further investigation given the evidence in Table 5 indicating that two groups of microregions did not follow the state convergence process. The reasons for this still need to be identified. Furthermore, it has to be clarified whether there is evidence of a long-lasting trend of this (divergent) movement.

Tables 7 and 8 present the test for 756 towns from 1985 to 2000. The results were similar to those obtained for Minas Gerais microregions.

Table 7 shows the number of occurrences of events for Minas Gerais towns. Similarly to the microregions, most grew below the mean (B_1) and a considerable part remained stagnant in the period (A_1B_1), meaning that they distanced themselves from the richest since they were relatively poor and grew at rates below the state mean. It is interesting to observe that approximately half of the initially poor towns were able to improve their conditions, while the other half showed low growth, worsening their situation in relative terms. It can also be stated that the number of towns that converged (group A_1B_2 + group A_2B_1)

caused the results of the tests to be positive, in favor of the convergence hypothesis, although divergence was frequent among the towns.

Table 8 presents the test results. According to the Z test, the independence hypothesis between the *per capita* GDP growth rate of the towns from 1985 to 2000 and the initial *per capita* GDP was rejected at the level of 1%, for all four groups, in favor of the absolute β-convergence hypothesis. This means that, within each group, the *per capita* GDP growth rates depended on the initial *per capita* GDP. Therefore, from this test it can be concluded that, generally, there was absolute β-convergence among the towns and microregions in the state. However, analysis of the configuration of these economies among the groups points to the problem that this convergence has not yet reached all the towns and microregions. The analyses in Tables 5 and 7 show a series of microregions and towns caught in a kind of poverty trap (group A_1B_1), which kept them at a low level of growth throughout these 15 years.

Thus it is believed that although there is dependence between the income growth rate and initial income, other variables are also important in determining the growth in the state, so that the conditional β-convergence may better explain the growth dynamic in Minas Gerais. Since the richer economies tended to train their human capital better and also to attract human capital from the poorer regions due to better structural conditions and salaries, they managed to reach a superior steady state to that of the poorer economies. These, in turn, because they have a low initial income also have low savings and low human capital, and cannot reach the level of wealth of the relatively more developed regions in spite of the decreasing returns on capital, and are therefore expected to have lower steady states of *per capita* income. Given the persistence of these regional problems, equalization policies are needed that can help reduce the degree of disparity detected here. Thus, future research focusing on potential long-term configurations of the Minas Gerais economy will be of crucial importance to policy-makers.

2.4.6 Quah Test (1993)

This test permits the analysis of whether the differences will tend to persist in the long term given the performance in the period under study, or whether the economies will be likely to move toward a situation where their differences will be overcome naturally. However, since the period of this study was only 15 years, conclusions regarding the long-term steady state should be drawn with caution.

Per capita GDP data of the Minas Gerais microregions and towns were used for this test for the years 1985–2000, defined in five *per capita* income strata: very poor (below 40% of the mean), poor (between 40% to 80% of the mean), medium (between 80% and 120% of the mean), rich (between 120% and 160% of the mean) and very rich (above 106% of the mean).

Table 9 summarizes the data. It shows that most of the microregions are in the three intermediate groups (poor, medium and rich) and that a tendency toward concentration occurred in these three groups from 1985 to 2000, while the two other groups (very poor and very rich) decreased. This suggests a decrease in the degree of income disparity among the microregions. Table 9 also shows Minas Gerais microregions probability vector in the steady state if the same tendency of the period under analysis had continued. The results obtained do not point to the existence of absolute convergence among the microregions since there was no evidence that the historic disparities found in the state decreased. Thus, in the long term, the differences between income groups seem to persist, and there may be conditional but not absolute convergence. In a situation of absolute income convergence, the microregions should move to the same steady state, which did not happen in Minas Gerais. Apparently its microregions are forming convergence clubs, among which the inequalities are being maintained.

Table 10 shows the β-convergence test for 756 towns and the configuration of income distribution among the towns in Minas Gerais in 1985, in 2000, and in the long run, as well as the changes in the distribution. Although these changes have not been of sufficient magnitude to end inequality among towns, they have not remained stationary in the same strata for 15 years. According to Table 10, the number of very poor towns fell from 17.46% of the total number of towns existing in 1985 to 8.07% in 2000 and will decrease to 4% in the long run, the number of poor towns increased from 34.26% to 43.25% in the period, suggesting that it will be around 46% in the long run; the medium towns increased from 21.69% to 26.72% and will be around 29% of the total in the long run; the rich towns decreased from 12.43% to 11.38% and tend towards 11%; and finally, the very rich towns decreased from 14.15% to 10.58% and tend towards 10% in the long run.

Thus with the persistence of the tendency presented in the period, it can be concluded that Minas Gerais towns will not converge to the same income strata in the long run. Although the inequalities are reduced and the number of very rich and very poor towns is tending to decrease, we will not find a concentration of these towns in the medium income strata, as would be compatible with a situation of absolute convergence. On the contrary, the results indicate that there are convergence clubs forming among the towns of Minas Gerais, meaning that they are moving to different long-term steady states.

The situation of the towns appears to be even worse than that of the microregions because of the much greater degree of disparity continuing between them. Half of Minas Gerais towns tend to remain poor or very poor, which could be attributed to the fact that many do not have a financial and economic base and are almost totally dependent on state government subsidies.[5] The low economic growth in these towns reveals the difficulty of releasing them

5 See Oliveira, Fortes and Andrade (2000) for details.

from the poverty trap and the need for adequate public policies to overcome these obstacles and permit greater income equalization in the state.

Thus it seems Minas Gerais is moving toward a long-term setting where income differences will persist among microregions and towns. Government action is urgently needed to prevent this tendency of persistent disparities within the state so that towns and regions can enter into a process of integration and equalization. Such policies and measures should focus primarily on the areas that have long remained poorer than the state mean and are caught in a cycle of long-run low growth that needs to be broken.

2.4.7 Visual Analysis based on Drennan and Lobo (1999) and the Quah (1993) Test

Figures 5 and 6 show maps according to the Drennan and Lobo test (1999) and the Quah test (1993) to better visualize the dynamics of each microregion and town.

Figure 5 shows the divisions of the microregions and towns according to the methodology of Drennan and Lobo (1999). The first group A_1B_1 corresponds to the economies that diverged downwards, had lower *per capita* GDP than the state mean, and grew less than this mean. In the intermediate groups are those that converged to the state mean, and in the fourth group are those that present an income dynamic superior to that of the rest of the state, because they had become relatively richer, moving upwards.

Figure 6 presents a division of the state economies according to the Quah test (1993). The microregions and towns are divided into very poor, poor, medium, rich and very rich, according to their *per capita* income from 1985 to 2000.

2.5 Conclusions

Regional income inequality is a phenomenon present in Minas Gerais State that needs to be broken. According to the present paper, although regional inequalities in *per capita* income are still very accentuated, we can observe a reduction in this differential over the last 30 years, shown by the σ-convergence test. Despite the reduction, the differences tend to persist and total equalization among the states has not been achieved. Thus, public policies should focus on freeing some of these regions from the poverty trap in which they are apparently caught.

According to the β-convergence tests performed, there is dependency between *per capita* GDP growth rate and its initial value, so that generally the poorer economies grow more than the richer ones. Thus economic growth has

acted positively in the sense of reducing the disparities in *per capita* income among the regions and towns. This conclusion can be inferred from the regressions and the β-convergence test that supported the hypothesis of a negative relationship between the growth rate and initial income for regions and towns.

However, from the estimated regressions, it was detected that the variables representative of human capital would also be important in determining the growth rate of the Minas Gerais microregions and towns. When the human capital variables were included in the model, the speed of convergence and the coefficient of determination increased, and the half-life was reduced. Thus, according to the Barro and Sala-i-Martin test, the hypothesis of conditional β-convergence is more suited to explain the dynamics of income growth in the microregions and towns in the period from 1985 to 2000.

The Drennan and Lobo test showed that two groups of microregions and towns remained at the edge of the convergence process (groups A_1B_1 and A_2B_2). The economies in group A_2B_2 showed superior performance with respect to the state mean, while the economies in group A_1B_1 showed inferior performance and probably moved to a lower steady state income level than the others.

The Quah test, carried out for the period from 1985 to 2000, confirmed that Minas Gerais economies are moving to different steady states, indicating that the conditional β-convergence hypothesis fit the dynamics of income growth among the Minas Gerais microregions and towns better. Thus, although the income inequalities have decreased, a certain level of inequality will remain. This will occur because the initial level of *per capita* income of their economies is not the only factor that influences the growth rate in the Minas Gerais microregions; as already mentioned, other factors also determine this rate, including the level of human capital.

A significant number of microregions and towns tend to remain in a low-income situation in the long term. This tendency shows their inability to escape from the poverty trap in which they seem to be caught, and the need for adequate public policies to overcome this obstacle and permit greater income equalization in the state. These policies should focus mainly on those areas that must be considered poor or very poor and that show low economic growth. In order to overcome the disparities in regional income, the structural parameters of the Minas Gerais economies should first be equalized, especially regarding the level of human capital.

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Tables and Figures

Table 1 Absolute Income β-convergence Test for 63 Minas Gerais Microregions in 1980-1996 period.

Dependent Variable: *Per capita* GDP Growth Rate, 1980-1996	
Explained Variable	Coefficient
β_2	-0.020191 ^{ns}
	(-1.297507)
Log of *per capita* GDP in 1980	0.004695*
	(1.802813)
Convergence Velocity	No convergence
Adjusted R^2	0.035021
F test	3.250136*
Number of observations	63

t statistic in parenthesis; *ns*- not significant; * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 2 Conditional β-convergence Test for 66 Minas Gerais Microregions, 1980-1996.

Dependent Variable: *Per capita* GDP Growth Rate, 1980-1996	
Explained Variable	Coefficient
β_2	-0.047**
	(-2.223)
Log of *per capita* GDP in 1980	-0.005269*
	(-1.706577)
Log of *per capita* Human Capital in 1980	0.031880***
	(2.812593)
Convergence Velocity	0.0050442
Half Life	125.92 Years
Adjusted R^2	0.086837
F test	4.090581
Number of observations	66

t statistic in parenthesis; *ns*- not significant; * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3 Conditional β-convergence Test for 65 Minas Gerais Microregions, 1980-1996.

Dependent Variable: *Per capita* GDP Growth Rate, 1980-1996	
Explained Variable	Coefficient
β_2	-0.042457*
	(-0.0214)
Log of *per capita* GDP in 1980	-0.008020**
	-2.313381
Log of *per capita* Human	0.035829***
Capital in 1980	3.134655
Convergence Velocity	0,008533
Half-Life	80.75 Years
Adjusted R^2	0.136824
F test	4.913897**
Number of observations	65

t statistic in parenthesis; *ns*- not significant; * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4 Income σ--Convergence among Minas Gerais Microregions and Towns, 1985 to 2000.

Anos	Microregions	Towns
1985	0,608	3,02
1990	0,609	1,45
1991	0,572	1,39
1992	0,635	1,41
1993	0,623	1,43
1994	0,551	1,41
1995	0,532	1,38
1996	0,524	1,43
1997	0,514	0,84
1998	0,481	0,79
1999	0,479	0,86
2000	0,469	0,96
Observations	66	756

Table 5 Number of Occurrences of Events from Minas Gerais Microregions

	B1 (*Per capita* GDP growth rate less than state average, 1985 to 2000)	B2 (*Per capita* GDP growth rate more than state average, 1985 to 2000)	Total
A1 (*Per capita* GDP less than state average in 1985)	29	9	38
A2 (*Per capita* GDP more than state average in 1985)	25	3	28
Total	54	12	66

Table 6 Independence Test between Minas Gerais Microregions *Per Capita* GDP Growth Rate in 1985-2000 and *Per Capita* GDP in 1985.

H0	p	π	σ	Z
P(B1/A1)=P(B1)	0.7632	0.8182	0.0155	-3.5562
P(B1/A2)=P(B1)	0.8929	0.8182	0.0113	6.6340
P(B2/A1)=P(B2)	0.2368	0.1818	0.0155	3.5562
P(B2/A2)=P(B2)	0.1071	0.1818	0.0113	-6.6340

Table 7 Number of Occurrences of Events from Minas Gerais Towns

	B1 (*Per capita* GDP growth rate less than state average, 1985 to 2000)	**B2** (*Per capita* GDP growth rate more than state average, 1985 to 2000)	Total
A1 (*Per capita* GDP less than state average in 1985)	293	197	490
A2 (*Per capita* GDP more than state average in 1985)	245	21	266
Total	538	218	756

Table 8 Independence Test between Minas Gerais Towns *Per Capita* GDP Growth Rate in 1985-2000 and *Per Capita* GDP in 1985.

H0	P	π	Σ	Z
P(B1/A1)=P(B1)	0.5980	0.7116	0.0178	-6.3708
P(B1/A2)=P(B1)	0.9211	0.7116	0.0098	21.3385
P(B2/A1)=P(B2)	0.4020	0.2884	0.0178	6.3708
P(B2/A2)=P(B2)	0.0789	0.2884	0.0098	-21.3385

Table 9 Minas Gerais Microregion Probability Vector in Steady State

Per capita Income Classification	*Per capita* Income Limits	Proportion of Microregion by *Per capita* Income Classification		
		1985	2000	Long Run
Very Poor(1)	Below 40% of Average	0.1212	0.0303	0.00
Poor (2)	[40% and 80%) of Average	0.3030	0.3333	0.17
Medium (3)	[80% and 120%) of Average	0.3030	0.3636	0.52
Rich (4)	[120% and 160%) of Average	0.1515	0.1970	0.26
Very Rich (5)	More than 160% of Average	0.1212	0.0758	0.05
	Sum	1.00	1.00	1.00

Table 10 Probability Vector in Steady State for Minas Gerais Towns

Per capita Income Classification	*Per capita* Income Limits	Proportion of Towns by *Per capita* Income Classification		
		1985	2000	Long Run
Very Poor (1)	Below 40% of Average	0.1746	0.0807	0.04
Poor (2)	[40% and 80%) of Average	0.3426	0.4325	.46
Medium (3)	[80% and 120%) of Average	0.2169	0.2672	0.29
Rich (4)	[120% and 160%) of Average	0.1243	0.1138	0.11
Very Rich (5)	More than 160% of Average	0.1415	0.1058	0.10
	Sum	1.00	1.00	1.00

Figure 1 Log of Minas Gerais Planning Regions Per Capita GDP, 1985 to 2000.

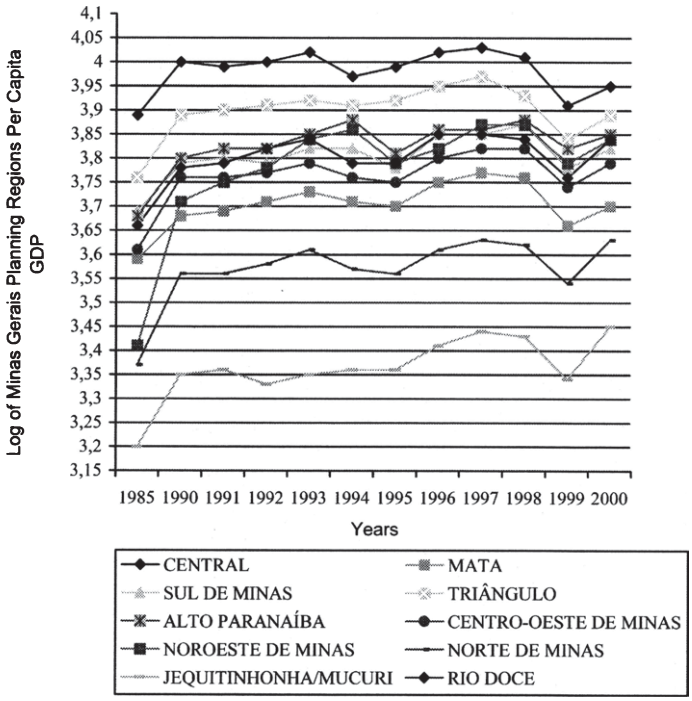
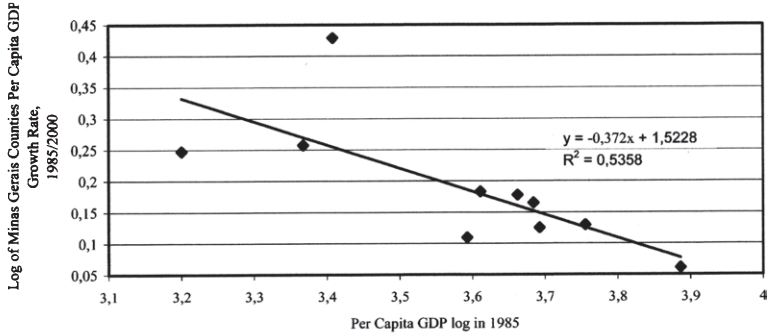


Figure 2 Absolute Income β-Convergence among Minas Gerais Planning Regions, 1985/2000.



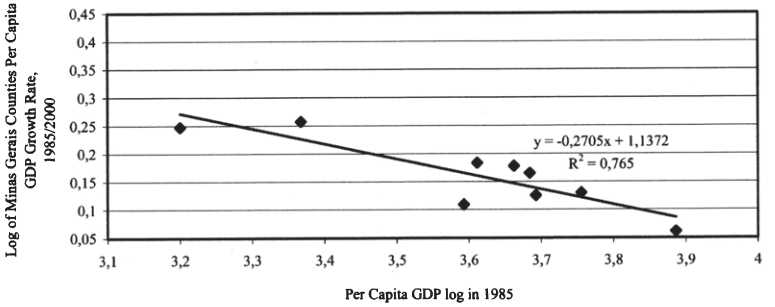


Figure 3 Absolute Income β-Convergence among Minas Gerais Counties,1985/2000.

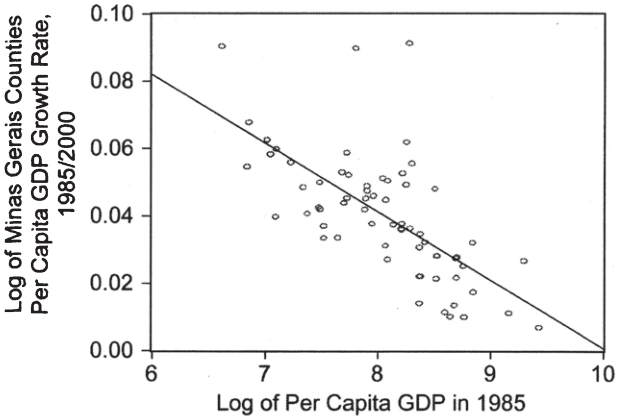


Figure 4 shows graphically the results found in the absolute β

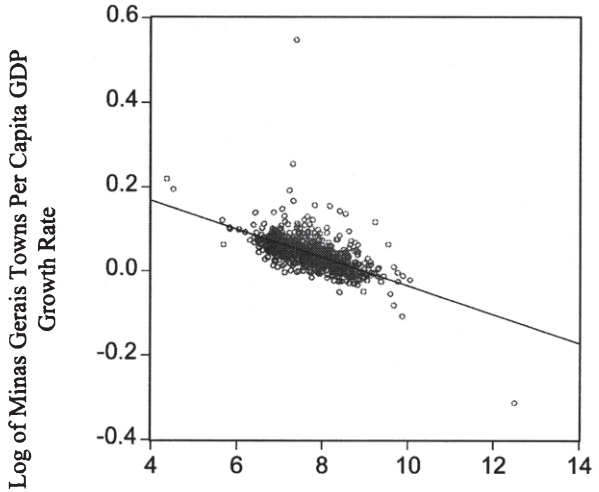


Figure 5 Maps of Minas Gerais Microregions and Towns according to Drennan and Lobo Test, 1985-2000

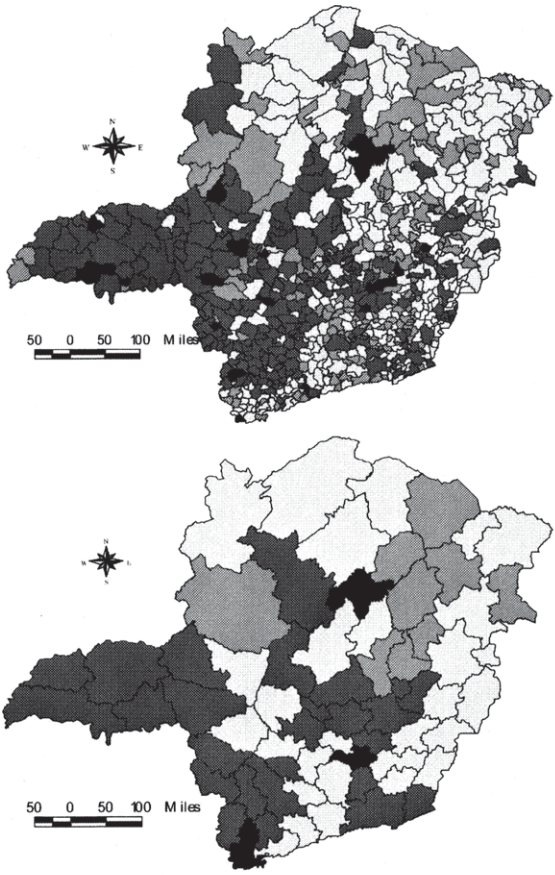
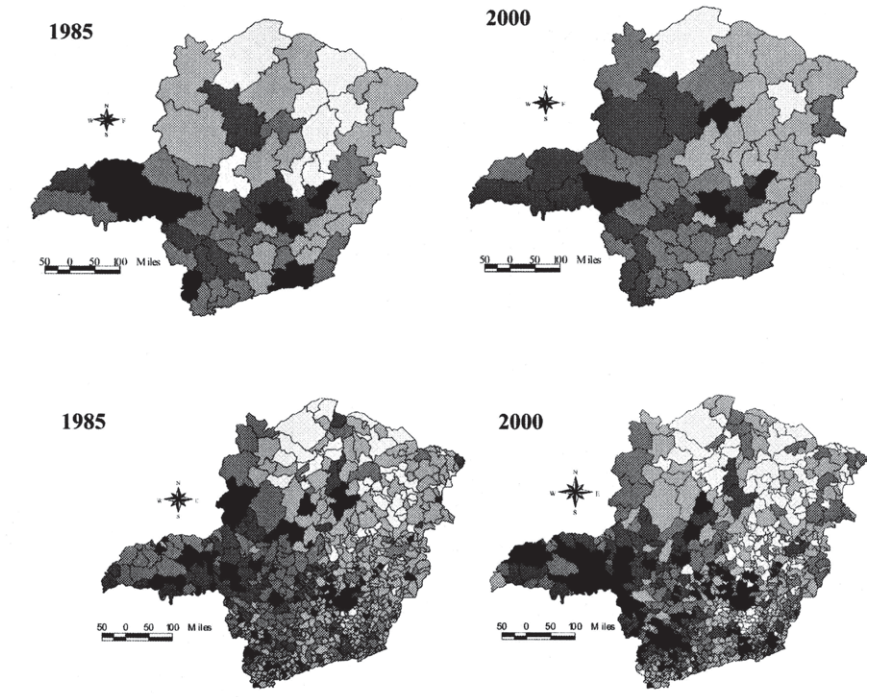


Figure 6 Maps of Minas Gerais Microregions and Towns according to Quah Test, 1985 and 2000.



I.3 Pro-Poor Growth in Colombia from 1996 to 2005

Adriana R. Cardozo Silva[a]

3.1 Introduction

The aim of this study is to examine whether economic growth reduced poverty in Colombia between 1996 and 2005, and to find the factors affecting the extent to which the poor participated in economic growth. The period of analysis is of high interest: it was a time when economic expansion ended with a drastic output contraction, reversing achievements in poverty reduction and returning poverty to 1988 levels, then followed by a slow recovery process. The paper examines how the poor experienced the negative effects of this crisis as compared to the non-poor and investigates whether they shared equally in the benefits of growth.

In order to measure the extent to which growth reduced poverty (that is, whether growth was pro-poor), this study will apply the methodology developed by Ravallion and Chen (2003) by drawing Growth Incidence Curves (GIC) and calculating the pro-poor growth rate (PPGR) for the nation as a whole, for the urban/rural divide, and by region. One of the central contributions of this paper is its detailed examination of the effects of economic recession on the incomes of the initial poor. The subdivision of the period into three sub-periods in accordance to the country's growth cycle between 1996 and 2005 presents a broader picture of the recession's effects as well as of how fast incomes recovered from it.

The data sources for this study are the Encuesta Nacional de Hogares (ENH) 1996 to 2000, and the Encuesta Continua de Hogares (ECH) 2001 to 2005, conducted annually by the National Administrative Department of Statistics (DANE). Although the main objective of these household surveys is the construction of labour market indicators, they are also used to calculate the incidence of poverty since they are the only ones providing yearly information on household incomes.

This chapter is divided into five sections. Section 2 presents a classification of pro-poor growth and how it is measured, briefly discussing the strengths and weaknesses of the two most widely used methodologies, namely Ravallion and Chen (2003), and Kakwani, Khandker and Son (2004). Section 3 reviews the history of economic growth in Colombia as well as the evolution of poverty and

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inequality indicators. Section 4 analyzes the resulting growth incidence curves and Section 5 concludes.

3.2 Defining and Classifying Pro-Poor Growth (PPG) by Concepts and Measurement Techniques

The relationship between growth and poverty is a familiar and important topic of debate among development economists and policymakers. Perspectives on this issue have changed in the last two decades after sweeping economic reforms and drastic policy shifts (ranging from import subsituting industrialization to economic liberalization) failed to produce the desired trickle-down growth effects or to reduce poverty in many developing countries—including several in Latin America (Birdsall and Szekely, 2005).

A variety of studies have emerged on how to evaluate the effects of growth on poverty, sparking discussion of how to measure whether growth is good for the poor and can thus be considered "pro-poor". Although consensus has not been reached on a definition of pro-poor growth (PPG), many studies treat it as the economic growth path that benefits the poor population as much as or more than the non-poor population, decreases inequality, and reduces poverty (Jean-Yves Duclos and Quentin Wodon, 2004).

While this general definition appears straightforward, measuring PPG is more complicated since it needs to tackle questions of the extent to which growth can be considered pro-poor and whether pro-poor growth is necessarily accompanied by decreased inequality. Other challenges are differentiating economic growth paths to determine which one is the most pro-poor and why, as well as determining what proportion of poverty reduction can be explained by growth. Measurement tools to cope with these questions are based mainly on the income dimension of poverty and use household surveys or Living Standard Measurement Surveys (LSMS) as data sources. Very few studies focus on non-income dimensions like health, education, and nutrition (Klasen, 2006).

There are basically two ways of classifying studies on PPG: first, according to their approach (general or strict), and second, according to specific features of the measurement methodologies (complete/full or partial). For the general (also called weak) approach, any growth path leading to poverty reduction is considered pro-poor. In contrast, the strict approach considers growth to be pro-poor only when both poverty and inequality decrease. This approach (also called strong, Kakwani, Khandker and Son, 2004) is based on the identity that decomposes reductions in poverty into changes in mean income or growth effect, and changes in the distribution of income, called the distributional effect (see Datt and Ravallion, 1992).

The strict approach to pro-poor growth can be further subdivided into strict-relative or strict-absolute. The relative approach focuses on proportional changes

in income between poor and non-poor and considers growth pro-poor when relative inequality, defined as the ratio of individual incomes to the mean, decreases. This is only possible if incomes of the poor rise by a higher proportion than incomes of the non-poor. For the absolute approach, growth is pro-poor if absolute income gains of the poor are as much or more than those of the non-poor, meaning that absolute inequality (defined as the absolute difference in income between the poor and non-poor) decreases.[1] One important critique of the strict-relative approach is that in a recession, large income drops among the rich can give a pro-poor picture even if the poor are not gaining at all. Similarly, a pro-rich distributional shift during a period of overall economic expansion may result in large absolute gains for the poor without the growth path being considered pro-poor (Ravallion, 2004). Furthermore, and as explained by Klasen (2005), pro-poor growth in the strict-absolute approach is almost impossible to achieve in practice, given that absolute income gains of the poor are usually much lower than those of the non-poor. As shown by Klasen, this concept makes good sense when analyzing the non-income dimension of poverty.

PPG measures can be classified into partial or complete types. Partial measurement uses neither a concrete measure of poverty nor a poverty line, while complete measurement requires a poverty line to compare different growth paths and the degree to which they are pro-poor. The growth incidence curve developed by Ravallion and Chen (2003) and the poverty growth curve proposed by Son (2003) can both be categorized under the partial type of measurement. In contrast, the indices of McCulloch and Baulch (2000), Kakwani and Pernia (2000), and Ravallion and Chen (2003) are categorized under the full approach because the growth processes are judged from a rate or an index of pro-poor growth that requires defining a poverty line (Kakwani, Khandker and Son 2004). Given that an exhaustive comparison of all existing methodologies is beyond the scope of this paper, in the next section we will summarize two selected methodologies: that of Kakwani, Khandker and Son (2004), which has been applied in two previous studies on Colombia, and that of Ravallion and Chen (2003), which will be used in the present study.

1 An example given by Ravallion (2004) illustrates the difference between changes in relative and absolute inequality better. Consider only two households: a poor one with an income of $1,000 and a non-poor one with an income of $10,000 in the first period. After an income increase of 100% for both households in the second period, the poor household earns $2,000 while the non-poor one earns $20,000. In this case, the distance from each household to the mean remains unchanged and thus relative inequality does not change. According to the strict approach, growth would have been neither pro-poor nor anti-poor. But since the absolute difference between the two households increases from $9,000 to $18,000, absolute inequality rises sharply and growth can be considered anti-poor in the strict-absolute sense.

3.2.1 Growth Incidence Curves (GIC) and the Absolute Rate of Pro-Poor Growth (Ravallion and Chen, 2003)

When using the absolute approach mentioned above, the growth incidence curve (GIC) graphs the rate of growth of real income (or real expenditure) for each percentile of the distribution between two periods of time. A curve below zero (the x axis) at all points of the distribution indicates that all households suffered income losses. The contrary indicates income gains for all percentiles and consequently a poverty decrease compared with the initial period. An upward-sloping curve indicates that rich households (the last income percentiles) benefited more than all others, while a downward-sloping curve indicates the poor benefited more, giving evidence of pro-poor growth in a relative sense (i.e., that relative inequality has fallen). The GIC is formally derived from the following equations:

$$y_t(p) = F_t^{-1}(p) = L_t'(p)\mu_t \qquad (y_t'(p) > 0) \tag{1}$$

$$g_t(p) = \left[\frac{y_t(p)}{y_{t-1}(p)}\right] - 1 \tag{2}$$

$$g_t(p) = \frac{L_t'(p)}{L_{t-1}'(p)}(\gamma_t + 1) - 1 \tag{3}$$

Where p is the corresponding quantile, F_t^{-1} is the inverse of the cumulative distribution function at the p'th quintile (which gives the income of that quintile), $L_t(p)$ is the Lorenz curve (with slope $L_t'(p)$) and $\gamma_t = (\mu / \mu_{t-1}) - 1$ is the growth rate in the mean of income (or expenditure) per capita. The GIC can be defined as the growth rate in income of the p'th quintile as shown in equation (2) or as shown in equation (3) after replacing (1) into (2). If all quintiles exhibit the same growth rate, then the Lorenz curve does not change, inequality remains unchanged and $g_t(p) = \gamma_t$ in equation (3) for all p. Should the ratio between the growth rate of the p'th quintile to the mean increase over time (i.e., $y_t(p)/\mu_t > y_{t-1}(p)/\mu_{t-1}$), then the growth rate of the p'th quintile is higher than the mean growth rate : $g_t(p) > \gamma_t$. Following this, inequality falls if $g_t(p)$ is a decreasing function for all p is (Ravallion 2001).

The graphical analysis of the GIC would not demand using a poverty line to determine whether growth was beneficial to the poor. However this is only possible when the slope of the curve has a clear trend. First-order dominance of the distribution at date t over t-1 exists when the GIC is above zero for all percentiles, a conclusion that cannot be easily drawn if the GIC switches sign. In practice, the GIC often has different slopes at different points and switches sign along percentiles, making it impossible to draw clear conclusions.

Based on the GIC, Ravallion and Chen (2003) proposed the rate of pro-poor growth (PPGR) as the area below the GIC up to the selected poverty line of the

initial period. This area equals total income growth of the poor. The PPGR is equivalent to the ordinary rate of growth times a distributional correction given by the ratio of the actual change in poverty over time (using the Watts index) to the poverty change that would have been observed if growth had not affected the income distribution (Ravallion, 2004). If the PPGR is higher than the mean growth rate, growth is pro-poor, while the opposite result indicates that distributional changes negatively affected the poor. Formally this is defined as follows:

$$PPGR = -(dW_t / dt) = \frac{1}{H_t} \int_0^{H_t} g_t(p)\,dp \tag{4}$$

where:

$$W_t = \int_0^{H_t} \log[z / y_t(p)]\,dp \tag{5}$$

is the Watts poverty measure, z is the poverty line and H_t is the Headcount ratio at time t.

3.2.2 Kakwani and Pernia (2000) – Pro-Poor Growth Index (PPGI), and Kakwani Kandher and Son (2004) – Poverty Equivalent Growth Rate (PEGR)

Kakawni and Pernia (2000) argue that poverty reduction depends on the growth rate of income as well as its distributional shift. For PPG to exist, both rates need to decrease. The authors propose the pro-poor growth index (PPGI) as the relationship between total poverty reduction and the amount of poverty reduction that occurs when growth does not affect the distribution at all. For calculating this ratio, the authors use the ratios of total poverty elasticity to the growth elasticity of poverty (Son, 2003).

$$\Phi = \frac{\delta}{\eta} \tag{6}$$

where δ is the total elasticity of poverty and η is the growth elasticity of poverty. δ is decomposable into changes in poverty due to growth (holding inequality constant) and changes in poverty due to variations in inequality (holding growth unchanged).

Formally:

$$\delta = \eta + \zeta \tag{7}$$

Where ζ is the poverty elasticity to inequality. Note that whenever growth is positive, η is negative, given that any increase in growth (assuming that the benefits of it are equally distributed among all population) is associated with a decrease in poverty (Nunez, 2005). If Φ is higher than one (i.e., $\delta > \eta$) growth is pro-poor because both poverty and inequality fall (Son, 2003). If the PPGI is higher than zero but lower than one, growth is pro-poor using the general

definition but not the strict one. As this index does not address the actual rate of growth, it does not satisfy the monotonicity axiom, i.e., it is not a monotonically increasing function of the growth rate (Son, 2003).

With the aim of considering observed growth rates in measuring PPG, Kakwani, Khandker and Son (2004) built the poverty equivalent growth rate (PEGR):

$$PEGR = \gamma^* = (\delta / \eta)\gamma = \Phi\gamma \quad (8)$$

Where $\gamma = dLn(\mu)$ is the average growth rate and $\Phi = (\delta / \eta)$ is the PPGI. The PEGR can be interpreted as the growth rate that would result in the same poverty reduction as the one generated by the actual growth rate had growth been distributionally neutral, i.e., if all individuals had received proportionally equal benefits of growth (Sarmiento, 2004). For determining if growth was pro-poor by using the PEGR, the following criteria are used:

- If $\gamma^* > \gamma$ growth is pro-poor
- If $0 < \gamma^* < \gamma$ there is a trickle-down process: poverty decreases but growth is accompanied by increases in inequality
- If $\gamma^* < \gamma$ growth is not pro-poor

3.2.3 Applications to Colombia

When comparing the two methodologies, the reader is most interested in the desirable properties of a pro-poor measure: namely the focus axiom (the measure is invariant to changes in incomes of the non-poor), the monotonicity axiom (any increase in income of a poor person decreases poverty), and the transfer axiom (poverty decreases by transfers from poorer to less poor).

According to the monotonicity axiom, a desirable pro-poor growth measure should move in line with the poverty indicator it enhances, i.e., whenever poverty decreases (increases), the pro-poor growth measure should be positive (negative) (see Ravallion, 2001). In their paper, Kakwani, Kandher, and Son argue that Ravallion's PPGR does not fulfill this axiom as it focuses on the headcount index in the initial period and does not take into account the incidence of poverty in the final period. But, should one incorporate the headcount index from the second period into the methodology, it would violate the focus axiom. The fact that the Watts Index is calculated using the headcount of the initial period explains why, in some cases, the PPGR can be positive (negative) although the headcount in the second period is higher (lower) than in the first.[2] Thus, the PPGR of Ravallion fulfills the monotonicity axiom restricted to both the initially poor and to the Watts Index.

2 The typical example is when people just above the poverty line in the first period fall below it in the second, becoming poor: the amount of persons below the poverty line (headcount) increases in the second period although in the first period the incomes of the poorest rose.

As with Kakwani's methodology, it satisfies the monotonicity axiom for the FGT group of poverty measures, given that any reduction in poverty according to that type of poverty measure is a growing function of the PEGR (Landa and Jimenez, 2004). Compared to the GIC, results in terms of elasticities are harder to interpret, as this methodology does not reveal changes in income throughout the whole distribution. Furthermore, in practice, it is difficult to separate poverty changes into growth and inequality holding one or the other constant, given that they usually happen simultaneously.

Two empirical studies using Kakwani's methodology have been done for Colombia in the period 1996-2004. The first one (Sarmiento et. al, 2005) analyzes the PEGR using the poverty gap as a poverty indicator for seven years from 1996 to 1999 and 2001 to 2004. Of these years, only 1997, 2002 and 2003 showed a positive mean income growth rate. Results show that growth was pro-poor only in 1997 and 2003 when poverty as well as inequality fell and that the PEGR was positive and higher than the observed mean income growth rate. In 1997 the fall in poverty is explained by improvements in inequality rather than in income, while in 2003 the growth effect was larger than the inequality effect. In 1999 the non-poor exhibited higher income losses than the poor, meaning that inequality decreased. The authors argue that in that year, although the poverty gap index rose, the recession was pro-poor because that increase would have been higher had inequality not improved.

The study of Jairo Nuñez (2005) also follows the methodology developed by Kakwani, Khandker and Son (2004), uses the mean income growth rate of the household surveys, and is based on the incidence of poverty to calculate the PEGR between 1997 and 2004. His results show that economic growth for total Colombia was not pro-poor, mainly because higher incomes in the urban sector and lower in the rural increased inequality. When calculating the PEGR, the author concludes that in only two years of the period analyzed, namely 2000 and 2003, was growth pro-poor. Both years exhibit PEGR larger than observed income growth rates as well as poverty reduction. When decomposing poverty changes into growth and inequality, Nuñez finds that in all years other than 1999, the growth effect alone helped reduce poverty each year by about 1%, but that the inequality effect counteracted the growth effect in almost the entire period 1996– 2004. The author's simulations indicate that had growth been neutral, the incidence of poverty would have decreased from 50.8% to 45.9% between 1996 and 2004, instead of having increased to 53.3% in 2004.

The contribution of the present study is the application of Ravallion's methodology to the period 1996 to 2005, concentrating on how economic recession affected the incomes of the initial poor. The subdivision of the period into three sub-periods in accordance with the country's growth cycle between 1996 and 2005 presents a better picture of the recession's effects, as well as of how fast incomes recovered from it. As explained above, by drawing GIC it is possible to clearly observe changes in income by percentiles, derive conclusions

about the income distribution, and provide a measure of pro-poor growth in a relative sense. Besides this, using Ravallion's methodology reveals possible data weaknesses. As is well known, income surveys have more severe problems than expenditure surveys due to the fact that people tend to omit more information or underreport it. Drawing GIC places high demands on the surveys in terms of data quality, and may also be a very useful tool to see how prices affect poor and rich households differently (see Grimm and Günther 2005).

3.3 Data Sources and Constraints

As mentioned in the introduction, data are taken from the Colombian household surveys, which consist of four basic chapters: i) identification variables, ii) characteristics of the households (physical characteristics and available services), iii) education, and iv) labor force information, the latter including income data.[3] Between 1990 and 2000, the survey "Encuesta Nacional de Hogares" (ENH) was conducted quarterly, and only the identification and labor force information were included in all four quarters. Only the third quarter, which is used in this study, is representative at the national level for the rural/urban divide, for four regions, and for some labor indicators at the department level.

Starting in 2001, the methodology changed to a continuous one (Encuesta Contínua de Hogares, ECH), which means that the information is collected year-round by dividing the sample size on a weekly basis (for details on methodological changes, see Lasso, 2002). Results are presented monthly and need to be aggregated depending on the desired degree of representativeness. For calculating poverty with the ECH, the usual procedure is to aggregate information corresponding to the third quarter.

Non-response and underreporting are important problems in Colombian household surveys, which are conducted using indirect reporting.[4] The National Planning Department (DNP) applies three correction steps: in the first, they estimate missing income using human capital models based on Mincerian equations, in the second, they adjust incomes to the national accounts to correct for underreporting, and in the third, they also rectify under-reported income of homeowners (DNP, 2006). This study uses the final corrected income variable

3 The household survey has specific modules introduced occasionally to investigate specific aspects of the household like household property, informalityinfirmity, and health.

4 In 1996 monetary income was missing for 4% of persons of working age. This percentage increases up to 8% in 2003. Together with all other sources of income, the cases (persons) with missing income were 5.5% in 1996 and 13% in 2003 (DNP, 2003) of the working age population.

produced by the DNP, which is the basis for official calculations of poverty. After all corrections, there remain very low and high fluctuating incomes in the first percentiles of the distribution as well as about 1 to 1.5% of households with an income equal to zero. When calculating standard poverty and inequality indicators, all information is taken into account. To draw the GIC, the first and last two percentiles of the distribution are not shown to facilitate reading the curves, given that high fluctuations in these percentiles may still be due to problems in the data rather than to true changes in income. Calculation of real income is done using the implicit deflators of the poverty line in its 2005 version (called M 2005), which updates the poverty lines by using the consumer price index for low-income groups[5] (for methodological details, see DNP, 2005).

3.4 Colombia: Economic Background and Sources of Growth

3.4.1 Economic Growth and Production Structure

The main components of GDP in Colombia are agriculture (14% of GDP), manufacturing (15% of GDP), mining (5% of GDP), and construction (5% of GDP). The most dynamic industrial sectors in the country are processed food, beverages, textiles, clothing, and chemicals. Cattle and coffee[6] are the most important agricultural products, accounting for 44% and 13% of total agricultural GDP (DANE, 2006). Other key agricultural products are tropical fruits, bananas, rice, vegetables, potatoes, palm oil, and sugarcane (Velez, 2000).[7] Regarding services, construction accounts for 4.5% of GDP, financial services represent 5.4%, and retail commerce accounts for around 7.4%. Telecommunications, a sector that has been expanding rapidly in the last decade, makes up 3% of total GDP.

Colombian GDP growth has been praised its stability compared to other Latin American countries due to lower fluctuations in private consumption

5 Poverty lines are available for each of the 13 metropolitan areas, for the rest of the urban areas, and for rural Colombia.

6 Coffee production fell substantially during the nineties, as did its share of exports (from 18% in 1992 to 6% in 2004), explained by low coffee prices, large stocks worldwide, and a higher supply from new producing countries. Furthermore, increasing participation of manufacturing after trade liberalization fostered export diversification away from coffee.

7 In the eighties, agriculture accounted for 22% of GDP while industry for less than 21%. Total participation of these sectors in GDP has decreased since the mid-eighties in favor of services and mining. Discovery of important mineral sources like nickel and coal in the Caribbean departments of Córdoba and La Guajira respectively, and petroleum in the lowlands of Arauca and Casanare, both in the northeast of the country on the border to Venezuela, have played a central role in this development.

(Cárdenas, 1992).[8] During the 20th century, growth was almost uninterrupted and fell only twice: once in 1931, when GDP contracted by 2%, and once in 1999 when growth fell 4% (See Figure 1). After using an import-substituting economic development model for almost 40 years and up to 1990, the country introduced a comprehensive reform package, including state modernization, a constitutional reform, and key changes in the labor, financial, and exchange rate markets.[9] Barriers to foreign direct investment as well as to capital exports were removed and the exchange market liberalized by eliminating controls to the foreign currency trade (Parra and Salazar, 2000).

The liberalization efforts fostered a surge of foreign capital flows from almost nothing in 1989 to 7% of GDP in 1996 and translated into a credit boom channeled by banks to the private non-tradable sector (Tenjo, 2003).[10] The consumption boom, together with higher capital flows and oil prices, led to an annual average growth rate of 5% from 1992 to 1995. The saving-investment deficit of the private sector rose[11] while the public sector saving-investment surplus increased (1991-1996) due to higher taxes and revenues from privatization (Tenjo, 2003). The direction of monetary policy changed starting in 1994, when interest rates increased and aggregate demand as well as growth slowed down due to political uncertainty, falling coffee revenues, and recession in the neighboring country of Venezuela. Growth slowed down and aggregate demand declined. The boom in real estate markets began to wane, housing prices fell, and borrowers began facing difficulties in paying their debts due to the previously generated asset mismatch (Tenjo, 2003).

After a short reactivation in 1997, capital flows to the country collapsed as result of the difficulties facing international financing markets due to the Asian and Russian crisis. The reversal of flows led to a breakdown of the credit channel and evidenced the already existing fragilities in the domestic private sector. These included high levels of borrowing (36% of GDP in 1999), deteriorated balance sheets sensitive to increases in the interest and exchange rates, mismatches in asset prices, and extremely low saving rates (Tenjo, 2003).

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8 Prudent management of coffee export revenues helped maintaining low external debt at the beginning of the eighties when the country entered the so-called "lost decade" in a favorable position compared to its neighbors. The sudden stop in capital flows due to the overall debt crisis in Latin America initially led to a reversal of some trade liberalization policies undertaken up to that point which were eased after 1986, when the coffee boom improved external sector (Ocampo, 1999).

9 Average tariffs decreased from 44% beginning 1990 to 11.8% in March 1992.

10 Especially the construction sector benefited from higher credit supply and the real estate market experienced a period of rapidly increasing prices between 1991 and 1995.

11 Household savings as a percentage of GDP fell from 14% in 1991 to less than 5% in 1997 while business savings went from 15% to 5%.

In 1997, the Central Bank increased active rates up to 50% to defend the target zone from a speculative attack, contributing to the sharp deterioration in portfolio indicators and balance sheets in the financial system. The crisis was triggered at the end of the year, when the government declared the economic emergency and intervened in several financial institutions. The credit supply collapsed and the recession reached its peak in 1999.[12]

The immediate effects of the crisis were bankruptcies, reorganizations of firms, and increased unemployment. The financial sector became extremely risk-averse regarding credit to the private sector and redirected credit to the public sector instead. Deposits in 2000 remained higher than loans and the financial sector became a net debtor, investing more in bonds and public securities than in credit to the private sector.

From 2000 to 2002, economic growth remained low (2.1%), unemployment high, and public spending as well as credit to the private sector constrained. Real currency depreciation undermined contributions of the external sector to growth, and a weak agricultural sector offset stronger growth in manufacturing, telecommunications, and construction. This period coincided with a marked escalation of internal conflict after a failed process of peace talks between the government of Andrés Pastrana (1998-2001) and the FARC (Revolutionary Armed Forces of Colombia).[13] Parallel to this, confrontations between paramilitaries and guerrillas worsened considerably, as did drug-related violence.[14]

One of the most comprehensive studies of the National Planning Department (DNP) regarding the cost of conflict in Colombia estimated its overall costs at

12 According to Posada (2004) the economic recession marked one of the most intensive business cycles experienced in Colombia, and was more a correction to the long-term growth path exacerbated by a sudden stop in capital inflows due to the Asian crisis.

13 The current internal conflict began almost 50 years ago with the emergence of leftist guerrilla groups whose root motivations were mainly ideological. Up to 1980, the military capacity of these groups was limited and concentrated in marginal areas of the country. Parallel to them, paramilitary groups developed slowly in the eighties to defend isolated areas from guerrilla attacks. During the coca bonanza (bonanza coquera) and the consolidation of drug trafficking in the eighties, illegal armed groups found new ways of financing operations and expanding through the control of areas where illegal crops where grown as well as territories rich in natural resources, particularly oil (Díaz and Sanchez 2004).

14 According to UNOCD estimations, illegal crops account for about 5% or of total agricultural areas (ca.121,000 hectares) the main one being coca leaf. Colombia is currently the main supplier of coca leaf worldwide with about 70% of total production in 2004 with a dramatically increase in plantation from 1990 to 2004 (UNOCD, 2004). Estimated repatriated earnings are around US$5 billion a year or 4 to 6% of GDP every year.

7.4% of GDP in 2003 (Borrego et al. 2003). The majority of the cost burden is borne by the private sector due to kidnapping, forced displacement (approximately 2 million persons in 2002), and crimes against private property.[15] Increased military spending is estimated to make up 25% of the total costs of violent conflict, diverting important public budget resources away from education and health.[16]

A change in policy has taken place under the administration of President Alvaro Uribe (in office since 2002), whose efforts have concentrated on fighting the guerrillas directly while negotiating the disarmament of paramilitary groups.[17] This strategy has been successful in significantly reducing homicides, kidnapping, piracy on roads, attacks on small towns, and terrorist attacks, but its success in reducing drug trafficking is still low (Echeverry and Escobar, 2006). Increased confidence due to the security policy, favorable international conditions given by high oil and commodity prices, as well as low interest rates in developed countries have revived capital flows and reserves, raising private investment and easing credit. Annual growth averaged 4.6% in 2003– 2005, private consumption accelerated, and in 2005 unemployment decreased to 12%. Similarly to the boom experienced in the early nineties, one of the most dynamic sectors in this reactivation phase has been construction.

3.4.2 Poverty and Inequality

From 1978 to 1995, Colombia managed to reduce the incidence of poverty by ten percentage points. This reduction reversed during the crisis, however, with poverty almost returning to 1988 levels (see Figure 2). The impact of the recession on household incomes was visible in per capita income falling continuously (even before 1999) and in high unemployment rates. Income losses began in 1996 and ended up in a 9% drop in real household income by 2001 (See Figure 3). The u-shaped per capita income graph gives evidence of

15 From 1998 to 2001, the number of homicides was approximately 100 thousand each year, rising annually to reach almost 28 thousand in 2001, of which 27.4% were considered of a political nature. According to Fuentes, J. (2005) adjusting life expectancy in Colombia to take into account its high homicide rate has led to the estimate that life expectancy during the nineties was reduced by between one and a half and two years.

16 Other studies consider long-run GDP losses due to the conflict, varying from 0.5% (Echeverry et al. 2001) to 2% (PNUD, 2003). Military expenditures in Colombia have grown significantly over the last fifteen years, from around 2% of GDP in 1990 to over 5% in 2005.

17 The strong policy of Uribe has been sponsored by the "Plan Colombia" intended to fight coca production and narcotrafics by strengthening police and military forces through a US$7.5 billion program (U.S. Department of State). The outcomes of this policy are under discussion. Although it seems to have weakened guerrillas, and different indicators point to improvements in security, there is no clear result regarding reduction of coca crops and narcotrafics.

recovery since 2002—also in regard to the incidence of poverty, which decreased to 49% by 2005. All poverty indicators (incidence, gap, and FGT2) show a similar trend, increasing up to 1999, briefly slowing down from 2000 to 2001, rising again in 2002, and improving since then. By 2005, poverty and inequality indicators at an aggregate level as well as real income had achieved the levels of the early to mid-nineties, or even better (See Table 4).

The rural/urban divide shows that at least during the recession, the poverty and indigence in rural areas increased much more than in urban areas, widening the gap between them. The incidence of poverty in rural areas (with 68% of the population under the poverty line in 2005) is more than one and a half times the urban incidence, and the rural poverty gap is twice the urban (34% versus 17% in 2005), indicating that there are more poor people in rural Colombia and that they are much poorer than those in urban Colombia.

Although rural poverty decreased more than 10 percentage points from 1999 to 2003, it began escalating again since then (see Figures 4 and 5). Falling rural wages and employment in non-agricultural activities as well as decreasing agricultural productivity explain this behavior. It is important to note that rural income is on average 30% of urban income, a proportion that saw no major changes from 1996 to 2005.

Regarding unemployment, labor market indicators point to a moderate increase from 1996 to 1997, when growth slowed down. From 1997 to 2002, occupation conditions deteriorated sharply. Unemployment moved from 10% in 1997 to 17.1% in 1999 and 15.8% in 2002. Although unemployment began decreasing in 2002 in line with economic cycles, in 2005 it was still higher than in 1996 with lower utilization of the labor force, higher underemployment (from 17.1% in 1997 to 37.4% in 2005) and higher part-time employment (see Figure 6). Weak improvements in real incomes, especially for skilled workers, and decreasing formal wage employment explain this trend (Farné et. Al., 2006).[18]

Analyses using non-income indicators like the Index of Unmet Basic Needs[19] and the Quality of Life Index show significant improvements in welfare from 1985 to 2004. According to the former indicator, poverty decreased between 1985 and 2003 when the percentage of population lacking one of these basic needs decreased by about 50%. Similarly, the living conditions of the

18 According to official statistics, unemployment in rural areas is much lower than in urban (7.1% vs. 13.6% in 2005) but as explained above, low incomes help maintain high poverty rates.

19 The Index of Unmet Basic Needs mainly captures infrastructural conditions at the urban level, including variables like inadequacy of housing conditions, homes without basic sanitary facilities, crowding, school absenteeism, and economic dependency. It assumes that people are poor if they lack one of their basic needs, and extremely poor if they lack two or more.

Colombian population reflected by the Quality of Life Index[20] have improved considerably since 1985, particularly in the non-urban areas. Although effects of the crisis are not directly visible in these indicators, which measure infrastructure conditions, they are evident in the stagnating pace of improvements in the second half of the nineties.

Regarding income inequality, the data shows that it is quite high and has been worsening during the last two decades. With a GINI coefficient of 0.58 in 2005, Colombia's income inequality is extreme in the international context, although relatively moderate in comparison to the Latin American context, where it ranks just above the median (Figure 7). According to Nuñez and Espinoza (2002), income inequality decreased in the sixties and seventies, remained stable between 1978-1988, and reversed thereafter. Furthermore, since 1988, the dynamics of inequality seemed to have been asymmetric in the rural and urban areas, improving in the former and deteriorating in the latter.

According to the World Bank's Poverty Report (2002) under almost any possible measure, inequality deteriorated during the 1980s and 1990s. The Gini coefficient increased over the entire period, as did the share of the top quintile of the distribution relative to the poorest 20%. From 1996–1999, these trends intensified when different inequality indicators deteriorated. As can be seen in Table 5, the GINI coefficient increased to 63 at the peak of the crisis in 1999.

3.5 Growth Incidence Curves

3.5.1 GIC in the Rural/Urban Divide

GIC are drawn from 1996 to 1999, 1999 to 2002, and from 2002 to 2005 to capture the effects of the economic slowdown, crisis, and recovery periods separately. Calculations are undertaken as well taking 1996 as base year (cumulatively) and comparing each of the following years with it to see how income growth evolved in the period as a whole.

Figure 8 shows results for the nation as a whole from 1996 to 2005. As can be seen, income gains were very close to zero for almost all percentiles of the distribution except the first five, giving evidence of the poor income performance. While in urban areas the GIC is rather flat, around zero (almost all percentiles had very low income growth rates and the PPGR is negative), in rural areas the curve has a clear negative slope indicating that growth was pro-poor. This is confirmed by the PPGR, which is higher than the mean growth rate (see Table 1). For total Colombia, the PPGR was just above the mean growth rate, influenced by results in rural areas. The behavior in rural areas would

20 This index is a multidimensional indicator, ranking from 0 to 100, with the latter representing the highest possible welfare. It captures in a single measure variables corresponding to quality of housing, access to public services, education as a measure of human capital, and the size and composition of the household.

suggest a fall in inequality, confirmed by decreases in all inequality indicators except Atkinson e=2. The GINI coefficient moved from 0.51 to 0.47 and the Theil entropy measure from 0.54 to 0.47. Urban inequality decreased from 0.57 to 0.55. The poverty gap and inequality among the poor fell in both areas as well as at the national level.

Growth incidence curves for the period 1996-1999 show that the economic slowdown affected the poor much more than the non-poor (see Figure 9). The positive slope of the GIC, which is below the zero axis for almost all percentiles of the distribution, confirms that the poorer the household, the larger the impact of the economic slowdown on income. In urban areas the income drop was larger for the extreme poor, where extreme poverty increased to 16.2% and the poverty gap widened. In rural areas the rise in poverty indicators was larger, with per capita income falling more than in urban areas (–7.9% versus –2.5%). Extreme poverty (which is three times that in urban areas) jumped to 48% of the population and the poverty gap to 49%.

Between 1999 and 2002, all GIC have a positive slope and growth was pro-poor as shown by the PPGR. This result should be interpreted cautiously as it is strongly influenced by a statistical effect of income moving back to the levels observed before the economic slowdown and by large income increases for the poor in rural areas (see Figure 10). If compared with 1999, poverty indicators improved, for the nation as a whole, urban, and rural areas, but if compared with the base year 1996 they almost all worsened. It is important to underline that although incomes of the poor population in rural areas increased up to 60%, the incidence of poverty decreased only slightly, from 78% to 75.1%. The poverty gap, in contrast, showed a larger decrease from 49.3% to 39.4%, indicating a decrease in the severity of poverty. In urban Colombia, the poverty gap remained close to 23% while the incidence of poverty decreased slightly.

It was in years 2003 and 2004 that favorable international commodity prices helped the rural sector achieve higher incomes and reduce poverty, a dynamic that did not hold on into 2005. Rural areas seem to have followed their own dynamics, which, although not completely isolated from domestic growth conditions, had different roots. In contrast, economic recession had a more direct effect on urban households, which had been major recipients of real estate credit in the boom period between 1991 and 1995. When incomes fell and the bubble in the real estate market burst, they were more directly affected than rural households, which are more dependent on external price conditions, demand from urban areas, and climate conditions.

In the period 2002 to 2005, growth was pro-poor in both urban and rural areas and consequently at the national level. As can be seen in Figure 11, for Colombia as a whole and for urban Colombia, incomes of the extreme poor increased more than for the rest of the population. In contrast, the inverted u-shaped form of the rural GIC shows the poorest five percentiles of the population and the richest ten as exhibiting the worst growth.

Summarizing, between 1996 and 2005, the recession affected the poor population proportionally more than the non-poor. Although economic recovery was pro-poor, when analyzing the period as a whole it is important to notice that from 1996 to 2005 there was only a very slight progress in poverty and inequality indicators and that the population remains still very vulnerable to changes in economic conditions. Reversal in GDP growth drove the country back to 1989 poverty levels, having a major effect on the population. Adverse consequences on unemployment and income lasted longer in urban Colombia, where growth was not pro-poor. Rural areas recovered more rapidly due to external factors affecting agricultural prices.

The aforementioned results are consistent with Figure 12, where the PPGR and the mean growth rate are calculated for each year against 1996 (i.e., cumulatively). The cumulative PPGR was negative up to 2003 and below the mean growth rate (which was also negative), except in 2001. These results give evidence of income losses for the entire population but more than proportionally for the poor in comparison to the non-poor. Starting in 2003, growth becomes pro-poor due to income gains in rural areas (see Table 2).

Urban data show that both the mean growth rate and the PPGR were negative in all years. Growth was anti-poor in all years if compared with 1996, and only in 2003 did the situation stop worsening and income losses diminish. In 2005, the urban mean growth rate and the PPGR were very close and just above zero, indicating that the population began benefitting from growth. In rural Colombia, growth was anti-poor until 2001 and the mean growth rate was negative up to 2002 (See Figure 13) while growth was favorable to the poor starting in 2001.

In order to identify regional differences in the pattern of pro-poor growth, we draw GIC for the five regions covered by the household surveys: Atlántico, Oriental, Central, Pacífico and Bogotá[21] (Figure 14). Atlántico on the Caribbean Coast is home to about 21% of Colombian population and the largest coastal cities in the country: Barranquilla (1.3 million), Cartagena de Indias (1 million) and Santa Marta (434,000 million). This region comprises departments whose economies are primarily based on agriculture and cattle farming (like Sucre and Magdalena) as well as departments with significant mineral resources in La

21 Since the 1991 Constitution, Colombia is divided into 32 departments (nine more than under the old constitution) and a capital district (Bogotá). Furthermore, the country is divided into five geographical regions. The departments are divided into "Municipios" which according to the 1991 Constitution are the smallest territorial entities with governmental and administrative functions. The household survey groups the departments into four regions plus Bogotá and does not include eight of the new departments, namely: Arauca, Casanare, Vichada, Guaínia, Guaviare, Vaupés, Amazonas and Putumayo which represent 3% of Colombian population.

Guajira and Cesar, which incidentally is also one of the poorest departments in the entire country. In this region, the mean growth rate from 1996 to 2005 was negative (-0.67) but the poorest 20% of the population had income growth rates up to 6% and the PPGR was also close to zero (0.36) (See Table 3).

The Central region accounts for 25% of the population and is mixed in its production structure as well. It combines important coffee-producing departments (Caldas, Risaralda and Quindio) with large industrial areas in Antioquia and around its capital city Medellín. It also consists of the departments of Tolima, Huila and Caquetá, located in the south, which base their income mainly on agriculture. In this region, the growth incidence curve from 1996 to 2005 was almost flat, around a mean growth rate of 0.62, pointing to stagnation in incomes for almost all percentiles of the population. The small gains in growth were distributed almost equally among the population.

In the Oriental region, growth was more favorable to the poorest percentiles and pro-poor overall. This region includes important industrial manufacturing and commerce activities around Cundinamarca that have evolved due to the close proximity to the capital city. The region that performed worst was Pacífico, where growth was anti-poor. This region encompasses extreme contrasts: it includes the poorest department in the country (Chocó) as well as one of the most developed (Valle). In Bogotá, the capital district with 15% of the Colombian population, the PPGR was just slightly above the mean growth rate and both rates were close to zero. The change in slope of the GIC indicates that the population closest to the poverty line showed the worst income growth.

In summary, GIC at a regional level from 1996 to 2005 presents similar results for all regions, except Pacífico, where growth was clearly anti-poor. According to the criteria established by Ravallion's methodology, growth was pro-poor in all other regions, but using this criterion alone, it is not possible to give precise information on the extent of pro-poor growth. The mean growth rate and the PPGR differ only slightly from each other and are both near the zero axis. The comparison between 1996 and 2005 indicates that incomes did not improve since the base year: they are only now recovering after the slowdown and crisis period at the end of the nineties.

Growth incidence curves drawn by region do not give evidence of important improvements in income in any of the regions. Although pro-poor growth rates are higher than mean growth in all regions except Pacífico, they are also close to zero. This confirms the national, urban and rural results discussed previously at the regional level . Progress in social and economic indicators in Colombia was almost nonexistent between 1996 and 2005, affecting all the population. It was only in the Oriental and Central regions where there was growth benefitting the poorest percentiles of the distribution most.

3.6 Conclusions

When using the methodology of Ravallion and Chen, one could conclude that from 1996 to 2005, growth in Colombia was pro-poor, since the PPGR was higher than the mean growth rate (0.94 vs. 0.43). Nevertheless the difference is very small and the methodology does not indicate anything about how large this distance needs to be to conclude pro-poor growth. A more balanced conclusion in this case would be that growth was very low and was not adverse to the poor in comparison to the non-poor, leading to an almost unchanged incidence of poverty in comparison to that observed in 1996. An important difficulty in using the applied methodology is that to produce reliable results it requires that the data be of high quality, which usually not the case for income data from household surveys.

Disaggregating results by areas makes it difficult to determine whether growth was more pro-poor in one region than in another given the similarity of growth incidence curves (for the period 1996 to 2005 as a whole) as in the cases of the Oriental and Central regions. It was only in Pacífico that growth was clearly anti-poor, while in the other regions, the results for the nation as a whole hold: low growth rates and small differences between the mean growth rate and the PPGR. Clear conclusions can be drawn for the urban/rural divide. In rural Colombia, growth was pro-poor, while in urban areas, the small income gains were distributed similarly among all percentiles.

Results are very sensitive to the years of analysis chosen and need to be explained in light of the economic context of those years. The economic recession was clearly anti-poor, as can be seen in the period 1996 to 1999, when the poor were affected much more severely and suffered major income losses. Typical characteristic of poor households include high dependence rates, lack of assets, and low education, making them quite vulnerable to changes in economic conditions and employment. The recovery period (1999 to 2002) was pro-poor at the national, urban, and rural levels but it was only pro-poor at the rural level if compared with the base year 1996. From 2002 on, economic conditions stabilized and growth was pro-poor. Income growth for the poorest percentiles in rural areas was much higher than in urban areas, leading to reductions in the poverty gap. In line with the other studies done up to now on Colombia between 1996 and 2004, we conclude that growth in Colombia was not pro-poor. In the year 2005, however, a more stable economic environment emerged, fostering favorable conditions in rural areas and leading to a reduction of extreme poverty.

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Tables and Figures

Table 1 Rate of Pro-Poor Growth for Three Selected Periods

	1996-2005	1996-1999	1999-2002	2002-2005
	Total National			
Growth rate in mean	0.43	-3.03	-0.56	5.24
Growth rate at median	0.31	-5.48	0.83	5.97
Mean percentile growth rate	0.71	-6.88	4.74	6.47
Rate of pro-poor growth	0.94	-11.84	7.89	7.53
	Urban (Cabecera)			
Growth rate in mean	0.24	-2.56	-2.11	5.64
Growth rate at median	-0.07	-4.23	-1.04	5.45
Mean percentile growth rate	0.14	-5.17	-0.03	6.82
Rate of pro-poor growth	-0.02	-9.55	2.02	8.06
	Rural (Resto)			
Growth rate in mean	0.49	-7.9	6.86	3.04
Growth rate at median	1.08	-12.5	12.13	4.38
Mean percentile growth rate	1.49	-12.65	18.25	3.69
Rate of pro-poor growth	1.92	-16.3	19.65	4.1

Source: Author's calculations based on ENH and ECH

Table 2 Rate of Pro-Poor Growth from 1996 to 2005

	1996-1997	1996-1998	1996-1999	1996-2000	1996-2001	1996-2002	1996-2003	1996-2004	1996-2005
				Total National					
Growth rate in mean	-0.63	-2.42	-3.03	-1.85	-1.60	-1.8	-0.14	-0.12	0.43
Growth rate at median	-3.81	-4.43	-5.48	-2.5	-2.14	-2.38	-0.1	-0.63	0.31
Mean percentile growth rate	-3.28	-4.37	-6.88	-2.27	-1.54	-2.04	0.29	0.06	0.71
Rate of pro-poor growth	-6.37	-6.20	-11.84	-2.71	-1.48	-2.25	0.62	0.13	0.94
				Urban (Cabecera)					
Growth rate in mean	0.65	-2.24	-2.56	-2.12	-2.24	-2.34	-0.85	-0.64	0.24
Growth rate at median	-1.65	-4.28	-4.23	-2.71	-2.78	-2.65	-0.95	-1.13	-0.07
Mean percentile growth rate	-1.01	-3.55	-5.17	-2.98	-2.58	-2.89	-1.07	-1.03	0.14
Rate of pro-poor growth	-3.62	-5.09	-9.55	-4.33	-3.00	-3.83	-1.55	-1.61	-0.02
				Rural (Resto)					
Growth rate in mean	-8.63	-5.51	-7.9	-1.77	-0.47	-0.79	2.07	0.96	0.49
Growth rate at median	-9.46	-6.67	-12.5	-1.09	-0.41	-0.95	2.91	0.98	1.08
Mean percentile growth rate	-11.36	-7.62	-12.65	-1.08	0.11	0.15	3.46	2.33	1.49
Rate of pro-poor growth	-13.08	-8.89	-16.3	-0.72	0.14	0.42	4.07	2.60	1.92

Source: Author's calculations based on ENH and ECH

Table 3 Rate of Pro-Poor Growth by Regions from 1996 to 2005

3 Atlántico	
Growth rate in mean	-0.67
Growth rate at median	-0.38
Mean percentile growth rate	-0.08
Rate of pro-poor growth	0.36
Headcount Index (1996)	54
Oriental	
Growth rate in mean	0.49
Growth rate at median	0.47
Mean percentile growth rate	1.16
Rate of pro-poor growth	1.71
Headcount Index (1996)	52
Central	
Growth rate in mean	0.56
Growth rate at median	0.34
Mean percentile growth rate	0.67
Rate of pro-poor growth	0.81
Headcount Index (1996)	58
4 Pacífico	
Growth rate in mean	1.16
Growth rate at median	1.00
Mean percentile growth rate	0.86
Rate of pro-poor growth	0.44
Headcount Index (1996)	54
Bogotá	
Growth rate in mean	0.42
Growth rate at median	0.18
Mean percentile growth rate	0.48
Rate of pro-poor growth	0.68
Headcount Index (1996)	29

Source: Author's calculations based on ENH and ECH

Table 4 Colombia: Poverty Measures by Area

	Poverty Line			Extreme Poverty Line		
Total National	**HC**	**Poverty Gap**	**FGT 2**	**HC**	**Poverty Gap**	**FGT 2**
1996	50.6%	23.3%	14.4%	17.1%	7.7%	5.2%
1997	52.4%	25.0%	15.7%	18.2%	8.4%	5.6%
1998	54.8%	26.5%	16.8%	20.4%	9.3%	6.2%
1999	57.1%	30.8%	21.1%	25.2%	13.0%	8.9%
2000	55.0%	26.4%	16.5%	19.0%	8.3%	5.3%
2001	55.2%	25.9%	15.9%	18.7%	7.8%	4.8%
2002	57.0%	27.5%	17.1%	20.7%	8.9%	5.6%
2003	50.7%	22.8%	13.7%	15.8%	6.6%	4.1%
2004	52.7%	24.0%	14.2%	17.4%	6.5%	3.6%
2005	49.2%	21.7%	12.8%	14.7%	6.1%	3.7%
Urban	**HC**	**Poverty Gap**	**FGT 2**	**HC**	**Poverty Gap**	**FGT 2**
1996	42.8%	17.8%	10.1%	10.6%	4.3%	2.8%
1997	44.0%	18.7%	10.7%	11.1%	4.3%	2.7%
1998	47.1%	20.4%	11.7%	13.1%	4.8%	2.9%
1999	49.1%	23.6%	15.0%	16.2%	7.6%	5.1%
2000	48.2%	21.8%	13.0%	13.5%	5.6%	3.6%
2001	49.4%	21.6%	12.5%	13.4%	5.1%	3.0%
2002	50.2%	23.0%	13.9%	15.5%	6.5%	4.0%
2003	46.3%	20.2%	11.8%	12.6%	5.0%	3.0%
2004	47.4%	20.9%	12.1%	13.7%	4.9%	2.7%
2005	42.4%	17.4%	9.7%	10.2%	3.8%	2.2%
Rural	**HC**	**Poverty Gap**	**FGT 2**	**HC**	**Poverty Gap**	**FGT 2**
1996	70.1%	37.1%	25.0%	33.2%	16.2%	11.0%
1997	73.7%	41.0%	28.3%	36.4%	18.8%	13.0%
1998	74.8%	42.4%	29.9%	39.3%	20.9%	14.8%
1999	78.0%	49.3%	36.9%	48.5%	26.8%	18.8%
2000	72.8%	38.5%	25.6%	33.2%	15.4%	9.9%
2001	70.5%	37.4%	24.7%	32.7%	14.8%	9.7%
2002	75.1%	39.4%	25.7%	34.5%	15.3%	9.8%
2003	62.9%	29.9%	18.8%	24.5%	10.9%	7.1%
2004	67.6%	32.7%	20.2%	27.5%	10.8%	6.2%
2005	68.2%	33.6%	21.3%	27.5%	12.4%	8.0%

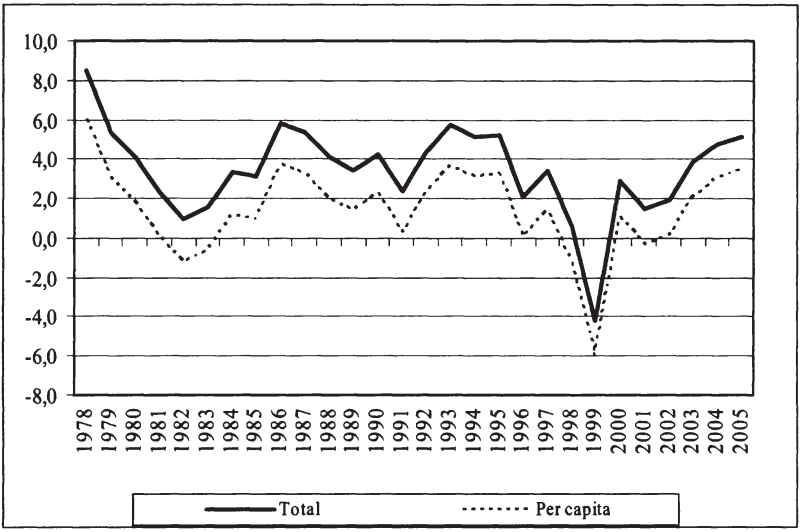
Source: Author's calculations based on ENH until 2000 and ECH from 2001 to 2005

Table 5 Colombia: Inequality Measures by Areas

Year	Atkinson inequality measures		
National	$\varepsilon = 0{,}5$	$\varepsilon = 2$	**Gini coefficient**
1996	0.31	0.94	0.59
1997	0.31	0.92	0.60
1998	0.31	0.81	0.60
1999	0.34	0.99	0.63
2000	0.29	0.76	0.59
2001	0.29	0.74	0.58
2002	0.31	0.81	0.60
2003	0.27	0.68	0.56
2004	0.29	0.71	0.59
2005	0.28	0.76	0.58
Urban	$\varepsilon = 0{,}5$	$\varepsilon = 2$	**Gini coefficient**
1996	0.28	0.96	0.57
1997	0.27	0.94	0.56
1998	0.27	0.65	0.57
1999	0.29	0.77	0.58
2000	0.26	0.70	0.56
2001	0.26	0.66	0.56
2002	0.28	0.73	0.57
2003	0.25	0.67	0.55
2004	0.27	0.68	0.57
2005	0.25	0.66	0.55
Rural	$\varepsilon = 0{,}5$	$\varepsilon = 2$	**Gini coefficient**
1996	0.23	0.66	0.51
1997	0.23	0.69	0.51
1998	0.26	0.79	0.54
1999	0.34	0.99	0.62
2000	0.21	0.67	0.49
2001	0.23	0.69	0.51
2002	0.29	0.79	0.56
2003	0.20	0.54	0.47
2004	0.21	0.58	0.49
2005	0.20	0.71	0.47

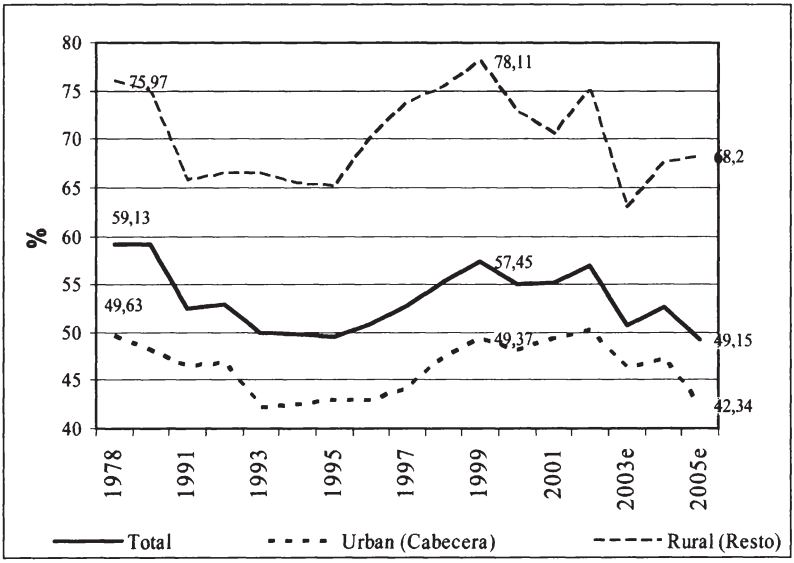
Source: Author's calculations based on ENH until 2000 and ECH from 2001 to 2005

Figure 15 Colombia: GDP Growth (real)



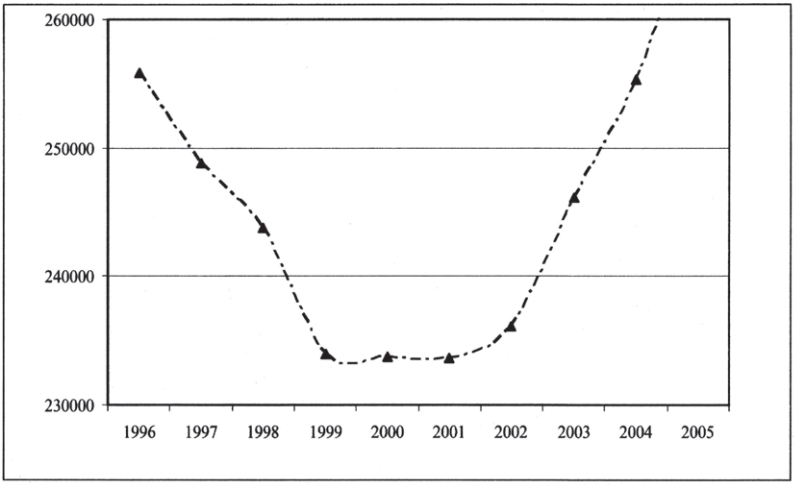
Source: Banco de la República based on National Accounts

Figure 16 Colombia: Incidence of Poverty by Area



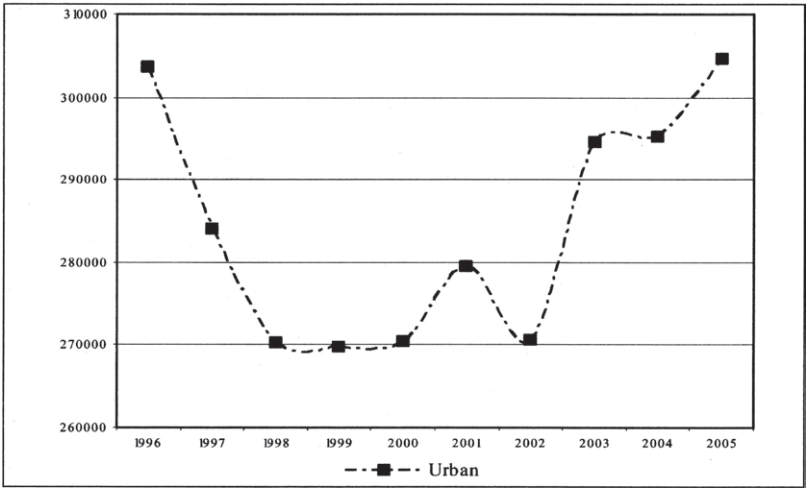
Source: Author's calculations based on ENH and ECH

Figure 17 Colombia: Real Per Capita Income



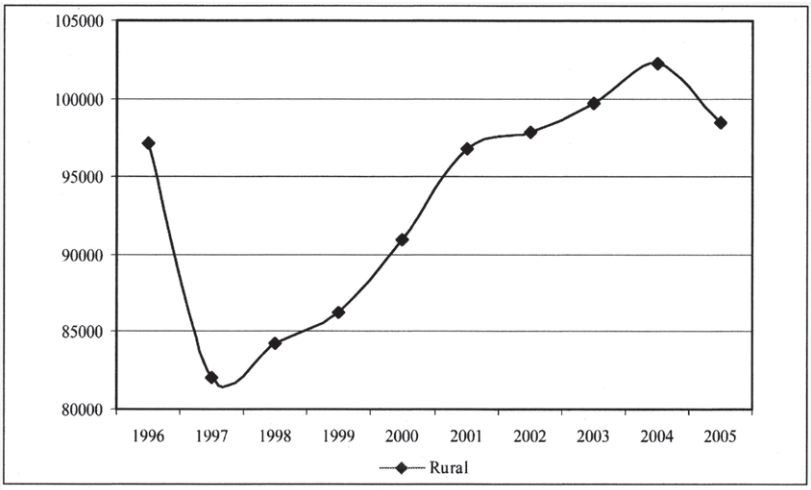
Source: Author's calculations based on ENH until 2000 and ECH from 2001 to 2005

Figure 18 Colombia: Real Per Capita Income Urban Colombia



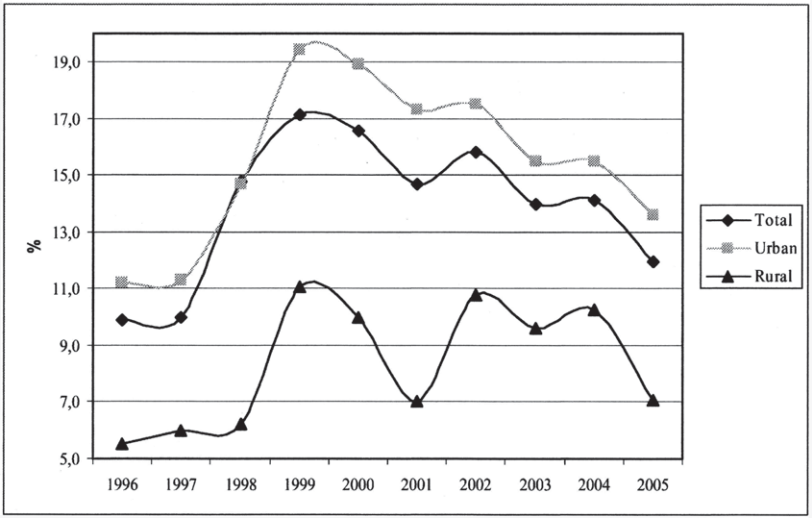
Source: Author's calculations based on ENH until 2000 and ECH from 2001 to 2005

Figure 19 Colombia: Real Per Capita Income Rural Colombia



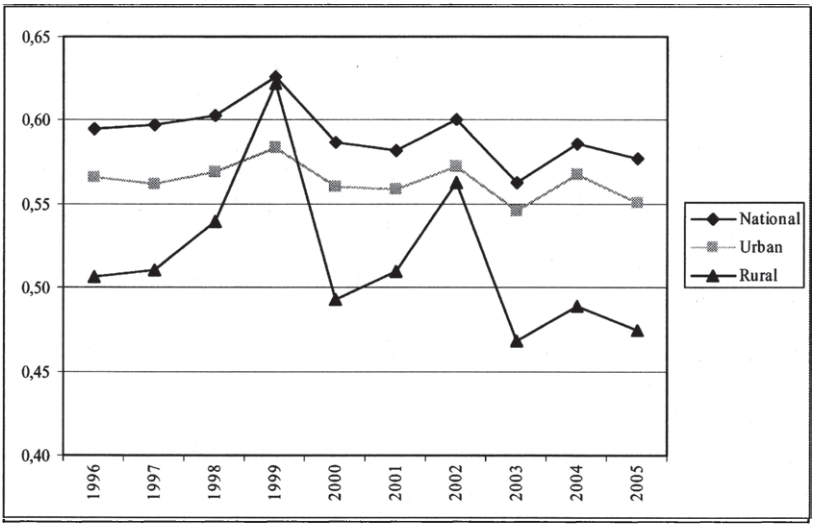
Source: Author's calculations based on ENH until 2000 and ECH from 2001 to 2005

Figure 20 Unemployment Rate by Area



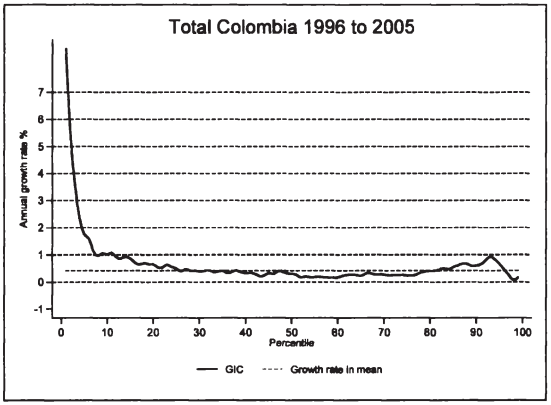
Source: DNP, 2006 based on ENH and ECH

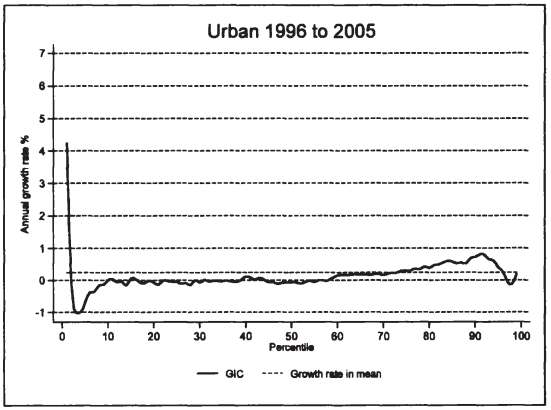
Figure 21 Colombia: GINI Coefficient by Area



Source: Author's calculations based on ENH up to 2000 and ECH from 2001 to 2005

Figure 22 Growth Incidence Curves 1996-2005





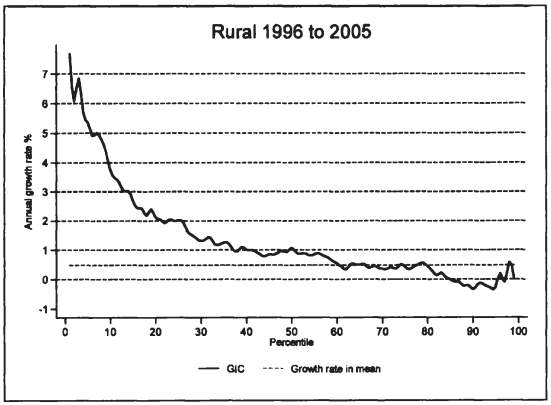


Figure 23 Growth Incidence Curves 1996-1999 by Area

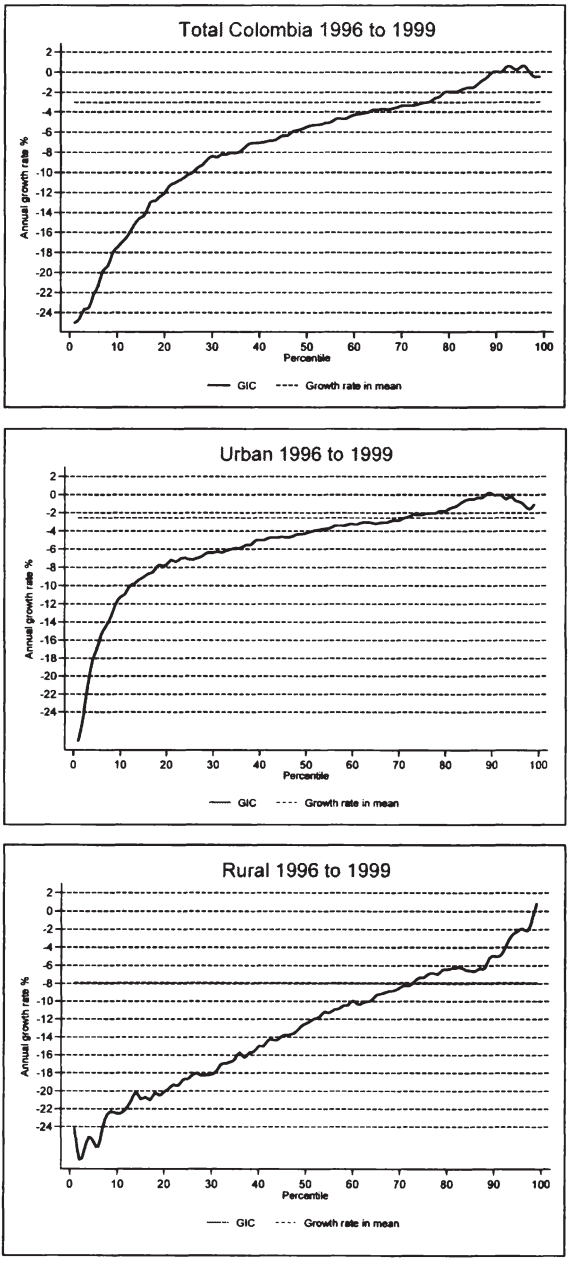
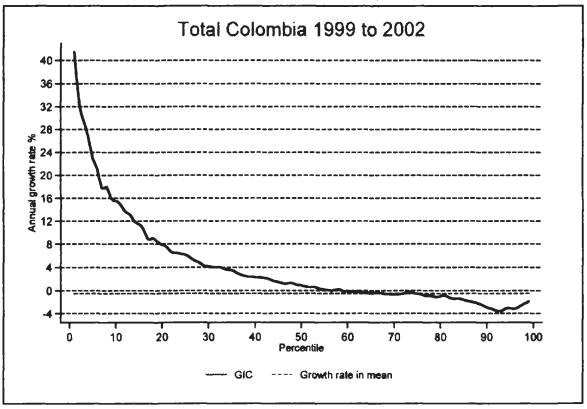
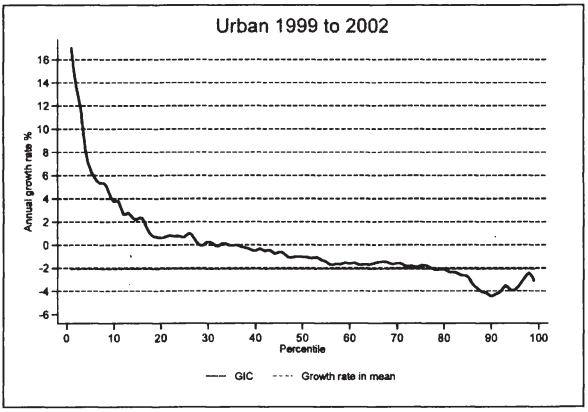


Figure 24 Growth Incidence Curves 1999-2002 by Area





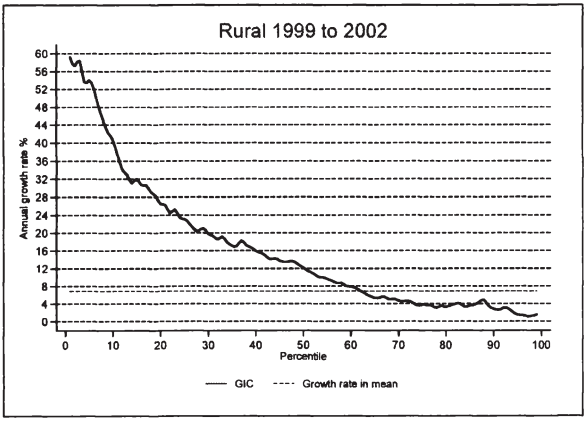


Figure 25 Growth Incidence Curves 2002-2005 by Area

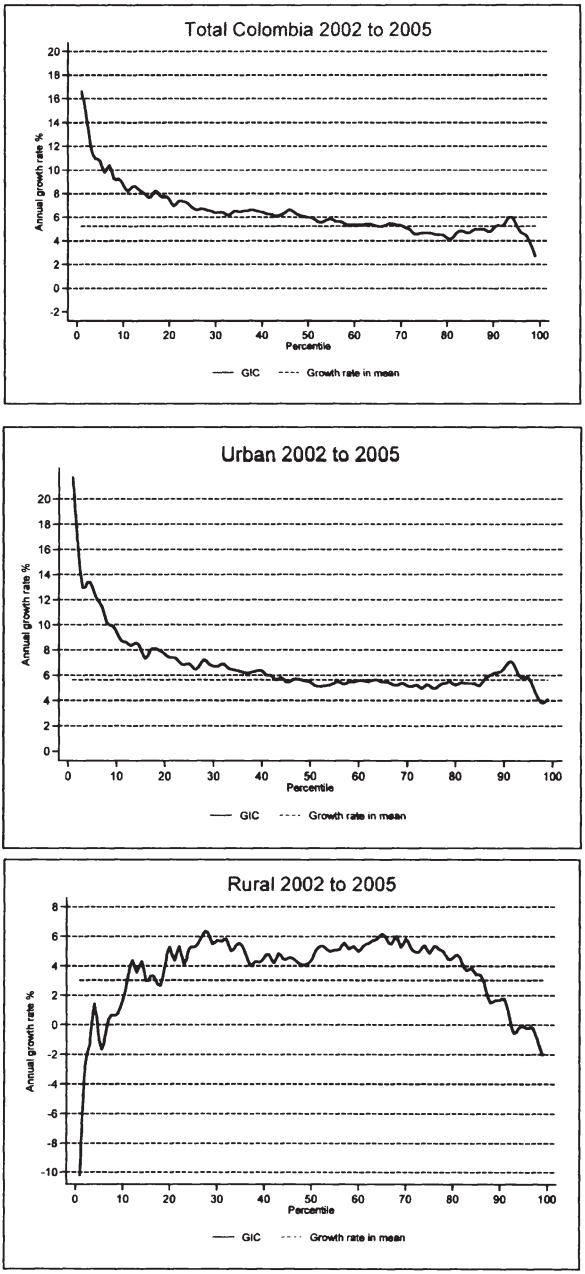
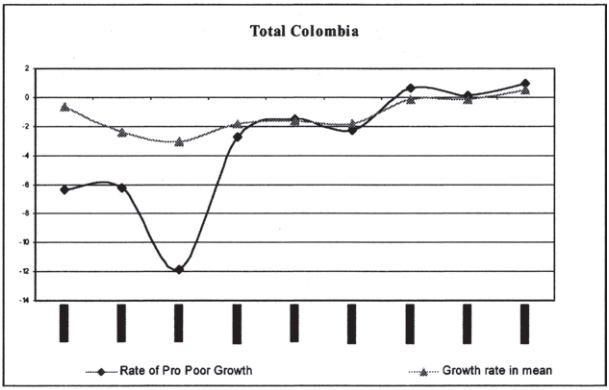
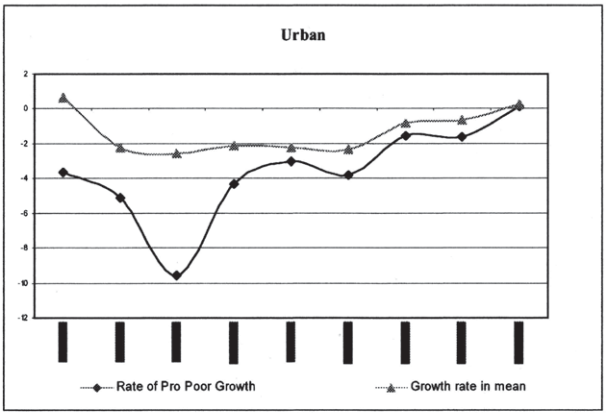


Figure 26 Pro-Poor Growth Rates 1996-2005 (base year 1996)





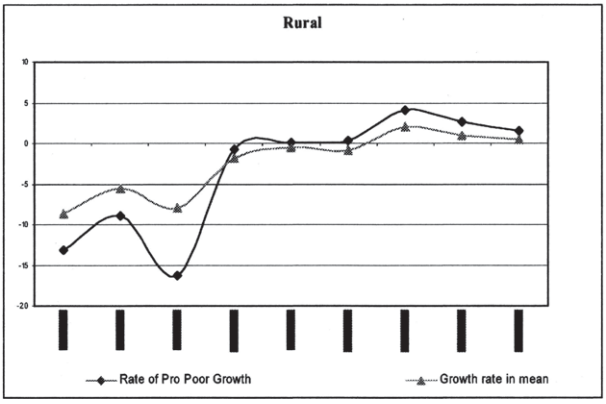
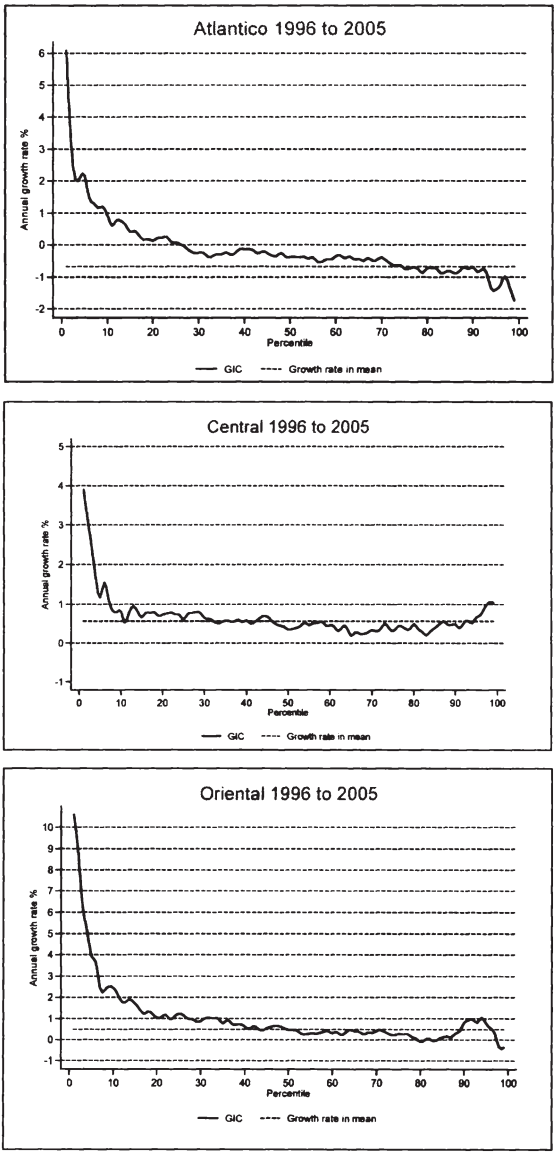
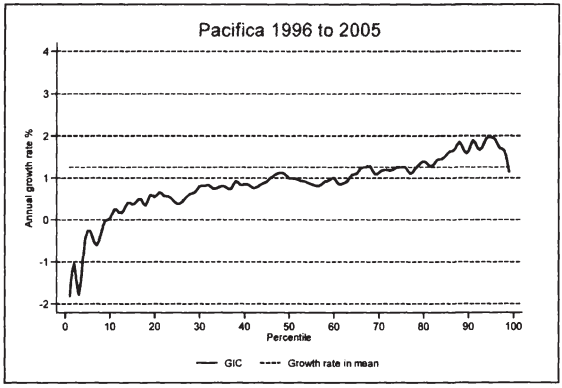


Figure 27 Growth Incidence Curves by Region





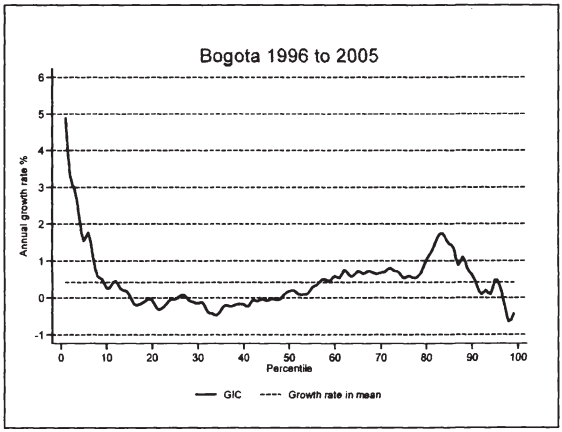
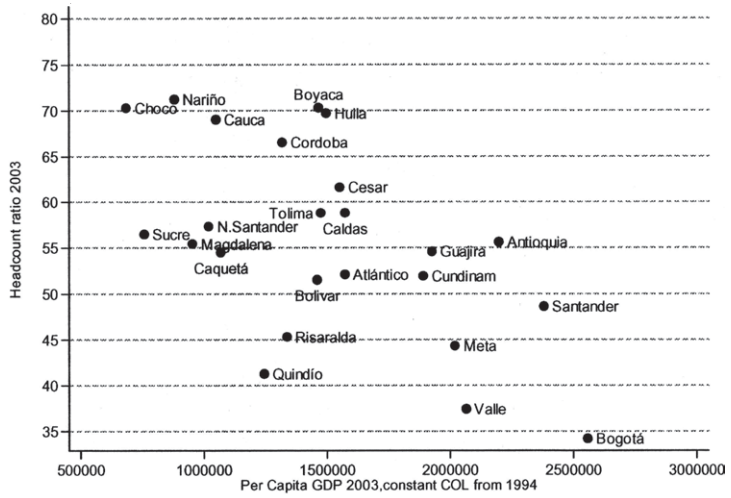
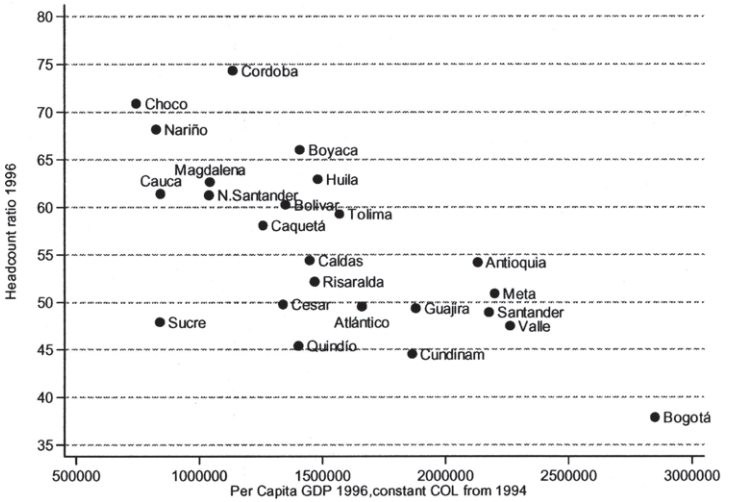


Figure 28 Per Capita GDP and Incidence of Poverty by Department





I.4 Crisis and Recovery in Argentina: Labor market, poverty, Inequality and Pro-Poor Growth Dynamics[†]

Melanie Khamis[a]

4.1 Introduction

After a prolonged recession Argentina experienced a severe economic crisis in 2001-2002. A slump with high levels of unemployment and increases in poverty was the consequence. Inequality, which had increased over the decade of the nineties, was exacerbated through the economic crisis. However, in 2003 and 2004 the economy slowly recovered and jobs were created.

This paper attempts to analyze the nature of the economic slump and recovery of Argentina through the lens of labor market transitions, poverty, inequality and pro-poor growth dynamics. The purpose is to understand whether the economic growth, as the Argentine economic recovery is the main interest, has been pro-poor or not and to provide a link to the labor market. Analysis of micro-level data will give an insight into the sectoral dynamics of the labor market, poverty, income changes and the link of poverty and the labor market. In addition to this the paper tries to understand the role of government policy, in terms of government transfers, which were mainly given through the workfare Plan Jefes y Jefas, in the recovery process. [1]

In the next section a description of the household survey data for Argentina is provided. Thereafter, in section 3, a brief literature summary of existing labor market studies for Argentina follows and the results of the analysis of the labor market dynamics for Argentina for 2001 to 2003. In part 4 growth performance, poverty, inequality and the labor market for this period are discussed. Poverty, inequality and pro-poor growth rates are described. Subsequently, several poverty decompositions, an Oaxaca-Blinder decomposition of income and

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† This paper is based on the joint working paper by Bertranou and Khamis (2005). I would like to thank Evelina Bertranou for her contribution to the working paper and Jesko Hentschel and Carlos Fernandez for many discussions and continued support. Moreover, I would like to thank the participants of the 'Poverty, Inequality and Policy in Latin America' conference in Goettingen for valuable comments and suggestions. The usual disclaimers apply and all the work and errors are my own in this current paper.

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1 In this paper I will use Plan Jefes or Jefes Program interchangeably. A short description of the program is given in footnote 2.

growth-incidence curves are estimated to complete the picture of analysis for the crisis and recovery periods. In the last sections the main conclusions are highlighted.

4.2 Data description

In this paper micro-level household data are employed to gain some insights into the labor market dynamics, poverty, income changes and pro-poor growth features of the Argentine economy during the crisis 2001-02, the early recovery period 2002-03 and the later recovery period 2003-04.

The official Argentine household survey, the EPH, is used for the period until May 2003. From mid-2003 onwards the Argentine national statistics office changed the frequency of data collection to four times a year and created a new version of the EPH, the EPH-continua (EPH-C from now onwards). Changes to the household and individual questionnaires of the EPH-C were implemented. Hence, for the period from 2001 to 2003 the old EPH surveys corresponding to the May wave were used in this paper and for the later period of 2003 and 2004 the analysis is based on the second semester EPH-C surveys.

Overall, most studies on the Argentine economy, especially the labor market, refer to the EPH and EPH-C data sets as these are the most extensive official micro-data available for Argentina. It seems only appropriate to use this data set for the empirical study. Clearly, due to some of the limitations of these data, the comparability of surveys EPH and EPH-C and also the representation of only urban population, leaving out rural areas, the results in this paper have to be viewed in this light.

4.3 The labor market in Argentina

In order to understand the recent trends in the labor market in Argentina, changes in the labor market in sectors and labor market participation, in other words the labor market dynamics, over the recent slump and recovery are looked at over the period 2001 to 2003. In the next section, a short summary of the previous literature on job creation and the labor market literature for Argentina in general portrays the context of this analysis.

4.3.1 The previous labor market literature

For this paper several recent research papers on Argentina are highly relevant: literature on job creation and destruction, the labor market, workfare program evaluation, the informal sector, and also the crisis response of the labor market.

Covering the 1990s, a study on job creation and destruction in industrial sectors uses employment changes over one year to determine the trends (Galiani and Gerchunoff, 2004). From 1992 to 1995 the manufacturing sector shed

employment while all the other sectors have employment growth with exception for the year 1994. During the 1990s they find that job creation was high alongside also very high job destruction in Argentina.

Contrary to Galiani and Gerchunoff (2004), Cavalcanti (2003) finds that job creation was relatively low during the growth years from 1992 to 1998. A lack of labor market dynamism seemed to persist, which was not related to slow growth or high non-wage labor costs. This low level of job creation also fuelled the informal market, where discouraged workers settled for low paying jobs. He finds that jobs were mostly created in large and medium size enterprises in the 1990s. Due to high costs of entry and exit smaller firms had a minor role in job creation.

Another study on job creation and destruction for Argentina by Pessino and Andres (2004) investigates through a difference-in-difference estimation strategy the impact of trade liberalization and the devaluation on job creation and destruction in sectors over the period 1990 to 2003. For the mid-1990s they find that globalization, in other words trade liberalization, had an impact on job destruction, in particular the service sector and the formal sector, and no significant impact on job creation. For the period of the devaluation (the economic crisis), 2001 to 2002, they conclude that the effect was very heterogeneous in its impact across groups. Job creation occurred in construction and destruction in services and government sector. In the short-run though services and medium and small firms appeared to benefit.

In addition to job creation and destruction Bosch and Maloney (2005) investigate the average mobility, duration and flows between different labor market states, unemployment, formal and informal sector work and outside the labor force status for Argentina for 1993 to 2001. In comparison with Mexico and Brazil, Argentina seems to exhibit very low labor market mobility.

In the recent literature on Argentina and the Argentine economic crisis of 2001 several authors have focused on the role of the labor market in the crisis and the recovery (McKenzie, 2003; Kritz, 2002). McKenzie (2003) finds that a large fall in real wages across all sectors to be the main impact of the crisis alongside weak labor demand, not-increasing labor supply and a fall in participation in self-employment.

In his labor market analysis Kritz (2002) suggests that the job creation has become more procyclical at the end of the 1990s than the earlier 1990s. Also he finds that mainly private sector jobs and formal jobs were destroyed in the aftermath of the crisis. Jobs newly created were mostly in the informal sector and in the intermittent worker sector.

As a response to the recent crisis, the workfare program Plan Jefes y Jefas was introduced by the Argentine government, which was intended as an immediate response to the crisis.[2] Galasso and Ravallion (2003) evaluate the

2 The workfare program, Plan Jefes y Jefas, was implemented in April 2002. The program is targeted at unemployed low-skilled workers who are head of

impact of the program with administrative data and the Argentine household surveys and conclude that although partial problems with coverage existed the program compensated many losers from the crisis and prevented extreme poverty. Also Ronconi et al. (2004) look at the poverty and employment impact of Argentine workfare programs and conclude that the programs were pro-poor and helped the participants increase income and reduce poverty. They concluded that the programs aided participants to join the labor market and find a job.

Given the diversity of studies on the Argentine labor market, this paper will add to this literature with the analysis of the particular period of the economic crisis and economic recovery in terms of labor market dynamics, poverty, inequality, the role of government transfers and pro-poor growth from 2001 to 2004.

4.3.2 Labor market dynamics during the Argentine economic crisis and recovery

The labor market dynamics surrounding the crisis, early recovery and later recovery period can be analyzed by looking at the shares and distribution of employment, unemployment, inactivity, formal and informal sector and industrial sector within the different time periods (Bertranou and Khamis, 2005). The results from this analysis are striking in terms of different experience of economic crisis and recovery. For example, jobs in the formal and informal segment of the labor market were initially both destroyed, but the informal sector played a more crucial part in the early recovery period than the formal sector. Certain labor-intensive, low-skilled economic sectors, such as retail, construction and manufacturing, contributed to job creation more than other sectors after the crisis. This could be an indication of the changing nature of the labor market. Following Herrera and Shady (2003) in the following I have exploited the rotating panel structure of the EPH and analyzed a panel of individuals for the years 2001 to 2003.[3] The later recovery period of 2003 to 2004 was not looked at as the new EPH-C did not allow the creation of panel data and to follow individuals for more than one period.

In terms of employment one can observe that 78.03 percent that were employed in 2001 remained employed in 2002 while the rest of the one's employed in 2001 moved into unemployment and inactivity in relatively equal

household. Participants receive a monthly benefit of $150 (Argentine Peso) per month by the government. The work requirement of the program is to do 20 hours of basic community work, training activities, school attendance or employment in a private company with a wage subsidy for a limited time period.

3 39.4 percent of individuals in the 2001EPH wave were present in the 2002 EPH wave. 33.4 percent of individuals in the 2002 EPH wave were present in the 2003 EPH wave. The May waves of the survey were employed. Due to fewer observations some of the subcategories in the transitions analysis could represent relatively small actual numbers of individuals and so the analysis should be viewed in that light.

shares (11.77 percent and 10.21 percent respectively) (Table 1). From the unemployed individuals in the panel in 2001 about 38.73 percent remained unemployed in 2002 with movements into employment and inactivity close to 30 percent. If an individual was categorized as inactive for 2001, it was very likely that they remained in inactivity (90.33 percent) in 2002.

The picture changes slightly for the years 2002 to 2003, the early recovery period. If an individual was employed in 2002, the crisis year, it was likely that the person remained employed (85.34 percent) the following year, 2003. In addition to this it seems that the job finding rate of individuals seemed to have picked up as one can see that about 46.82 percent of the people unemployed in 2002 were in employment in 2003. Contrary to this improved dynamics for the unemployed about 90 percent of the inactive individuals in 2002 remained inactive in 2003.

Transitions from employment, unemployment and inactivity into a workfare plan were generally higher for the transition period 2002 to 2003 than for 2001 to 2002, the immediate crisis period. 6.34 percent of those unemployed individuals in 2002 reported participation in a workfare plan in 2003 while 3.15 percent of the employed and 1.55 percent of the inactive from 2002 participated in a workfare program. Corresponding numbers for 2001 to 2002 are much smaller, pointing at the importance of the transitions into workfare programs and the early economic recovery (Table 2).

In terms of labor market dynamics between formal and informal sector and labor force status, it seems that informally employed workers were more likely to become unemployed or inactive than formally employed workers in both transition periods. On the reverse picture unemployed and inactive individuals appeared to find more informal jobs than formal jobs in 2001-2002 and 2002-2003 (Table 3).

Employers, followed by employees and then self-employed, were most likely to retain their jobs in the crisis period and the early recovery period whereas the unpaid were the least likely. Movements from unemployment and inactivity into employments usually meant a move into employee or self-employed status (Table 4).

Overall, in the period, 2002-2003, more unemployed found employment in the informal sector and moved from the unemployment status to employment status as employees than in 2001-2002. Hence, the onset of economic recovery was reflected in the labor market. In terms of industrial sectors four sectors seemed to be the most dynamic in terms of employment, unemployment and inactivity movements: manufacturing, other services, construction and the trade/retail, restaurants and hotels sectors (Table 5).

4.4 Growth, poverty and the labor market

From the earlier analysis, the negative growth rates of the economic crisis and the positive growth rates of the recovery period were largely reflected in the general trends in the labor market: increases in unemployment and inactivity alongside decreases in employment during the crisis and the reverse picture during the recovery period. It seemed that the labor market was more response to the recovery period than to the crisis. This is points to a changing nature of the labor market.

In general the connection between the labor market and poverty would be through the channel of employment and income. The income of the poor could come from labor earnings and/or from government transfers. In the Argentine case, for example, not only individual income of the different labor market sectors was important, but also income from transfers played a role. Especially in the early recovery period after 2002, transfers by the government through the Jefes Program could account for part of the individual income of the poor.

An analysis of poverty, inequality and the labor market seems necessary to understand the performance of the labor market during crisis and recovery and the role of government transfers, like the workfare programs, further. For this reason a short description of the Argentine poverty, inequality and pro-poor growth data, accounting for government transfers, is provided in the following section. Thereafter poverty changes are analyzed and decomposed according to growth and inequality components and sectors, which here could be economic sectors or labor force/labor market status. In addition to this I also analyze changes in mean income through an Oaxaca-Blinder type decomposition.

Finally, I proceed to look at income changes and the distribution of those changes during the Argentine crisis and recovery. In particular it is interesting to see whether the poor disproportionately shared the Argentine growth experience or not. In other words, whether the economic growth, as the Argentine economic recovery is the main interest here, was pro-poor or not. The role of government policy, for example transfers through the Plan Jefes program, is taken into account in this analysis.

4.4.1 Poverty, inequality and pro-poor growth performance in Argentina

This section intends to describe some of the trends in the poverty, inequality and pro-poor growth performance in Argentina, especially in the period of interest, 2001 to 2004.

As one can see in Table 6 poverty and extreme poverty highly increased during and after the crisis in 2001 to 2002. The official poverty rate shows that over 53 percent of the population were poor in 2002, while in 2001, 35.9 percent were poor. This sharp increase is also apparent on the household level, where the percent of poor households rose from 26.2 percent in May 2001 to 41.4 percent in May 2002. In addition to this, extreme poverty more than doubled between 2001 and 2002. In 2001 8.3 percent of households were in extreme

poverty while in 2002 18 percent of households were counted as indigent. The individual indigence rate exhibits a similar pattern with 11.6 percent in 2001 and 24.8 percent in 2002. In the period 2002 to 2003, although economic recovery had started slowly, poverty rates and indigence rates still show small increases. Contrary to this, official Argentine poverty and indigence rates fell between the first semester of 2003 and the second semester 2004.

These poverty and indigence rates are based on household income, which due to the economic crisis might have been supplemented by government transfers, for example the Jefes Program. This would bias these indicators downwards. In other words, actual poverty and indigence might be higher without the income from this government policy. For this reason, in Table 6 the poverty and indigence rates, unadjusted and adjusted for Jefes Program, are presented. It is possible to see from these numbers that the poverty and indigence rates are overall slightly higher when accounting for Jefes Program. Still, the trend of a decrease in poverty and indigence remains for the period of October 2002 to the second semester of 2004. Not only increases on poverty occurred during the crisis period, but also impacts on inequality can be observed.

Inequality, across all different measurements of inequality, increased over the decade of the 1990s in Argentina (CEDLAS, 2004). Once a very-low-inequality country by Latin-American standards, Argentina experienced disequalizing changes to which many different factors contributed (Gasparini, Marchionni and Sosa Escudero, 2002; De Ferranti et al., 2004). In a recent study on socio-economic indicators for Argentina it was found that inequality measures, which demonstrated a coherent increase along all the measures for the nineties, disagreed over the inequality behavior over the period 2001 to 2003 (CEDLAS, 2004). Indices that attach a higher weight at the bottom of the income distribution exhibit a fall in inequality (Atkinson with parameters 1 and 2, and entropy with parameter 0) since relative income of the very poor increased. In order to understand the income inequality patterns a stricter income, the equivalized household labor monetary income instead, was used. Inequality patterns were similar to the previous inequality measures with exception of the period 2001 to 2003, where all indicators using labor monetary income showed an increase in inequality between 2001 and 2003 (CEDLAS, 2004). With the focus on labor income, capital income and transfers are ignored. In particular transfers from Jefes Program are excluded from the statistics and therefore incomes in the first deciles go down between 2001 and 2003.

In order to understand the impact of the crisis and recovery for 2001 to 2004, not only poverty and inequality patterns need to be looked at. It is interesting to see how the poor shared the recession and growth.

The rate of pro-poor growth, which has recently dominated the development research literature, could provide us with some insights into the nature of economic growth and its links to the distribution of income to the poor

(Ravallion, 2004; Ravallion and Chen, 2004; Klasen, 2004).[4] In general pro-poor growth implies that the distribution of relative incomes is changed through the growth process in order to benefit or favor the poor. Pro-poor growth can have many possible definitions. For example, growth with a high poverty elasticity, growth that reduces the poverty headcount index, growth with declining inequality, incomes of the poor growing more than those of the rich, or share of income accruing to the poor increases, are several of the possible options. Out of recent research though, two main definitions for measuring pro-poor growth have emerged. Both approaches require the poor to be identified by specifying a poverty line.[5]

The first definition is the relative definition of pro-poor growth. It compares the income change of the poor with the income change of the rest of the population that is not poor. In this relative measure growth is pro-poor if the poor people's income grows faster than the income of the entire population. This implies a favorable distributional change for the poor alongside economic growth. In other words, income inequality falls (Klasen, 2004).

The second one is known as the absolute definition of pro-poor growth. This definition focuses only on the incomes of the poor. Growth is considered pro-poor if on average the incomes of the poor are rising. In other words, the poor benefit in absolute terms, indicated by a falling poverty measure (Ravallion and Chen, 2003; Kraay, 2004). In this paper the absolute definition of pro-poor growth is used to understand the nature of the Argentine slump and recovery.

Pro-poor growth rates are calculated for the period 2001-02, 2002-03 and 2003-04 (Table 7). The poor experienced a very strong decline (-36.70 percent) in their household income in 2001-02. However, the poor deciles of the income distribution experienced on average a 7.27 percent growth in income between 2002 and 2003. In the most recent period, 2003-2004, pro-poor growth was even higher with 15.40. These numbers though are, as previously the poverty and inequality numbers, biased through the transfer component in the income measures used. Hence, pro-poor growth rates were calculated for income without government transfers.

Clearly, the number for 2001 to 2002 did not change significantly but was slightly higher than before (-37.27 percent). For 2002 to 2003 though, as opposed to the previously positive rate, the pro-poor growth rate is now negative at -10.32. Hence, the pro-poor growth in this period can be entirely accounted for through the government transfers such as the Jefes Program. This picture changes for the latest period 2003-2004. Without government transfers, pro-poor growth is found to be 15.78 percent. This is relatively similar to the pro-poor growth estimate with transfers for 2003-2004. Overall, in the early recovery period part of the growth seems to be due to transfers, but in the later recovery period transfers do not seem to be the main contributor to growth in the overall

4 For a short summery see DFID (2004).

5 In the case of Argentina the national poverty line is used.

income in the lower percentiles of the income distribution anymore. For 2003 to 2004 it seems that the pro-poor pattern of growth itself, for example through job creation in labor-intensive, low-skilled sectors of the economy, explains the pro-poor growth rates instead of government action through transfers.

4.4.2 Growth-redistribution and sectoral decompositions of poverty

To understand the above described trends and changes in poverty more in detail, it is possible to calculate decompositions of those changes. Following Ravallion and Datt (1991) and Ravallion and Huppi (1991) Argentine growth-redistribution decomposition of a poverty change and sectoral decompositions of poverty are calculated.

In Table 8 growth-redistribution decompositions are presented for poverty and indigence changes for the different time periods. Looking at the general trends one can observe that in both poverty measures, extreme and moderate, a huge increase in poverty occurred for the time period May 2001 to May 2002 (the crisis period).

Clearly, when this poverty increase is decomposed, the growth component, in other words the sharp drop in growth, seems to account for the most of the increase in poverty. The redistribution component does play some role, but is not the major contributor to the poverty change. Looking at indigence the growth and the redistribution component seem to be equally important during the crisis.

This picture changes dramatically for the onset of the recovery, May 2002 to May 2003. Still, a small increase in poverty is observed, which is mostly accounted for by the growth component. In the case of indigence the redistribution component does have a dampening effect on the poverty increase. This could be due to the emergency transfer programs such as the Jefes Program having an impact on this part of the population. For later recovery period, 2003 to 2004, a poverty decrease is found for the sample using the poverty line as well as the indigence line. Both poverty and indigence rates were reduced by a growth effect and a distribution effect, which was nearly twice as large as the growth effect.

Overall, it is noticeable that not only the growth component is important in explaining the poverty and indigence changes for Argentina during 2001-2004, but also a considerable element is due to redistribution.

These poverty changes can also be looked at from the sectoral perspective, which would supplement the sectoral labor market analysis. Here, the link to poverty changes in sectors is explicitly discussed.

Different industrial sectors, formal and informal workers, labor force status (employed, unemployed and inactive) and labor market status (employer, self-employed, employee and unpaid) are looked at in this analysis (Table 10 and Table 11). In order to understand the magnitude of poverty in these sectors and their contribution to poverty changes, I also calculated the poverty shares of the total poor in sectors (Table 9). From these calculations it is possible to see that

many working poor were in some of the industrial sectors, for example retail, construction and manufacturing. The 'other services' sector also employed a large share of the poor during 2001-2004. Some other sectors, for instance education and public administration, increased the percentage of poor over time. The informal sector had a higher share of poor people than the formal sector during 2001 to 2003. However, during the period 2003 to 2004 the formal and informal sector had relatively equal shares of the poor. This might be due to the changed household survey definitions from EPH to EPH-C. In terms of labor force status the poor were mainly in the inactive group of the population. Surprisingly, many poor were also in the labor force in either status. Employed poor represented a bigger share of the poor than the unemployed. The numbers change quite a bit for the recent period and this is possibly again due to the difference between the two surveys, EPH and EPH-C. Looking at the labor market status the poor in this categorization were mainly employees and to a lesser extent self-employed. Employers and the unpaid did not have high shares of the total poor.

After these general characteristics of the poor, Table 10 displays growth-redistribution decompositions for poverty changes in the particular sectors. In general terms poverty increases occurred across all sectors from May 2001 to May 2002. Certain sectors though experienced a higher effect from the drop in economic growth, for instance primary, construction and transport, the informal, the unemployed and the inactive. In May 2002 to May 2003 several sectors, manufacturing, construction and transport and the self-employed, experienced a reduction in poverty. Growth and redistribution components played a differing role in these poverty reductions within sectors. The growth effect, which sometimes was outweighed by the redistribution effect increase, had a poverty-reducing effect in primary, construction, transport and other services sector and for the unemployed and self-employed. For the overall period from May 2001 and May 2003 a general poverty increase is prevalent, in which the growth component has the largest contribution. For 2003 and 2004 an overall poverty reduction across all sectors occurred.[6] Here, the growth and redistribution components also had diverse impacts in these poverty reductions. In some sectors, for example manufacturing, trade and transport, growth seemed to have contributed largely to the poverty change.[7] However, also the redistribution component has had an immense impact on poverty reduction in certain sectors, for instance the primary sector. For 2003 to 2004 I also find that an overall poverty reduction for the entire labor force, employed and unemployed, due to growth, but also redistribution. Even the inactive population experienced poverty reduction due to growth and redistribution. The informal workers and

6 Except the unpaid, who according to 4.4, did not represent a large share of the poor.

7 'Trade' is the short name used here for the 'Trade/retail, restaurants and hotel' sector.

self-employed experienced a decline in poverty partly contributed by a large growth component.

In order to gain further insights additional sectoral decompositions of poverty changes are presented in Table 11. Previously, the change of poverty in sector was decomposed into a growth-inequality component while now the contribution of the sector to total poverty changes is measured. Poverty changes are decomposed into intra-sectoral, inter-sectoral (population-shift) and interaction effects based on sectors or status. Obviously, the general poverty trends, a rise in poverty for the periods 2001-2002 and 2002-2003, and a decline in poverty for 2003-2004, have remained as general tendencies. In Table 11 the first column under each year provides the population share of each sector in the first period. The second column presents the contribution of each sector to the poverty change, the total intra-sectoral effect, the population-shift effect and the interaction effect.

For May 2001 to May 2002 manufacturing, construction, trade, transport and other services seemed to have contributed mostly to the poverty increase. This could point at the potential of these sectors to adjust relatively quickly to changes in the economic conditions. Inter-sectoral movements had a decreasing effect on poverty. Also the small interaction effect dampened the increase in poverty, suggesting that some people moved into sectors where poverty was not as high. For the formal and informal sector contribution to poverty change, it is apparent that the informal sector contributed to a higher degree to the poverty increase. This is offset by inter-sectoral shifts and a dampening interaction effect. The employed, unemployed and inactive segments all shared part of the poverty increase. The employed and self-employed were the main contributors to the poverty increase when looking at the labor market status category. Even the inter-sectoral shifts and the interaction effect accounted for a poverty increase in the labor force status and labor market status category.

In the following period, May 2002 to May 2003, the industrial sectors experienced diverging patterns: manufacturing, construction and transport actually reduced overall poverty when one looks at the contribution. Public administration, education and other services accounted for most of the poverty increases.

The formal and informal workers contributed to the poverty increase as well as the employed, unemployed and inactive. Also employees accounted for a huge contribution. For May 2002 to May 2003 the self-employed were one of the categories which showed a different trend to the 2001-2002 period. In the early recovery period the self-employed actually had a negative contribution to the overall poverty increase. In other words, the self-employed experienced reduced poverty, while overall an increase in poverty prevailed. For the entire period, 2001 to 2003, poverty increased to different degrees in the above-mentioned categories.

In the recent recovery period, 2003 to 2004, overall poverty was declining. For the 2003 and 2004 the industrial sectors showed all a contribution to poverty

decrease, except the finance sector. Informal workers still contributed a big share to poverty reduction. The formal sector, having a higher population share, seemed to contribute to a higher degree to poverty reduction than previously. In addition to that employees also experienced a huge part of this poverty decrease.

In general the sectoral decomposition of poverty changes results in several mixed messages. Certain industrial sectors, such as manufacturing, construction, and transport, experience very diverging contributions from one year to the next, with increasing poverty in the slump and decreasing poverty in the recovery. In other words, these sectors seem quite dynamic. Informal workers and employees play a role in both the slump and recovery period of the poverty changes. However, the interaction effect, the effect between intra-sectoral and population shift, that indicates whether people moved into sectors where poverty was falling was ambiguous. On one hand, for instance May 2001 to May 2002, it had a dampening effect on poverty increases while on the other hand (May 2002 to May 2003) it did not. In the case of poverty reduction the interaction effect was equally ambiguous. For 2003 to 2004 the interaction effect had a very small dampening effect.[8]

In the following section I will complete the analysis with an Oaxaca-Blinder decomposition of the mean income changes and a discussion of growth incidence curves, which will give an insight into the income changes of the entire distribution for the different time periods and different income sources.

4.4.3 Decomposition of income changes

In order to complement the analysis of labor market dynamics and poverty decompositions and to provide individual analysis of the link between poverty and labor market characteristics Bertranou and Khamis (2005) estimated probit regressions in order to understand the characteristics, which determine the probability of an individual to be in poverty. In this paper an Oaxaca-Blinder decomposition is performed to understand the mean income changes and to see to what extent covariates and price effects played a role (Blinder, 1973). In a very similar fashion to Klasen and Wolterman (2005) the following regression is estimated for period t and t':

$$\Delta\bar{y} = \bar{y}_{t'} - \bar{y}_t = (\alpha_{t'} - \alpha_t) + \beta_t(\bar{x}_{t'} - \bar{x}_t) + \bar{x}_{t'}(\beta_{t'} - \beta_t)$$

The mean income in this equation is the sum of several effects, the shift effect resulting from the difference in regression constants, the endowment effect and the price effect.[9]

Table 12 and Table 13 present the results of this analysis for Argentina with certain household characteristics previously employed in the probit regression analysis of Bertranou and Khamis (2005).

8 In Bertranou and Khamis (2005) the interaction effect had a dampening effect when using 2nd semester 2003 and 1st semester 2004 data.

9 t is period 2001 and t' is period 2003.

From this analysis it is possible to see that the large price effect and the endowment effect are negative and hence on their own would have decreased mean income. However, at the economic recovery onset in 2002 to 2003, their overall effect is partially outweighed by a large positive shift coefficient.

4.4.4 Growth and government transfers: Growth incidence curves

This section analyzes the linkage to economic growth and tries to understand how lower percentiles of the income distribution shared the recent economic crisis (2001-02), the early recovery (2002-03) and the later recovery period (2003-04).

Given the interest in pro-poor growth features the growth incidence curves preferably should display growth, which would be indicated through the line lying above the horizontal axis. The pro-poor nature would be with a decreasing line from left to right, with the lower percentiles of the income distribution being on the left. Growth incidence curves for 2001-2002, 2002-2003 and 2003-2004 fully capture the time period of the recession, the onset of the recovery and the later recovery.

Different income measures, total per capita household income with and without transfers, are used in this growth incidence analysis (Figure 1 and Figure 2).[10] The household income measures without transfers subtract the additional income from government transfers. Transfers such as Jefes Program could have a major impact especially in the lower tail of the income distribution, where the poor are, and could lead to an underestimation of the slump or an overestimation of the recovery.

In Figure 1 (left panel) growth incidence curves of total household income per capita including transfers are displayed for the 2001-2002 and 2002-2003 period. For the period of the slump, 2001-2002, is characterized by negative growth rates across the entire income distribution. For the poor though the recession is more prevalent than for the higher percentiles of the income distribution. This is apparent in the upward-sloping growth incidence curve. For the period 2002-2003 a downward-sloping growth-incidence curve with some positive growth rates in the lower percentiles and negative growth rates for the upper percentiles is the result of the calculations, using the total household income per capita. As pointed out earlier, the downward-sloping and positive growth part of the growth-incidence curve makes it possible to classify the economic growth of total household income as pro-poor growth.

In addition to this growth-incidence lines excluding transfers are drawn up for both years (Figure 1 right panel). In this direct comparison the growth-incidence curves for 2001-2002 with and without transfers coincide while the growth-incidence curves for the two income measures for 2002-2003 differ. The

10 The left panel in Figure 1 and Figure 2 displays growth incidence curves for income with transfers while the right panel in Figure 1 and Figure 2 shows growth incidence curves for income without transfers.

pro-poor component, the higher growth at the lower end of the income distribution, seems to be taken away when using the income measure without transfers. For this reason one could argue that the pro-poor growth observed during the 2002-2003 period could likely be due to government transfer programs such as the Jefes Program.[11] Overall, the role of transfers seems to be prevailing in the growth tendencies over the recovery period of 2002-2003.

For 2003 to 2004 one can clearly see the downward-sloping very positive growth trend for the income per capita with transfer (Figure 2 left panel). Most percentiles, except possibly the very high percentiles, experience a positive growth rate in real terms. This is clearly very pro-poor. Comparing it to the earlier period, 2002-2003, the positive growth rates are much higher than before for a bigger share of the income distribution.

Given the earlier observations that growth in 2002-2003 was partly accounted for by the transfer component of income, I compare total household income with and without transfer to see whether the nature of growth was similar. In Figure 2 (left and right panel) the results show that both income measures, with and without transfers, follow a very similar trend. They do not diverge very much. The general pro-poor trend remains and one can conclude that transfers seem to matter less in this growth experience than in the early recovery period. Compared to the previous period, where transfers seemed to drive economic growth partly, it seems that stronger growth was experienced across sectors. The pro-poor pattern of growth itself could account for these features. Possibly through a shift in the labor market towards labor-intensive sectors, where the poor are more likely to be employed, could be one explanation.

4.5 Conclusion

This paper attempted to present and discuss the Argentine crisis and economic recovery of 2001 to 2004 through a closer look at the labor market. In the analysis of the household survey data, I discovered several important findings.

Firstly, in the labor market dynamics analysis of the different labor market states and formal and informal segments of the labor market, it was possible to see a diverging experience for crisis and recovery period. In the period, 2002-2003, more unemployed found employment in the informal sector and moved from the unemployment status to employment status as employees than in 2001-2002. Hence, the onset of economic recovery was reflected in the labor market. In terms of economic sectors it seems that certain labor-intensive, dynamic, low-

11 The impact of the Plan Jefes program might be slightly overestimated through this graph. Also it is important to bear in mind that there are other transfers available outside Plan Jefes. For an impact evaluation of Plan Jefes see Galasso and Ravallion (2003) or Ronconi et al. (2004).

skilled sectors such as manufacturing, other services, construction and the trade/retail, restaurants and hotels contributed the movement between employment, unemployment and inactivity.

Secondly, while the sectoral decompositions of poverty gave mixed results, I found that in the decompositions of poverty changes according to growth and redistribution not only the growth component is important in explaining the poverty and indigence changes for Argentina during 2001-2004, but also a considerable element is due to redistribution. In the sectoral decompositions it was possible to see that certain sectors such as manufacturing, construction and transport were very dynamic, experiencing a very diverging contribution to poverty increases and decreases from one year to the next.

Thirdly, from the Oaxaca-Blinder analysis it is possible to see that the large price effect and the endowment effect were negative and hence on their own would have decreased mean income over the time period 2001 to 2003. However, at the economic recovery onset in 2002 to 2003, their overall effect is partially outweighed by a large positive shift coefficient.

Finally, in the poverty, inequality and pro-poor growth rates and the growth incidence analysis (and probably supported by the considerable redistribution element in the poverty decompositions) it was possible to gain some insight into the role of government policy during the crisis and in particular in the early recovery period of 2002-03 and the later recovery period 2003-04. The pro-poor features of the early economic recovery period were mainly accounted by these government transfers, where the workfare program Plan Jefes can be counted into. Contrary to this, at later stages of recovery income increases of the poor are less attributed to government transfers and more due to the pro-poor pattern of growth itself.

This result seems to tie in with the labor market analysis, which indicates a move towards certain labor-intensive sectors, where a high proportion of the poor work. In other words, in the Argentine case the labor market and its dynamics could provide an explanation for the drivers of the observed pro-poor growth.

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Tables and Figures

Table 1 Labour force status transitions, 2001/02 and 2002/03 (%)

	2002					
2001	E	U	I	Total	Total Row	Total No.
E	78.03	11.77	10.21	100	34.77	3247299
U	33.24	38.73	28.03	100	6.42	599335
I	5.45	4.22	90.33	100	58.82	5493695
Total Column	32.36	9.09	58.55	100	100	
Total No.	3066712	861205	5548764			
	2003					
2002	E	U	I	Total	Total Row	Total No.
E	85.34	5.47	9.19	100	32.10	1892425
U	46.82	34.40	18.78	100	8.48	499847
I	6.54	3.30	90.15	100	59.43	3503871
Total Column	35.66	6.78	57.56	100	100	
Total No.	3568513	678290	5760051			

Note: EPH data. Employment (E), Unemployment (U) and Inactivity (I).

Table 2 Workfare plan and labour force status, 2001/02 & 2002/02 (%)

	2002		2003
2001	Workfare Plan	2002	Workfare Plan
E	1.28	E	3.15
U	1.93	U	6.34
I	0.27	I	1.55

Note: EPH data. Employment (E), Unemployment (U) and Inactivity (I).

Table 3 Informality/formality and labour force status, 2001/02 and 2002/03 (in %)

	2002				
2001	E	U	I	Total	Total No.
Formal E	88.03	7.89	4.09	100	1463598
Informal E	67.06	16.90	16.04	100	857627
	2003				
2002	E	U	I	Total	Total No.
Formal E	92.32	3.16	4.53	100	825967
Informal E	77.72	8.88	13.41	100	500869

	2002		
2001	Formal E	Informal E	Total
E	68.91	31.09	100
U	27.68	72.32	100
I	19.22	80.78	100

	2003		
2002	Formal E	Informal E	Total
E	65.17	34.83	100
U	17.44	82.56	100
I	13.54	86.46	100

Note: EPH data. Formal Employment (Formal E), Informal Employment (Informal E).

Table 4 Labor force status and labor market status, 2001/2002 and 2002/2003 (in %)

	2002				
2001	E	U	I	Total	Total Row
EM	86.31	4.80	8.99	100	4.71
SE	71.17	15.00	13.83	100	22.39
EMP	80.20	11.26	8.54	100	71.80
UP	41.63	11.26	51.30	100	1.10
Total Column	32.36	9.09	58.55	100	100
	2003				
2002	E	U	I	Total	Total Row
EM	93.08	3.16	3.76	100	3.50
SE	81.38	5.99	12.63	100	24.48
EMP	86.77	5.31	7.92	100	1.50
UP	65.08	9.52	25.40	100	1.50
Total Column	35.66	6.78	57.56	100	100
		2001			
	2002	E	U	I	
	EM	4.26	1.53	1.29	
	SE	22.84	36.81	34.56	
	EMP	72.19	59.49	60.95	
	UP	0.70	2.16	3.21	
		2002			
	2002	E	U	I	
	EM	4.25	1.40	1.58	
	SE	22.96	31.57	27.15	
	EMP	71.93	66.12	68.47	
	UP	0.87	0.92	2.80	

Note: EPH data. Employer (EM), Self-Employed (SE), Employee (EMP), Unpaid (UP).

Table 5 Industrial Sector and labor force status, 2001/02 and 2002/03 (%)

	2002				
2001	E	U	I	Total	Total Row
Primary	76.10	10.65	13.25	100	1.28
Manufacturing	72.28	14.28	13.44	100	14.64
Construction	50.39	40.00	9.61	100	9.44
Retail, Rest. And Hotel	68.18	14.60	17.22	100	22.85
Utilities and Transportation	76.91	16.32	6.77	100	8.82
Finance and Prop.	73.39	19.33	7.28	100	9.55
Public Adm. and Defense	87.49	5.81	6.70	100	7.57
Education and Health	86.45	5.88	7.67	100	11.70
Other Services	66.73	13.76	19.51	100	14.15
Total Column	32.36	9.09	58.55	100	100
	2003				
2002	E	U	I	Total	Total Row
Primary	84.54	7.79	7.67	100	1.03
Manufacturing	75.17	14.37	10.46	100	13.09
Construction	66.35	25.21	8.44	100	9.57
Retail, Rest. And Hotel	76.44	10.98	12.58	100	23.18
Utilities and Transportation	84.95	8.80	6.25	100	7.51
Finance and Prop.	76.15	11.63	12.22	100	9.59
Public Adm. and Defense	90.48	3.07	6.45	100	7.77
Education and Health	88.41	3.84	7.75	100	13.64
Other Services	74.14	10.37	15.49	100	14.63
Total Column	35.66	6.78	57.56	100	100
	2001				
2002	E	U	I		
Primary	1.02	1.13	1.18		
Manufacturing	14.75	13.83	15.68		
Construction	7.34	21.72	4.62		
Retail, Rest. And Hotel	21.60	22.57	32.27		
Utilities and Transportation	9.27	7.76	4.38		
Finance and Prop.	9.65	8.43	5.47		
Public Adm. and Defense	9.30	4.06	3.71		
Education and Health	14.53	5.76	8.92		

Other Services	12.54	14.73	23.78
	2002		
2003	E	U	I
Primary	1.18	1.01	1.95
Manufacturing	12.45	13.36	11.95
Construction	6.96	21.14	7.93
Retail, Rest. And Hotel	21.64	22.01	24.15
Utilities and Transportation	8.82	8.95	2.75
Finance and Prop.	9.76	6.49	7.64
Public Adm. and Defense	9.38	4.67	6.00
Education and Health	15.85	7.51	15.09
Other Services	13.95	14.87	22.54

Note: EPH data. Employment (E), Unemployment (U) and Inactivity (I).

Table 6 Poverty and Indigence rates

	Poverty				
	May-01	May-02	May-03	S2-03	S2-04
Total Urban					
Households	26.2	41.4	42.6	36.5	29.8
Individuals	35.9	53	54.7	47.8	40.2
Excluding income from Plan Jefes 1/					
Households	-	-	43.2	37.1	30.6
Individuals	-	-	55.3	48.5	40.9
	Indigence				
	May-01	May-02	May-03	S2-03	S2-04
Total Urban					
Households	8.3	18	17.9	15.1	10.7
Individuals	11.6	24.8	26.3	20.5	15
Excluding income from Plan Jefes 1/					
Households	-	-	20.5	17.2	13
Individuals	-	-	29.7	23.5	18.2

Source: EPH, INDEC.

1/ Plan Jefas y Jefes with and without work requirement is considered.

Table 7 Rate of por-poor growth

	2001-02	2002-03	2003-04
Total hhs. Income			
Mean growth rate at headcount index percentile	-36.70	7.27	15.40
Total hhs. Income without transfers			
Mean growth rate at headcount index percentile	-37.27	-10.32	15.78

Note: Author's calculations based on EPH for 2001-02 and 2002-03. EPHC for 2003-04.

Table 8 Decomposition of poverty and indigence changes

	Total change	Growth effect	Distribution effect
Poverty			
2001-2002	16.874	12.885	3.989
2002-2003	1.336	0.948	0.388
2003-2004	-6.565	-2.106	-4.459
Indigence			
2001-2002	13.071	6.787	6.284
2002-2003	0.619	0.708	-0.089
2003-2004	-4.307	-1.414	-2.893

Note:
1/ Data for May 2001 to May 2003 from EPH. For 2003 and 2004 the data are second semester data from EPH continua.
2/ Average effect is quoted. Residuals are zero.

Table 9 Poverty in sectors (shares of the total poor)

	May-01	May-02	May-03	2nd 03	2nd 04
Industrial Sectors					
Primary	0.35	0.36	0.51	0.60	0.55
Manufacturing	4.60	4.85	4.59	4.97	5.54
Construction	4.37	4.25	3.98	2.72	3.15
Retail, Rest. And Hotel	7.43	7.94	7.75	8.02	8.82
Utilities and Transportation	2.31	2.67	2.38	2.62	2.78
Finance and Prop.	1.49	1.53	1.68	3.00	3.02
Public Adm. and Defense	1.44	2.09	2.66	3.57	3.35
Education and Health	1.94	2.85	3.68	5.98	5.81
Other Services	5.65	5.81	6.06	5.01	5.39
Formal/Informal Sector					
Formal	6.56	7.33	7.60	13.95	14.84
Informal	8.37	8.43	11.94	14.30	14.70
Labor Force Status					
Employed	21.79	22.87	26.90	36.66	38.52
Unemployed	8.75	10.59	7.74	7.08	5.92
Inactive	69.39	66.48	65.34	37.78	37.56
Labor Market Status					
Employer	0.20	0.22	0.25	0.96	1.24
Self-Employed	6.31	6.44	6.74	8.15	8.42
Employee	14.97	15.82	19.55	32.31	32.86
Unpaid	0.31	0.38	0.37	0.56	0.48

Note: Deflated poverty lines and real household income per capita.

Table 10 Growth and inequality decomposition of poverty, by sector and labor force/market status

	May'01-May'02		May'02-May'03		May'01-May'03		2003-2004	
	Growth	Inequality	Growth	Inequality	Growth	Inequality	Growth	Inequality
Primary	15.72	1.15	-2.50	6.15	15.04	5.46	21.20	-30.66*
Manufacturing	13.93	6.32	1.85	-5.02*	16.58	0.51	-4.13	-4.23*
Construction	23.14	0.76	-5.79	5.03*	17.08	6.07	-2.34	-4.63*
Trade	13.43	5.19	2.30	-1.86	16.51	2.55	-4.15	0.47*
Transport	16.60	4.26	-1.12	-2.44*	15.88	1.42	-4.97	-2.80*
Finance	6.25	1.33	2.08	-1.90	8.96	-1.20	-0.38	-4.39*
Public admin.	9.96	4.77	4.69	5.84	14.44	10.83	-1.97	-5.34*
Education	8.36	4.71	2.98	3.48	11.30	8.23	-3.25	-3.07*
Other services	10.28	6.08	-1.71	4.57	10.10	9.12	-2.46	-6.62
Formal	7.89	2.07	1.68	-0.50	9.47	1.67	0.63	-6.18*
Informal	15.77	6.22	4.79	1.63	21.33	7.08	-5.88	-0.60*
Employed	10.31	4.94	3.26	0.59	13.98	5.12	-1.60	-4.59*
Unemployed	15.18	0.73	-1.60	1.71	15.78	0.24	-2.81	-3.88*
Inactive	13.11	3.38	1.14	0.37	14.57	3.43	-1.17	-4.53*
Employer	3.38	1.78	2.00	-0.55	3.70	2.91	2.70	-1.68*
Self-Employed	12.32	5.10	-1.19	-0.91*	12.62	2.70	-4.93	-1.36*
Employee	9.95	4.56	4.20	1.64	14.38	5.97	-1.70	-5.46
Unpaid	9.60	9.07	8.87	1.59	22.41	6.73	3.81	-2.41

Note:
1/ Industrial sectors are aggregated from EPH household survey.
2/ National poverty lines are used.
3/ All residual components are zero and omitted from the table.
4/ Definition for formality/informality: benefits receipts.
5/ Asterisk indicates an overall poverty reduction.
6/ Data for May 2001 to May 2003 from EPH. Data for 2003 and 2004 from EPH continua, semester data.

Table 11 Sectoral decomposition of poverty

	May'01-May'02		May'02-May'03		2003-2004	
	Share	Contribution	Share	Contribution	Share	Contribution
Industrial Sectors 5/						
Primary	1.14	1.13	1.04	3.43	1.65	2.54*
Manufacturing	14.38	17.11	13.97	-39.86	13.63	18.56
Construction	9.57	13.44	9.15	-6.22	7.46	8.47*
Retail, Rest. And Hotel	23.29	25.49	22.65	9.08	21.98	13.18*
Utilities and Transport	8.75	10.73	8.27	-26.46	7.17	9.09*
Finance and Prop.	9.08	4.05	8.43	1.37	8.23	6.40*
Public Adm. and Defense	7.24	6.27	8.13	77.07	9.79	11.67*
Education and Health	11.75	9.03	12.79	74.41	16.38	16.87*
Other services	14.80	14.24	15.57	40.07	13.72	20.32*
-Total Intra-sectoral		101.48		132.89		107.10
-Population shift effect		-1.04		-52.63		-6.99
-Interaction effect		-0.44		19.74		-0.11
Formal/Informal Sector 6/						
Formal	60.79	41.80	61.42	12.44	49.38	43.17*
Informal	39.21	59.53	38.58	42.43	50.62	51.68*
-Total Intra-sectoral		101.33		54.88		94.85
-Population shift effect		-0.81		38.54		5.28
-Interaction effect		-0.52		6.58		-0.13
Labor Force Status 7/						
Employed	34.85	31.49	31.71	90.79	44.97	43.15*
Unemployed	6.96	6.56	9.03	0.74	8.69	9.00*
Inactive	58.20	56.87	59.25	66.59	46.34	40.92*
-Total Intra-sectoral		94.92		158.13		93.08
-Population shift effect		4.92		-66.01		7.00
-Interaction effect		0.16		7.89		-0.07

Labor Market Status 8/						
Employer	3.73	1.26	3.01	1.13	2.29	-0.34*
Self-Employed	21.37	24.42	22.71	-12.39	19.42	17.92*
Employee	73.75	70.18	73.01	110.70	76.96	80.77*
Unpaid	1.15	1.41	1.27	3.45	1.33	-0.27*
-Total Intra-sectoral		97.27		102.89		98.07
-Population shift effect		2.00		-3.60		2.39
-Interaction effect		0.73		0.71		-0.46

Note:
1/ Share refers to population share in period 1. Contribution refers to change in total poverty.
2/ Decomposition is calculated for poverty head count index.
3/ Data for May 2001 to May 2003 from EPH. Data for 2003 and 2004 from EPH continua, 2nd semester data.
4/ Asterisk indicates an overall poverty reduction.
5/ According to main salaried earner in the sectors.
6/ According to main salaried earner in the sectors.
7/ Includes only people in a labor force status.
8/ Includes only all employed.

Table 12 Decomposition results for variables (as %)

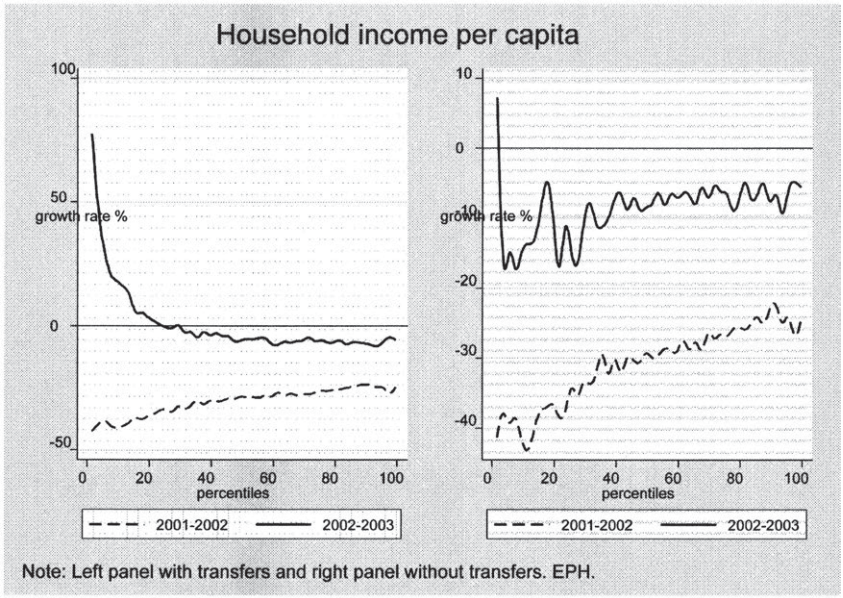
Variable	Attribution	Endowment	Coefficient
Age	1.2	0.0	1.2
Sex	0.1	0.0	0.1
Head of Household	-0.4	0.0	-0.4
Head's age	-23.4	-0.4	-23.0
Female Head	-0.1	0.2	-0.3
Single female head	-0.4	0.0	-0.4
Married head	-9.4	-0.1	-9.3
Education of head			
Primary incomplete	0.7	0.1	0.6
Primary complete	2.4	0.1	2.3
Secondary incomplete	0.7	-0.1	0.8
Secondary complete	2.2	0.1	2.0
Tertiary incomplete	-0.3	-0.4	0.2
Tertiary complete	0.8	-0.7	1.5
No. of household members	15.3	0.0	15.3
No. of children	-7.8	0.4	-8.1
Region			
GBA	-22.8	-0.1	-22.7
Cuyo	-3.6	0.1	-3.6
NEA	-2.9	0.2	-3.1
NOA	-5.1	0.1	-5.3
Pampaneana	-11.0	-0.6	-10.4
Patagonia	-1.7	0.0	-1.7
Subtotal	-65.6	-1.1	-64.5

Table 13 Summary of decomposition results (as %)

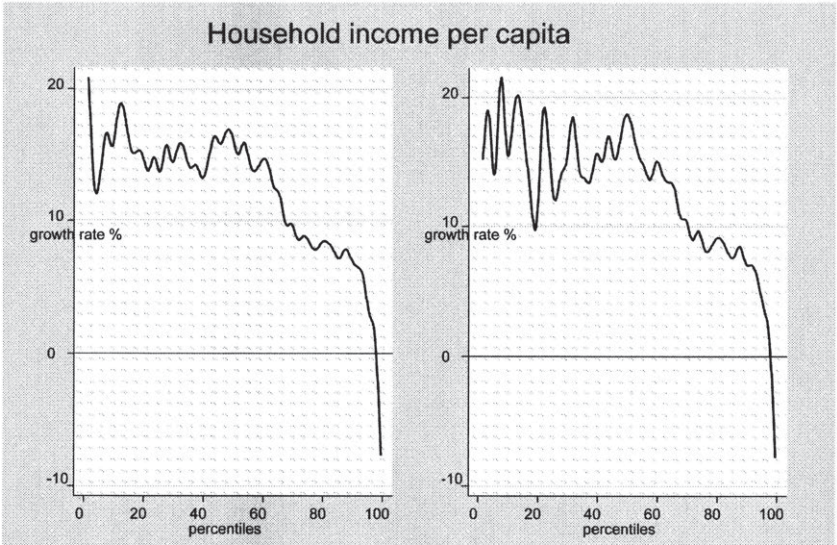
Amount attributable:	-65.6
-due to endowments (E):	-1.1
-due to coefficients (C):	-64.5
Shift coefficient (U):	103.6
Raw differential (R) {E+C+U}:	38
Adjusted differential (D) {C+U}:	39.1
Endowments as % total (E/R):	-2.8
Discrimination as % total (D/R):	102.8

Note: U (difference btw. Model constants).
D (proportion due to discrimination (C+U).
A positive sign indicate advantage to 2001 group, a negative sign indicates advantage to 2003 group.

Figure 1 Growth Incidence Curves, 2001-2003



Note: Left panel with transfers and right panel without transfers. EPH.



Note: Left panel with transfers and right panel without transfers. EPH continua data for 2003-2004.

I.5 Factors Influencing Income Inequality Across Urban Argentina (1998-2003)

María Emma Santos[a]

5.1 Introduction

Over the last four decades, and with considerable research, economists concluded that the distribution of income plays an important role in social welfare. Atkinson's theorem (1970) and extensions by Dasgupta, Sen and Starret (1973) and Shorrocks (1983) showed a direct link between Lorenz rankings and welfare rankings.[1] Because of these strong links with welfare, inequality is one of the most interesting topics in economic development.

Within any country, inequality exists between and within regions. Inequality between regions is called *spatial inequality*. Although the *between-regions* component tends to be small, this does not mean that it is an unimportant explanation of inequality. "*Spatial location is often not of interest itself but rather because of its association with many other important influences (...) Current procedures assign all of these factors to location without trying to disentangle the associated influences.*" (Shorrocks and Wan (2005), p.10)

Latin America is one of the regions in the world with the highest level of inequality. However, until the mid-1970's, Argentina was the exception to the rule, with most people belonging to the middle-income class with a few rich and poor. Since 1974, the country has experienced persistent deterioration in the distribution of income. While many papers have studied the determinants of the overall level of inequality in Argentina in recent decades, they have rarely

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1 Atkinson's Theorem states that if social welfare is the sum of individual utility functions, strictly concave in income, then, given two income distributions x and y, both with the same total income, if x Lorenz dominates y, the value of the welfare function in x is higher than in y. (Atkinson, 1970). Dasgupta, Sen and Starret (1972) proved that the theorem is valid in the less strict case of non-additive social welfare functions, non-individualistic social welfare functions and S-concave individual utility functions. Shorrock (1983) extended the validity of the theorem to compare income distributions with different mean incomes with the Generalized Lorenz Curve concept.

analyzed the factors that contribute to spatial inequality.[2] This paper focuses on spatial inequality and identifies some of those factors.

The paper provides evidence that education plays a very important role in the determination of spatial income inequality. Urban agglomerations with a high percentage of people who have completed primary education appear to have lower inequality, while urban areas with a high percentage of people who have completed secondary education show higher inequality. Urban areas with higher unemployment rates, higher returns to education and a lower percentage of people employed in the secondary sector tend to have higher levels of inequality. Areas with a higher percentage of people with unsatisfied basic needs and a higher percentage of households with indigenous members also show higher levels of inequality, although the effect of ethnicity is small. We also find association between spatial inequality and dependency and the level of development.

Section 2 presents a review of the literature on inequality determinants. Section 3 describes the data sources. Section 4 explains the measurement of inequality. Section 5 presents the basic features of inequality in Argentina. Sections 6 and 7 present the analytical model and the empirical approach. Section 8 presents the results. Finally, Section 9 provides policy implications and concluding remarks.

5.2 Literature Review

Bourguignon, Ferreira and Lustig (2005, p.10) distinguish two broad approaches to the study of inequality: the *macroeconomic* and the *microeconomic approach.* The first one uses aggregated data and regression analysis. The second one relies on microeconomic data, probit regressions and decomposition analysis.

The *macroeconomic approach* is usually applied to the study of international inequality determinants. The pioneer paper in this literature was Kuznets (1955) who hypothesized that in the process of development, inequality first rises and then declines. The original explanation for this theory argued that the process of economic development produces migration of the population from the agricultural sector to the industrial one. The initial shifts in population to the industrial sector lead to higher earnings among that small group of people, which increases the level of inequality. As more and more people move to the industrial-urban sector and the agriculture sector gets smaller, the ratio of the industrial wage to the agricultural wage decreases, decreasing the level of inequality.

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2 This may be due to the fact that it was not until the 1990s that the official household survey had reasonable National coverage.

Several papers tested the Kuznets' hypothesis. Some of the cross-country studies found support for the Kuznets' curve (Paukert (1973), Ahluwalia (1976) and Fields (1980)), but others found that by adding control variables to the model such as education (Bourguignon and Morrison, 1990) or regional dummy variables (Deininger and Squire (1998)), there is no support for the Kuznets' hypothesis. Using country-specific parameters, Deininger and Squire (1998) found that most countries under study show no U or inverted U-shaped relationship. In summary, there is no consensus on whether there is an inverted-U empirical regularity between inequality and income across countries or within countries over time. Moreover, even when empirical support is found for the Kuznets hypothesis, the low R^2 usually obtained makes it clear that there are many other factors that are associated with inequality.

The study of the determinants of spatial income inequality within countries also belongs to the *macroeconomic approach*. The starting point of most of these studies is again the Kuznets hypothesis but many other variables have been suggested as potential determinants of spatial income inequality. These include industrial structure (Levernier et al., 1995), city size (Long et al. 1977, Nord 1980), demographic characteristics (Nord 1982, Levernier et al., 1995), education (Al-Samarrie and Miller, 1967) and labor market variables (Dunford, 1996).

The papers by Trendle (2005) and Morrill (2000) are worth mentioning for their similarities with our study. Trendle (2005) evaluates the sources of cross-sectional variation in income inequality between local government areas, within the region of Queensland, Australia, with data from the 2001 Census. Using the Gini Coefficient as the inequality measure, he finds that the average regional income, the share of women in the workforce, the proportion of the population with post-school qualifications and unemployment are positively associated with inequality. Higher shares of employment in the construction industry tend to reduce inequality, while higher shares of employment in the mining industry tend to increase it. Morrill (2000) uses Census data to examine income inequality across states in the United States from 1970 to 1990 and also uses the Gini Coefficient as the inequality measure. He runs separate regressions for each year and one regression for the change in inequality in the period. He finds that high rates of labor force participation, manufacturing wages, unions, welfare support levels, urbanization and home ownership lowered inequality while higher rates of female-headed households, racial minorities, property income, dependence on military expenditures, service employment and farm activities increased inequality.

For Argentina, Gasparini et al. (2000) tested the Kuznets' hypothesis with a panel of 22 provinces' capital cities for the years 1990, 1992, 1994, 1996 and 1998. They used the Gini coefficient for per capita family income as the inequality measure and per capita electricity consumption of each province as a proxy for GDP per capita. They estimated both fixed and random effects

models. Adding additional time-invariant variables such as education, the school dropout rate and the percentage of people with unsatisfied basic needs to the random effects model, they find support for the Kuznets' hypothesis.

The *microeconomic approach* is usually applied to the study of the determination of inequality within a specific country over time. For Argentina there are several recent papers that employ the microeconometric decomposition technique of Bourguignon, Ferreira and Lustig (1998). This methodology evaluates the impact of specific factors on the change in the income distribution between periods *t* and *t'* by simulating what the income distribution would have been in *t'* if the parameters of the earnings equation in *t* had been those of *t'*.

Using this methodology, Altimir et al. (2002) studied the Greater Buenos Aires region (GBA) for the period 1972-2000. They find that decreases in the labor force participation among households in the upper deciles of the distribution and increases in participation among households in the lower deciles lowered inequality. The increase in unemployment had an inequality-increasing effect of large importance in the subperiods 1980-1986 and 1990-1994. The change in educational structure had an equalizing effect while the increase in the dispersion in relative earnings by educational level contributed to an increase in inequality. In a similar study, Gasparini, et al. (2005) find that during the 1990's increases in returns to education and dispersion in the endowments or returns to unobservable factors and the fall in hours of work of less-skilled, low-income people were the dominating forces that increased inequality. The reduction in the gender wage gap, the increase in unemployment and in average education of the population only had mild effects on the change in inequality.

Our paper follows the *macroeconomic approach*. The model is based on the paper by Gasparini et al. (2000) although the purpose of our paper is different. We do not focus on the empirical test of the Kuznets' hypothesis in Argentina but on the identification of a much broader set of spatial inequality determinants across urban agglomerations.

5.3 The Data

Inequality studies for other countries apply cross-sectional regression analysis with Census data. However, in Argentina, the data that allow this type of study are micro level data of the Encuesta Permanente de Hogares (Permanent Household Survey, EPH from now on)[3], a survey that was conducted twice a year in Argentina by the National Institute of Statistics and Census (INDEC) in

3 This is because the Census data does not provide information on incomes

the months of May and October until May 2003.[4] The survey was carried out in all the urban agglomerations of more than 100,000 people according to the 1991 census, 28 cities in total.[5] The use of these data imposes two limitations. First, the study is restricted to urban areas.[6] Second, 28 urban agglomerations is a small number of observations over which to run cross-section regressions that allow one to identify spatial inequality determinants. We, therefore, develop and use a panel data set of the 28 cities over the period 1998-2003.

The urban agglomerations covered by the survey contain 71% of the total urban population in Argentina and 62% of the country's population. About 20,000 households and more than 61,000 individuals were randomly sampled.[7] The urban agglomerations of the survey belong to six statistical regions: Greater Buenos Aires, Northeast, Northwest, Cuyo, Pampeana and Patagonica. We generated four inequality measures, the returns to education, the rates of primary, secondary and superior education, the dependency index and the share of employed people in the secondary sector. The data on unemployment were provided by INDEC and were also calculated with the EPH data.

The data on the percentage of people with unsatisfied basic needs and per capita electricity consumption correspond to the department to which each urban agglomeration belongs.[8] The percentage of people living in households with unsatisfied basic needs was obtained from the 2001 Census, and data on the total electricity consumption (Mega Watts Hour) were obtained from the Secretary of Energy of the Ministry of Economy in Argentina.

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4 From then on, a new version of this survey, the EPH Continua, was administered quarterly.

5 These agglomerations are the Greater Buenos Aires, the capital cities of the 23 provinces with their surrounding urban areas (Gran Catamarca, Gran Tucumán-Tafí Viejo, Jujuy-Palpalá, La Rioja, Salta, Santiago del Estero-La Banda, Corrientes, Formosa, Gran Resistencia, Posadas, Gran Mendoza, Gran San Juan, San Luis-EL Chorrillo, Gran Córdoba, Gran La Plata, Gra Santa Fe, Gran Paraná, Santa Rosa-Toay, Comodoro Rivadavia-Rada Tilly, Neuquén-Plottier, Río Gallegos, Ushuaia-Rio Grande), and four other cities belonging to different provinces: Bahía Blanca-Cerri, Mar del Plata-Batán, Concordia and Gran Rosario. In 2003, three other cities were included in the survey, but they were not included in this study.

6 This does not make the results less representative since, according to the 1991 Census, 87% of the Argentinean population lives in urban areas.

7 In the survey, each sampled individual has an associated weight, indicating how many people in total population are represented by that person. These weights have been used for all the calculations in the paper.

8 The country is divided in 23 provinces, each of which is sub-divided in departments.

5.4 Measurement of Inequality

5.4.1 Inequality Measures

Based on conventional use in the empirical literature and on the properties of inequality measures, we chose the Gini Coefficient, the Theil 1 and Theil 2 Indices and the Coefficient of Variation (CV from now on) as our inequality measures. The Gini coefficient can be expressed as:

$$G = \frac{1}{2N^2\mu}\sum_{i=1}^{N}\sum_{j=1}^{N}\left|Y_i - Y_j\right|$$

where Y_i *(*Y_j*)* is the income of individual *i (j)* N is the total population size and μ is the mean income of the income distribution. The values of the coefficient range from 0 to 1; the higher the value, the higher the level of inequality.

Following the same notation, the Theil 1 measure is defined as:

$$T_1 = \frac{1}{N}\sum_{i=1}^{N}\frac{Y_i}{\mu}\ln\left(\frac{Y_i}{\mu}\right)$$

This measure ranges from 0 (for perfect equality) to $\ln(N)$(for perfect inequality).

The Theil 2 measure -the mean logarithmic deviation measure- is defined as:

$$T_2 = \frac{1}{N}\sum_{i=1}^{N}\ln\left(\frac{\mu}{Y_i}\right)$$

This index is zero for the case of perfect equality, approaches infinity in the case of perfect inequality, and can take both positive and negative values in the middle.

The CV is the square root of the variance divided by the mean:

$$CV = \frac{1}{\mu}\sqrt{\sum_{i=1}^{N}\left(\mu - Y_i\right)^2 / N}$$

It ranges from 0 in the case of perfect equality to $\sqrt{(N-1)}$ in the case of perfect inequality.

These four inequality measures satisfy four basic axioms stated in the inequality measurement literature: (1) **symmetry** (the measure is unchanged if there is a permutation of incomes between two persons; this principle is also called the *anonymity* principle); (2) **replication invariance** (the measure is unchanged if the population is doubled, tripled, and so forth), (3) **mean independence** (the measure is unchanged if all incomes in the distribution are multiplied by a scalar); and (4) **Pigou-Dalton Principle** (the inequality measure increases with any regressive transfer). Because they satisfy these four principles, these measures belong to the class of measures of relative inequality which are Lorenz consistent (Anand, 1983). This means that whenever one distribution x Lorenz-dominates another distribution y, each of these measures

will show a lower inequality value for x than for y. However, whenever the Lorenz criterion is not decisive over a pair of distributions, these inequality measures may differ in the assessment of inequality (Foster, 1985).

There are three other properties that a measure of inequality may satisfy: The first is **transfer sensitivity**, an idea introduced by Atkinson (1970) and formalized by Shorrocks and Foster (1987); this is based on the concept of a *'favourable composite transfer'*, which consists of a progressive transfer at one part of the distribution and a regressive transfer of equal size higher up. They define a measure of inequality as being transfer sensitive when a *favorable composite transfer* produces a reduction in inequality.

A second property is **additive decomposability**. This property is satisfied whenever the total income distribution is divided into subgroups and the weighted sum of the inequality measures *within* each group plus the value of the inequality measure *between* each group equals the value of the inequality measure of the whole distribution.[9] This property allows identification of how much of total inequality is explained by a certain characteristic.

Finally, as decomposability is a strong requirement that only a reduced group of inequality measures satisfy, a less restrictive but related property can be required, which is **subgroup consistency**. This property just requires that if inequality rises in one subgroup and remains unchanged in the other subgroups, overall inequality must increase. If a measure is additively decomposable, it is subgroup consistent, but the converse does not hold.

The Gini coefficient is widely used in the empirical literature. It is a very direct measure of income differences, taking account of differences between every pair of incomes. It has a very easy graphical representation which is two times the area between the Lorenz curve and the line of absolute equality. However, the Gini coefficient is transfer-sensitive on the number of people between income levels and not on the size of the income levels; that is, a regressive transfer between two people has increasing impact on the Gini the greater the number of people apart the two individuals are. Also, the Gini coefficient is not additively decomposable,[10] and it does not satisfy subgroup-consistency (Sen and Foster, 1997).

Both Theil measures satisfy transfer sensitivity, subgroup consistency and additive decomposability. In particular, the weights needed for the within-inequality term for Theil 1 are the group income shares, $w_k=(n_k/n)\ (\mu_k/\mu)$, where

9 To calculate the between-group inequality the income distributions of each subgroup are 'smoothed' replacing the income of the individual in each group by the mean income of that group.

10 As long as there is overlap in the incomes of the subgroups, it is always necessary to add a residual term to the sum of within and between inequality to compensate in the equation (Sen and Foster, 1997).

k refers to the subgroup. The weights for the Theil 2 measure are the population shares, $w_k=(n_k/n)$ which are more intuitive because the sum of the shares equals one. Finally, the CV gives exactly the same weight to transfers produced at different parts of the distribution, so it is not transfer-sensitive. However, the square of this measure is additively decomposable.

5.4.2 Empirical Measurement Issues

We calculate the four measures of inequality over per capita family income. Per capita family income is obtained by dividing total family income (which is the sum of all individual incomes in the household except for the income earned by domestic service) by the number of household members including domestic servants. Because the income (often in-kind) from domestic service is not measured, per capita income is downward biased.

All people belonging to a household where someone gave an invalid answer were excluded from the calculations.[11] Valid zero incomes were not included in the calculations either, though including them does not change the coefficients significantly.

Misreporting of income is a well-known problem in household surveys. For the case of Argentina, Gasparini (1999) proposed a set of coefficients to adjust the different sources of income, but they were calculated with information from 1993 and have not been updated because more recent information on disposable income is unavailable. Therefore, we decided not to make this adjustment. Finally, inequality measures can be calculated with the equivalent household income which is obtained by dividing total family income by the number of equivalent adults in the household raised to 0.8 to adjust for economies of scale. When this adjustment is made, all inequality measures are reduced, since poorer families tend to be bigger, but the pattern of inequality does not change.

5.5 Inequality in Argentina

5.5.1 Inequality over time

The period 1998-2003 is part of a longer period over which inequality increased in Argentina. This longer period starts in 1974 when the first (independent) estimations of the Gini coefficient for per capita family income became available, but only for the GBA area. Over the 1980s, the Gini fluctuated, but there was an evident overall increase in inequality from the beginning of 1980

11 An example of an invalid answer is someone who works for pay but reports zero income. This does not introduce bias in the estimation since, as Gasparini (2004) points out, the percentage of observations with non-missing and valid household income stabilized around 90% in the 1990s.

until the end of the decade. During the 1990s an increasing number of cities were progressively incorporated into the EPH. This allowed researchers to perform inequality estimation for a bigger number of urban agglomerations. This research showed an increase in inequality independent of the measures used.[12]

Graph 1 presents the evolution of the Gini Coefficient calculated with two different income definitions: per capita family income (pcfi) and equivalized family income (efi). The patter over time for the other three measures used in this paper is the same. The graph starts in 1995. There is a steady increase in inequality over time with a peak in 2002 after the December 2001 crisis and a decline after 2002. However, the overall increase in inequality between 1998 and 2003, which is the period under study, is relatively small.

As expected, the plot of the Gini calculated over household equivalized income is found below the plot using per capita family income. This is because equivalized household income considers the number of equivalent adults and not just the total number of family members. Because poorer families tend to be bigger, they count less. Also, this income measure corrects for economies of scale. However, the trends are the same.

5.5.2 Inequality across regions

Inequality across the six statistical regions changed over the period under analysis. Graphs 2 and 3 plot the Gini Coefficient of each region calculated with the two income specifications (per capita family income and equivalized household income) in the years 1998 and 2003. It is interesting to observe that the two income specifications do not significantly change the ranking of the regions. Second, inequality ordering between regions changed over the period. Although the rankings obtained with the other measures are not presented here, they show that in 1998, all inequality measures except for the CV ranked the NE as the region with the highest inequality. The second and third places were alternatively occupied by the GBA and the Patagonia region. The CV placed Patagonia first, followed by the NE and GBA. In the case of the Gini, the NW shared third place with Patagonia. For the two Theil measures and the CV, NW was always in fourth place. Finally, all measures agreed that the Pampeana region was the least unequal. In 2003, the ranking picture had changed. All inequality measures ranked GBA as the most unequal region, followed by the NE and NW regions. Cuyo was always in the middle, and Pampeana and Patagonia had the lowest inequality. The Patagonia region had the lowest level of inequality and NW climbed to a higher rank.

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12 For a thorough analysis of the evolution of inequality see Gasparini et al. (2000) and Altimir et al. (2002), among others.

5.5.3 Inequality between and within cities and regions

The overall level of inequality in Argentina can be decomposed to see what percentage of inequality can be attributed to within-city inequality and between-city inequality. The same procedure can be applied for regions (the six statistical regions defined in Section 3). This decomposition can be conveniently done with the Theil 2 Index since the weights for the within-inequality component sum to one. Specifically, the decomposition is defined as follows:

$$T_2 = T_2[W] + T_2[B] = \sum_{k=1}^{K}\left(\frac{n_k}{n}\right)\left[\left(\frac{1}{n_k}\right)\sum_{i=1}^{n_k}\ln\left(\frac{\mu_k}{Y_{ik}}\right)\right] + \left(\frac{1}{n}\right)\sum_{k=1}^{K} n_k \ln\left(\frac{\mu}{\mu_k}\right)$$

where k represents the subgroup (in this case a city or a region) from *1* to K, Y_{ik} is the income of individual i belonging to subgroup k, n_k is the total number of people in subgroup k and n is the total population size. Finally, μ is the total mean income and μ_k is the subgroup k mean income. The value of the between index over the value of the total index indicates the percentage of total inequality that can be attributed to between-group inequality. A similar index measures the within part. Table 5.1 shows this decomposition for cities and region for the years 1998 and 2003.

From the table, it can be seen that, over the period 1998-2003, the between-city component represents around 6% of total inequality. This is consistent with empirical evidence found for other countries. Shorrocks and Wan (2005) examine empirical evidence from different countries and conclude that the between-group component in spatial decompositions averages 12%, with a minimum of 0% and a maximum of 51%. Only in the case of the urban-rural divide does the between component tend to be bigger. The between-city inequality does contribute to total inequality in Argentina, and its causes have not yet been explored.

5.6 Analytical Model

Considering empirical findings for other countries and the characteristics of the Argentinean economy during the period under analysis, we hypothesize that spatial income inequality is determined by four major sets of characteristics of cities. First, we include variables that capture the characteristics of the *labor market* and determine earnings, the most important income source for most families. Second, we include variables that measure *human capital assets*. Third, we include the *demographic characteristics* of the population. Finally, the level of inequality of a specific community might also be conditioned by the overall *level of development* in that community; we can use this variable to test the Kuznets' hypothesis. All together: $I_{it} = (L_{it}, A_{it}, D_{it}, Z_{it})$ (1) where I_{it} is the level of inequality of the urban agglomeration i in period t, L_{it}, and Z_{it} are vectors of

characteristics of the labor market (such as unemployment and returns to education) and level of development, A_{it} is the vector of human capital assets and D_{it} the vector of demographic characteristics for each urban area.

5.7 Empirical Approach

5.7.1 Selected Variables

The dependent variable –inequality- is measured with the Gini Coefficient, the Theil 1 and Theil 2 Indices and the CV. Models with each of the four measures are compared.

Labor Market Characteristics

The variables representing the labor market characteristics of each urban agglomeration in each year (L_{it}) are the unemployment rate, the returns to education and the share of the employed in the secondary sector. The unemployment rate is the percentage of unemployed people over the total active population (employed plus unemployed). It is likely to be negatively related to inequality since the income of most households at the lower end of the distribution in urban areas is comprised of labor earnings. Argentinean cities show wide variation in unemployment.

Variability in returns to years of education across urban agglomerations may also influence spatial inequality since they are positively related to human capital investment and future earnings. During the 1990s returns to education in Argentina increased, especially for the group with university education.[13] Returns to education were estimated from the traditional Mincer earnings function, corrected for sample selection bias. For workers in each city and year, the log of hourly earnings was regressed on years of education, age (proxy for experience), age squared and a dummy variable for gender. The selection equation also included the number of children younger than 6 years and the number of children between 6 and 18 years old and dummy variables for marital status and for the presence of non-labor income.[14] The coefficient on years of schooling in the separate city-year regression was the rate of return in city k in year t.

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13 See Gasparini et al. (2005) and (2000).

14 The years of education completed by each person were estimated from information on the maximum level of education the person attended and on the last year completed at this level. Other studies using the same survey data measured education through dummy variables for the maximum level of education achieved.

The third labor market variable is the share of workers employed in the secondary sector, which is calculated as the number of people employed in the secondary sector[15] over the total number of employed people. Most people in urban areas are employed either in the secondary or tertiary sector. However, given that Argentina is a developing country, the tertiary or 'services' sector typically includes a broad range of activities, including those in the informal sector. Therefore, a higher share of people employed in the secondary sector indicates a higher degree of formality and a higher proportion of better-paid jobs.

Assets

The distribution of assets clearly affects the distribution of income. The more diversified the income sources are, the lower the impact of a crisis from a specific source of wealth. A complete model should consider all types of assets when analyzing income inequality. However, data availability imposes a restriction on the kind of assets that can be considered for the estimation of equation (1). Specifically, the assets A_{it} vector is restricted to only one type of asset: education. Three measures of education were constructed: the proportion of people who completed primary school, the proportion of people who completed secondary school and the proportion of people who completed university or tertiary education (grouped in 'superior education'). The first rate was calculated over the population older than 12 years, the second, over the population older than 18 years and the third was calculated over the population older than 22 years. The lower bound ages are the minimum possible ages at which a person can complete the corresponding level of education.

We expected the rate of complete primary education to have an inequality-reducing effect. However, we did not have a clear prediction on how the rate of secondary education impacts on inequality because this rate is much lower than the rate of complete primary education in all cities, never exceeding 53%. This suggests that at most half of the population is able to get the higher returns that secondary education generates. Finally, we expected tertiary and university education to have a positive impact on inequality, since it is the most selective level of education and the one that provides the highest returns.

Demographic Characteristics

Several demographic features determine spatial income inequality. However, not all of them are equally relevant in Argentina. The Argentinean population is quite homogeneous in terms of race and ethnicity. Among native Argentineans

15 The industries in the secondary sector are: textiles and shoes, chemical products, petroleum refining and nuclear power, metal products, machinery and equipment, other manufacturing, utilities, construction, wholesale and retail trade.

only descendants from indigenous groups can be considered to have a different ethnicity, and they represent a very small fraction of the population; only 2.8% of total Argentinean households have one or more indigenous or indigenous-descendant members. However, as there are certain regions of the country where the presence of indigenous groups is more important, a variable defined as the percentage of households with at least one indigenous member was included as one of the elements in vector D_{it}. The values used correspond to the departments where each city belongs and are provided by the 2001 Census; they do not change over time.

Gender is another potential source of spatial income inequality, though perhaps not very significant for the period under analysis. Considering that labor earnings constitute the main income source, it is worth noting that in Argentina, the hourly wage gender gap decreased over the 1990s and stabilized close to equality at the end of the decade.[16]

Finally, the other included variable in vector D_{it} was the Dependency Index which is related to the age-distribution of the population. It was calculated for each city in each year as the number of people younger than 15 years old and older than 65 years old over the total population. With a weak system of social welfare and pensions, the higher the number of people of non-working age per working-age person, the lower the per capita family income tends to be. Combined with the fact that families at the lower end of the income distribution tend to be bigger, dependency may contribute to inequality.

Level of Development Characteristics

By including a measure of the level of development of each city in the model we can test the Kuznets' hypothesis. Following Gasparini et al. (2000), electricity per capita was taken as a proxy for GDP per capita. There are no reliable estimates of GDP for each of the provinces or urban agglomerations. In each year, the per capita electricity consumption (MWh) of each department is calculated as the total electricity consumption of the department divided by the estimated population. The population values were estimated assuming a constant annual population growth rate which was calculated from the population values for each department in the 1991 and 2001 Censuses. There were eight cases in which the total provincial electricity consumption was not disaggregated by departments, so the value was estimated in the following way. First the ratio of the electricity consumption of the department to the total provincial consumption was calculated for each of the years for which this information was

16 For statistics on this issue see Gasparini (2005). For the period 1998-2003, the value of this variable for the urban agglomerations ranges from 0.8 to 1.3, and about 50% of the observations are around one. This variable was included in earlier versions of this paper and was not significant. We eliminated it from the current model.

available. Then the average of these ratios was taken, and this average was multiplied by the total provincial consumption. The approach gives us a close estimate of the electricity consumption in that department in that year.

Vector Z_{it} is composed of per capita electricity consumption, its square and a dummy variable that controls for the cases where electricity consumption was estimated. Two other variables were included in this vector: a poverty measure defined as the percentage of people with unsatisfied basic needs and the politics of the city. The poverty measure is calculated by INDEC with every Census since 1980. A person is considered poor if she lives in a household that satisfies one or more of the following characteristics: (1) more than three people per room, (2) substandard housing, (3) without any type of water closet, (4) children of school age who do not go to school, (5) household with four or more people per employed member and whose family head has a low level of education (second grade of primary school at the maximum). The higher the percentage of people with unsatisfied basic needs the lower the level of development. The values for this variable correspond to the department level and are provided by the 2001 Census. This is a time-invariant variable.

The second is a dummy variable equal to one if the last two elections of governors in the province were won by the Peronista Party, which is supposed to be more concerned about people at the lower end of the income distribution. We expect that provinces that have elected leaders from this party would support economic and social policies designed to reduce inequality, and inequality would therefore tend to be lower. Because the party in power influences the development policies in each urban area, this political variable belongs to the group of *level of development*. Table A.1 in the Appendix presents the summary statistics for all the variables.

5.7.2 Estimation Technique

Using the variables discussed above, the baseline estimating equation is written in a double log form as:

$$Log(I_{it}) = \alpha_{it} + x'_{it}\beta + e_{it}, \text{ with } i = 1,....,28 \text{ and } t = 1998,...,2003 \qquad (2)$$

where $Log(I_{it})$ is the log of each of the four inequality measures (Gini Coefficient, Theil 1 Index, Theil 2 Index and CV). The vector of explanatory variables includes the log of all of the following variables: unemployment rate, returns to education, share of employed people in the secondary sector, rates of primary, secondary and superior education, dependency index, percentage of households with indigenous members, per capita electricity consumption and its square, percentage of people with unsatisfied basic needs and a set of dummy variables that control for: the cases where the electricity consumption was predicted; the urban agglomerations belonging to provinces with Peronista governors; and region with GBA as the base category. One dummy variable groups the two northern regions (Northeast and Northwest) together, one groups

the two center regions (Pampeana and Cuyo) together and one includes the South region (Patagonia). These variables capture all the fixed regional characteristics that could not be addressed by the other explanatory variables.

The regression was estimated assuming that the individual specific constant terms are randomly distributed across the urban agglomerations, so that $\alpha_{it} = \alpha$ and $e_{it} = \mu_i + v_{it}$, where μ_i is the random disturbance characterizing the *i-th* urban agglomeration and is constant over time. In theory, the *random-effects* specification should only be used when the cross-sectional units are randomly drawn from a large population, which is not the way the 28 cities of the survey are chosen. However, other reasons justify this specification.

The main reason is that the purpose of this paper is to study inequality between the different urban agglomerations of Argentina. Given that the survey is available only for 28 cities, estimating equation (2) with a cross section specification would leave too few degrees of freedom. On the other hand, estimating it with a *fixed-effects* model, which assumes that differences across urban agglomerations are fixed and can be captured through differences in the intercept ($\alpha it = \alpha i$), would eliminate all the variation between urban agglomerations, which is precisely the interest of this paper. Also, it would mean a loss of 28 degrees of freedom, which is not a minor loss. The panel is composed of a relatively large number of cross-section units (28 cities) over a relatively short time span (6 years). Therefore, most of the variation is between units and not over time-within each unit. This makes the random-effects model a better specification, since its estimator is a weighted average of the within and between-units estimators (Greene, 1993). Also, although cities are not randomly chosen, they belong to a much bigger population of cities in the country. Finally, the households included in the survey in each city are randomly selected.

5.8 Results: Determinants of spatial inequality

Table 2 presents the estimation results of equation (2) using the inequality measures calculated with per capita family income. Results with the inequality measures calculated with the equivalized family income are not reported because they are very similar. Given that the model was specified in double log terms, all coefficients can be interpreted as the elasticities of each specific inequality measure with respect to each of the explanatory variables. The overall goodness of fit of the model is quite good in most of the cases; the R^2 is 0.64 in the case of the Gini, 0.55 with the Theil 1, 0.61 for the Theil 2. The lowest R^2 (0.33) is obtained with the CV. The R^2 Between in each case is high, ranging from 0.91 for the Gini to 0.80 for the CV.

The three variables that capture labor market characteristics are very significant in most cases and have the expected signs. The unemployment rate has a significant positive coefficient. The unemployment elasticity of each

inequality measure ranges from 0.117 (with the Theil 2) to 0.037 (with the Gini). Returns to education are also significant and positive in all cases. The returns elasticity of each inequality measure was in all cases higher than the unemployment elasticity, ranging from 0.183 (with the Theil1) to 0.078 (with the Gini). As expected, the higher the share of employed people in the secondary sector, the lower the level of inequality. Only in the CV regression was this variable not significant. The elasticity ranges from -0.197 (with the Theil 1) to -0.116 (with the Gini).

Among the group of variables accounting for human capital assets, the rate of primary education has a strong inequality-decreasing impact, with an elasticity going from -2.432 (with the CV) to -0.756 (with the Gini). However, the rate of secondary education appears to have an inequality-increasing impact; the coefficient ranges from 0.535 with the Theil 1 Index to 0.206 with the Gini Coefficient. The inequality-reducing effect of the rate of primary education agrees with the intuition that the higher the percentage of people who finish primary school, the higher the percentage of people who can earn a reasonable income for living. A positive effect of secondary education is expected for two reasons. First, while the rate of primary education ranges from 77% to 94% with a mean of 87%, the rate of secondary education never exceeds 53% and has a mean of 42%. Secondary education is more selective with respect to ability and access. Second, the secondary education has a higher marginal return than the primary education.[17] Finally, the proportion of people with tertiary or university degrees was significant only for the case of the Theil 2, and its effect was negative. This result was not expected because tertiary education is even more selective than secondary education.

Regarding the demographic characteristics, the dependency index had the expected positive coefficient and was significant in all regressions, except for the CV. In the models with equivalized family income, the income measure took family structure into account, and dependency had no additional impact on inequality. It is interesting to note that the percentage of households with indigenous members was significant and positive in all cases except for the Theil 2 Index. This is a city-level, time- invariant variable, and the effect is small in magnitude; the elasticity ranges from 0.023 with the CV to 0.006 with the Gini.

The log of per capita electricity consumption, our proxy for GDP per capita, was significant and positive in all cases, ranging from 0.262 (the Theil 1 Index) to 0.096 (the Gini). The square of electricity consumption had a negative coefficient in all cases, as the Kuznets' inverted-U hypothesis predicts. However, the variable was not significant in any model. This suggests that the higher the level of electricity consumption, the higher the level of inequality,

17 Evidence for this is provided in Gasparini (2005).

which is compatible with evidence found for other countries such as Australia (Trendle, 2005). The overall level of development of an urban area does play a role in the determination of inequality.[18]

The percentage of people with unsatisfied basic needs was significant and positive for all inequality measures except for the CV. The endogeneity problem that may exist in this case (inequality can cause poverty) is weakened by the fact that our poverty measure is mostly related to characteristics of the shelter, which tend to be stable over time. Income inequality immediately affects income poverty, but the effect on 'structural' poverty, as captured in this measure, is not immediate.

The political development variable is not an important determinant of spatial inequality. The negative coefficient suggests that urban areas where the Peronista Party was elected for two consecutive periods experienced a reduction in inequality. However, the variable was significant in only two cases (with the Gini Coefficient and the Theil 1 Index), and only at the 10% significance level. This can be understood from political economy theory: a democratic society with a two-party system converges in the type of politics offered by each party, which tends to satisfy median-voter demands in the long run.[19]

Finally, the regional dummies were significant in all regressions except for the CV model. The South region systematically had lower inequality compared to the Greater Buenos Aires area. The urban agglomerations belonging to the Center region also had lower inequality than the GBA, but the regional impact was smaller than for the South. The North region was significantly different from GBA only in two of the four regressions, again with a negative coefficient. The lower level of significance of this regional dummy was expected since the levels of inequality in northern cities are quite similar to those observed in the GBA.

5.9 Policy Implications and Concluding Remarks

In the last three decades, inequality has become a problem in Argentina, and, although there has been considerable research on the factors that led to the increase in inequality, there has been little evaluation of the extent to which inequality differs across regions. Although there is a general belief that the northern regions and the Greater Buenos Aires area have higher levels of inequality, the causes and consequences of this spatial inequality have not been

18 The dummy variable that controls for the cases in which electricity consumption was predicted was significant and negative in most of the cases.

19 Although there are more than two political parties in Argentina, apart from Peronismo and Radicalismo, the others represent minorities of voters.

isolated. In this paper we try to measure the importance of spatial inequality and to determine the causes of regional disparities.

To address these questions, we constructed a panel data set of 28 cities in Argentina for the period 1998-2003. The performance of the economy during this period was poor. 1998 was a recession year and the situation worsened over the following years ending in an economic breakdown in December 2001. The Convertibility Plan[20] was eliminated at the beginning of 2002 and by the end of that year the economy started to show signs of recovery. These facts make this period suitable for the study of spatial inequality because inequality was high and rising before and after the economic shocks.

We found that from 1998-2003, inequality between urban agglomerations explains about 6% of total inequality in household income, which is in line with findings for other countries. We hypothesized that the inequality between urban areas is determined by labor market characteristics, human capital assets, demographic characteristics and the level of economic development. We expected unemployment, return to education, poverty and dependency index to have positive impacts on inequality, while the rate of primary school completion and the share employed in the secondary sector were expected to have negative impacts. We did not have a clear prediction on the impact of secondary and tertiary education and per capita electricity consumption, which proxied for GDP per capita. We expected a positive effect of the indigenous population and a negative effect for the influence of the Peronista party in local politics.

We found that the four sets of city characteristics did play a role in the determination of spatial inequality. Unemployment and returns to education are indeed positively associated with inequality, but it is the composition of employment in the city (share of employed people in the secondary sector) that has the greatest (negative) impact on inequality. Primary school completion seems to reduce inequality, but secondary school completion increases it; tertiary education plays a small role for cities inequality. Education is a strong determinant of spatial inequality. The level of development and poverty are of lesser importance than education and sectoral employment. The demographic characteristics have a small impact on inequality, but we do find that cities with a larger indigenous population have higher income inequality than other cities.

These results are important because they suggest that an urban agglomeration is more unequal not just because it is located in the North for example, but because, compared to other cities, it is likely to have a lower proportion of the population with primary education, a less developed industrial sector, and higher unemployment. It may also have a high level of structural

20 With the Convertibility Plan the exchange rate between Argentinean pesos (A$) and US dollars (US$) was fixed at A$1=US$1. In January 2002 the Argentinean currency was devaluated and the exchange rate system was changed to a floating one.

poverty and dependency and is affected by the presence of indigenous groups in the local population. These findings are relevant from a policy perspective because they provide the policy maker with information on regional conditions that contribute to inequality and can be affected by regional policies strategies.

In general, we think that policies designed to reduce spatial inequality between urban areas in Argentina should focus on the promotion of primary education in the cities with the lowest completion rates. However, primary school rates are already quite high and the efficacy of this policy will not have much impact in the long run. On the contrary, there seems to be more room for the development of the secondary sector with a focus on employment creation. This sector contains a great variety of industries and each urban area can promote different industries that fit the geographical constraints. Policies to tackle structural poverty and to integrate the indigenous population into the mainstream labor market would also help to reduce spatial inequality. Finally, although secondary school completion seems to increase inequality, we do not recommend a diminution in efforts to expand education at this level and higher. Inequality is only one aspect of welfare, and the benefits that accrue from a better educated population far outweigh the cost in terms of inequality.

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Tables and Figures

Table 1 SPATIAL DECOMPOSITION OF INEQUALITY IN URBAN ARGENTINA

Year	Category	No Groups	Total Inequality (Theil 2 pcfi)	Between %	Within %
1998	Urban Agglomeration	28	0.43	6.4	93.6
	Region	6		6	94
2003	Urban Agglomeration	27*	0.51	5.6	94.4
	Region	6		5	95

Source: Own calculations based on EPH, May wave of each year.
*In May 2003 EPH could not be done one of the urban agglomerations (Santa Fe) due to severe floods.

Table 2 INEQUALITY REGRESSIONS WITH PER CAPITA FAMILY INCOME

Dependent Variable (in Log)	GINI COEFFICIENT		THEIL 1 INDEX		THEIL 2 INDEX		COEFFICIENT OF VARIATION	
Independent Variables (in Logs)[a]	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-1.455***	0.375	-2.828***	1.026	-2.188***	0.828	-1.634	1.288
Labor Market Characteristics								
Unemployment	0.037***	0.012	0.084***	0.032	0.117***	0.026	0.071*	0.041
Returns to Education	0.078***	0.018	0.183***	0.048	0.157***	0.039	0.149**	0.060
Share of Secondary Sector	-0.116***	0.033	-0.197**	0.090	-0.270***	0.073	-0.047	0.113
Assets								
Rate of Primary Education	-0.756***	0.199	-2.204***	0.544	-1.763***	0.439	-2.432***	0.683
Rate of Secondary Education	0.206***	0.071	0.535***	0.195	0.522***	0.157	0.519**	0.245
Rate of Superior Education	-0.041	0.036	-0.110	0.098	-0.156**	0.079	-0.126	0.122
Demographic Characteristics								

Dependency Index	0.267**	0.105	0.625**	0.288	0.488**	0.232	0.450	0.361
Households with Indigenous Members	0.006**	0.002	0.020***	0.007	0.007	0.006	0.023***	0.009
Level of Development Characteristics								
Electricity	0.096***	0.029	0.262***	0.080	0.164**	0.064	0.231**	0.100
$(\text{Electricity})^2$	-0.039	0.029	-0.134*	0.081	-0.035	0.065	-0.139	0.101
Dummy Electricity	-0.038**	0.017	-0.081*	0.047	-0.088**	0.038	-0.055	0.058
Poverty	0.095***	0.024	0.205***	0.065	0.190***	0.052	0.125	0.081
Peronista Party	-0.019*	0.010	-0.052*	0.027	-0.025	0.022	-0.054	0.034
Regional Dummies								
North	-0.052*	0.029	-0.116	0.079	-0.140**	0.064	-0.103	0.099
Center	-0.059**	0.027	-0.127*	0.074	-0.135**	0.059	-0.086	0.092
South	-0.110***	0.032	-0.236***	0.087	-0.208***	0.070	-0.145	0.109
N obs	167		167		167		167	
N groups	28		28		28		28	
R^2 Within	0.213		0.121		0.279		0.041	
R^2 Between	0.908		0.899		0.900		0.796	
R^2 Overall	0.640		0.555		0.615		0.330	

Note: [a]***=significant at the 1% level, **=significant at 5% level and *=significant at 10% level.

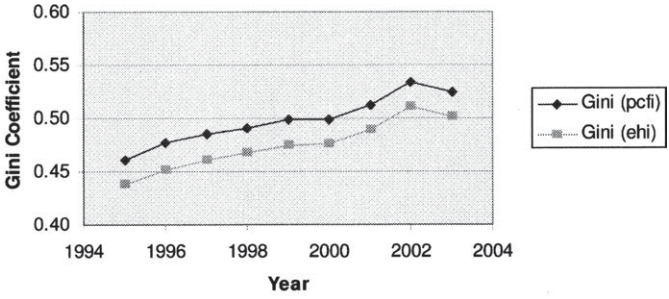
Table 3 SUMMARY STATISTICS

Variables	N observations	Mean	Standard Deviation	Minimum	Maximum
Inequality Measures:					
Gini (pcfi)	167	0.477	0.035	0.340	0.549
Gini (efi)	167	0.453	0.034	0.348	0.527
Theil 1 (pcfi)	167	0.424	0.078	0.190	0.708
Theil 1 (efi)	167	0.378	0.071	0.203	0.610
Theil 2 (pcfi)	167	0.419	0.066	0.218	0.588
Theil 2 (efi)	167	0.372	0.060	0.224	0.537
Coefficient of Variation (pcf)	167	1.198	0.267	0.635	2.936
Coefficient of Variation (ehi)	167	1.101	0.234	0.675	2.512
Labor Market Characteristics:					
Unemployment	167	13.919	4.868	1.9	25.5
Returns to Education	167	0.092	0.063	0.037	0.887
Share of Secondary Sector	167	33.828	4.720	21.713	45.691
Assets:					
Rate of Primary Education	167	86.738	3.138	76.569	94.055
Rate of Secondary Education	167	42.274	4.791	29.671	52.890
Rate of Superior Education	167	11.067	1.953	70.721	17.084
Demographic Characteristics:					
Dependency Index	168	39.552	2.012	34.81	44.643
Households with Indigenous Members	168	3.389	2.502	1	10.5
Level of Development Characteristics					
Electricity	168	1.337	0.523	0.658	3.590
Poverty**	168	15.44	5.164	8.3	25.8
Peronista Party	168	0.607	0.49	0	1

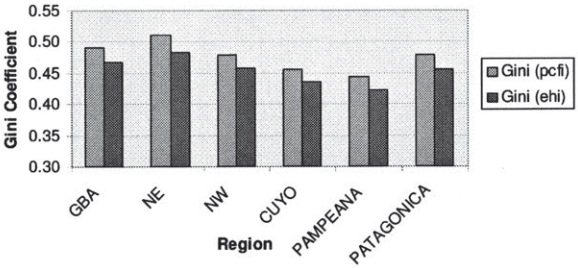
Note:

For all the inequality measures pcfi means that the measure was calculated with the per capita family income, while efi means that it was calculated with the equivalized family income.

Graph 1: Evolution of the Gini Coefficient

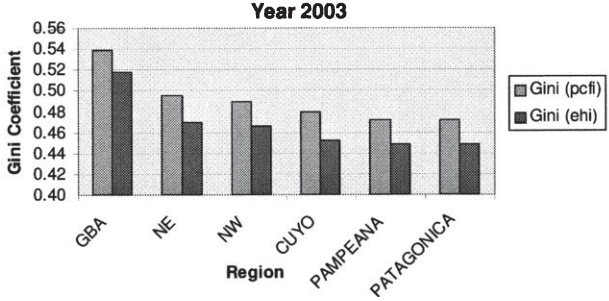


Graph 2: Gini Coefficient by Regions Year 1998



Source: Own calculations based on EPH, May wave of each year.

Graph 3: Gini Coefficient by Regions Year 2003



Source: Own calculations based on EPH, May wave of each year.

II.6 The Determinants of Subjective Poverty: A Comparative Analysis in Madagascar and Peru

Javier Herrera[a], *Mireille Razafindrakoto*[b] *and François Roubaud*[c]

6.1 Introduction

The multidimensionality of poverty is now fully acknowledged, but in the countries where this problem is more acute, poverty reduction policies fail to take its different dimensions into account. In developing countries, poverty is usually only studied in monetary terms by comparing the level of income or consumption with a given threshold. Very few studies have been carried out on households' subjective perception of well-being in these countries (Frey and Stutzer, 2002a). This can partly be explained by the lack of household surveys covering the different facets of poverty, in particular its subjective dimension. But probably the most important explanation is the underlying hypothesis that poverty is first and foremost a monetary question for the poorest people or in the poorest countries (Argyle, 1999; Ferrer-i-Carbonnell, 2002).[1] There is also a certain degree of scepticism as to the reliability of the responses and to whether it is possible to compare people's subjective perceptions of well-being (Easterlin, 2001).

The aim of this study is to assess the relevance of this hypothesis by looking at two very different developing countries, Peru and Madagascar: the first, an emerging country in Latin America and the second, located in Africa and rated amongst the world's poorest countries. By mobilising a particularly

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1 In a simple explanatory model of subjective well-being, if the log of income is examined instead of the absolute levels of income, this lessening of the impact of income for the richest households disappears (Easterlin, 2001).

comprehensive database grouping objective individual variables (socio-demographic and economic characteristics), together with identical subjective questions for both countries, we examine the extent to which the traditional approach to poverty matches the households' perceptions of their living standards. The same type of data obtained by adding subject-specific modules to traditional statistical surveys has already provided information on the opinions of the poor, especially in terms of their needs, in a view to drawing up poverty reduction policies (Razafindrakoto and Roubaud, 2002 and 2005a). However, we should point out that surveys combining qualitative and quantitative variables, which offer many advantages for measuring poverty, are still seldom used in developing countries (Ravallion, 2002).

Our study examines households' subjective assessment of their living conditions. Without entering into the vast debate about the concept of poverty, the latter is defined here as opposed to well-being, in the economic sense of the term.[2] It covers a wide set of themes, opened up in particular by Sen (1984) with the notion of *lack of capabilities*, and later explored and focused on in developing countries as part of the "Voices of the Poor" initiative (Narayan *et al.*, 2000a and 200b; World Bank, 2001). Factors, such as vulnerability, social capital and autonomy, were added to lack of resources or difficulties in accessing basic social services (education, health) as means of understanding the phenomenon of poverty. These "new" additions to the concept of poverty, which are only just beginning to be taken into account by development economists in the poor countries, have been studied in depth for a long time in developed countries, by both economists and sociologists.

The aim of this study is two-fold: first, to provide a better understanding of the phenomenon and to hone the criteria used to measure poverty; and second, to identify the domains that influence individuals' economic well-being and where action is required to improve their living standards. We also examine whether the results generally obtained in developed or transition countries are confirmed in the cases of the two developing countries studied here.

To be more precise, the main focus is on four questions. First, to what extent does the level of income determine the way households assess their well-being? Is the idea that the relationship between income and the assessment of subjective well-being is stronger for the poor confirmed when we compare

2 Offer (2003) concludes that the link between the economic situation and well-being in general varies depending on the periods studied, the latter being harder to define than unhappiness, which can be associated with the notion of poverty. On the contrary, Frey and Stutzer (2002a) establish a relationship between economics and psychology by suggesting that subjective well-being is equivalent to being happy. This is still a recent approach and has not been studied in any depth by economists in the past, except for the movement initiated by Easterlin (1974) and Van Praag and Kaypten (1973).

Madagascar and Peru? Second, what is the impact of relative income on well-being? This raises the problem of identifying the reference group in relation to which the individuals judge their own situation. Third, apart from income, which socio-economic factors have an impact on well-being? In particular, what is the role of the situation in the labour market and job quality, of origin and social mobility, of the geographical environment and the impact of the neighbourhood? Fourth and finally, we take advantage of our comprehensive databases to introduce new dimensions that are now considered an integral part of the concept of poverty: vulnerability (impact of shocks on income, job loss, corruption, insecurity) and social and political exclusion. The impact of these variables on well-being has rarely been tested empirically (Frey and Stutzer, 2002a).

In section 2, we give a brief summary of the literature on the determinants of well-being, focussing on developing countries. Section 3 compares the economic situation in the two countries and presents the data used, touching on the problems raised by international comparisons. An initial series of descriptive results is given in Section 4, notably comparing the subjective perceptions and objective indicators of well-being in Madagascar and Peru. In Section 5, we attempt to model the determinants of subjective well-being and discuss the results obtained, underlining the similarities and differences in the two countries. Section 6 presents the conclusion and outlines perspectives for further research.

6.2 Analysis of subjective well-being: review of existing literature

Although empirical literature on the perception of subjective well-being (hereinafter referred to as SWB) is growing rapidly, studies on developing countries are still scarce and focus on just half a dozen countries: Nepal, Jamaica, South Africa, Madagascar, Mexico and Peru.[3] Whereas a certain number of stylised facts emerge from studies on developed countries, it is not yet possible to make generalizations for developing countries, due to the small number of studies carried out and also to the great diversity of methodologies and approaches employed. Some of the results concerning developing countries even seem to go in the opposite direction from those found systematically in developed countries. Is this due to a specific feature of developing countries, or to specific cases? In this section we review the main, most recent work on SWB and its determinants, in developed and developing countries. This is not intended to be an exhaustive review of the studies, but a comparison of the

3 See in particular studies by Fafchamps and Shilpi (2003), Pradhan and Ravallion (2000), Razafindrakoto and Roubaud (2000, 2005b), Herrera (2001), Rojas (2003), Graham and Pettinato (2000 and 2001), Kingdom and Knight (2004), and Lokshin, Umapathi and Paternostro (2004).

stylised facts found for developed countries with the fragmented results obtained for developing countries where fewer empirical studies have been carried out on the question of subjective well-being.
In this field of research, there is very wide consensus on three salient facts:

1) First, there is unanimous agreement in all the studies on the fact that there is a positive correlation between SWB and level of income (the monetary indicator most often used; Easterlin, 2001). It is also recognized that this correlation is not perfect (Easterlin, 2001; Frey and Stutzer 2002a). These observations, which are made for developed and developing countries alike, are doubtless the most robust results to be found in all the empirical literature on this subject.

In addition to these results, Easterlin puts forward two other stylised facts applying to developed countries only:

2) The positive correlation found in the cross-sectional studies weakens or even disappears when inter-temporal comparisons are made (whether by examining cohorts or panel data). Over the life cycle, the average level of SWB remains constant overall, despite a substantial increase in income (Easterlin, 2001);

3) Despite the fact that a cohort's SWB remains constant throughout the life cycle, the individuals think that their situation was worse in the past and that it will improve in the future (-ilbid).

Although these three stylised facts appear to be firmly established, the authors do not agree on how to interpret them. Several hypotheses have been put forward concerning the partial correlation in cross-sectional studies between SWB and level of income. The first, where there is the widest consensus, is that the subjective perception of well-being is not only determined by the level of current income, but also by a series of variables relating to the income trajectory and other factors such as health, education, employment, etc., irrespective of their impact on income (Ravallion and Lokshin, 2002a). This list is not exhaustive: other studies also include the family status (divorce or widowhood, etc.), governance, democracy and social capital (Frey and Stutzer, 2002b).

The second stylised fact, i.e. the weakening or even disappearance of the correlation between income and SWB if a temporal approach is used instead of a cross-sectional approach, can be explained on the one hand by changes in aspirations and on the other by the growing importance, as the life cycle advances, of other areas of well-being (such as health, family life, etc.) in assessing overall SWB. For example, individuals have little ability to adapt to

widowhood, retirement, unemployment or deterioration in health. Given that these events have a much higher probability of occurring towards the end of the life cycle, SWB will tend to fall over time, partially or totally offsetting the positive effect of growth in income resulting from increased professional experience.

In an attempt to explain why individuals tend to look at the past with bitterness and the future with optimism (the third stylised fact), Easterlin (2001) suggested that a distinction can be made between decision utility and experience utility, and put forward the hypothesis that individuals judge the future with their current aspirations, which have been formed from past experience. Hence, if we take the most common case where the people's incomes grow gradually during the life cycle, as the aspirations are adapted and increase with income, the past standard of living is naturally considered insufficient in the light of current aspirations. On the contrary, the prospect of increasing income in the future are seen as positive for well-being given that it is not possible to take into account immediately the resulting rise in aspirations.

The different determinants of SWB can vary in importance depending on the social groups and the stage in the life cycle. According to Easterlin, individuals share the same set of aspirations at the beginning of their life cycle. Then, depending on the level of education reached, they will follow two distinct trajectories, associated with two different levels of objective and subjective well-being. Subsequently, the principle of adaptability of aspirations plays an important role throughout the trajectories, as the individuals on each "track" adapt to the way their own income progresses (Easterlin, 2001; Frey and Stutzer 2002c). According to Easterlin, the principle conditioning the aspirations also changes during the life cycle. The weight of past experience declines in favour of social comparisons (Easterlin, 2001). In the case of developing countries, it has been suggested that material circumstances count more in SWB than other aspects of well-being, such as freedom and political involvement, respect for human rights, etc., put forward by cultural transition and post-modernist theorists (Inglehart, 1997; Inglehart and Welzel, 2005).

The asymmetrical movement of SWB depending on whether the income trajectory is upward or downward can also account for part of the variance in SWB that is not explained by the current level of income. Hence, using a ten-wave British panel, Buchardt (2003) noted that the SWB of people who have suffered a negative shock is lower than the SWB of people who have permanently low income. On the contrary, the same author observed that people adapt more easily to an upward income trajectory: in this case, the SWB is not higher than for individuals who enjoy high incomes on a permanent basis. According to Easterlin, there is a positive correlation between the level of SWB and the level of income and a negative correlation with aspirations (Easterlin, 2001). As people progress in the income scale, aspirations grow in similar proportions, so that SWB remains constant. More generally speaking, Michalos

(1985), taken up by Senik (2003), considered that SWB depends on the gap between individuals' situations and their points of reference, which in turn consist of their past situations, aspirations, needs and objectives.

The asymmetrical nature of SWB movements depending on whether individual mobility trajectories are upward or downward is even more pronounced for non-monetary aspects of well-being than for the case of income. For instance, job loss leads to a reduction in well-being which cannot be made up for with a simple monetary gain equivalent to the amount lost due to unemployment (Ravallion and Lokshin, 2002a). As Clark and Oswald (1994) point out, this means that apart from the financial loss, job loss has a lasting effect on well-being, through its effect on social exclusion, the feeling of not being useful, loss of self-esteem, etc.

Aspirations do not just depend on past experiences and individual trajectories: other people's experiences are also crucial ("social comparison theory", Easterlin, 2001)". According to Senik (2003), it is important to distinguish between two cases, although both concern social interactions. First, the subjective perception of well-being is subject to the interdependency of preferences. Second, the situation relative to the other individuals in the reference group, particularly in a dynamic perspective, has a cognitive value. Whereas the income comparison theory suggests that other people's income has a direct impact on an individual's SWB (relative well-being), the cognitive interpretation of the income of a reference group implies that the link between their income and the individual SWB is indirect and depends on information (in terms of opportunities and possible trajectory). Thus, for Russian households, Senik found that the individual SWB increases when the income of the reference group increases even more quickly. It is anticipation and the prospect of having the same increase in income (tunnel effect) that makes the difference compared with the reference group acceptable and impact positively on SWB. The two effects demonstrate the importance of social interactions, but the perceptions are interdependent in one case and not in the other (Selnik, 2003).

Although, generally speaking, the positive impact of individual income prevails over the negative impact of relative income, this is not always true. For example, Fafchamps and Shilpi (2003) showed that in the case of rural Nepalese households, the negative impact of the average income of the reference group is such that it cancels out the positive impact of individual incomes. In their view, this specificity stems from the particular situation of rural communities in Nepal, characterised by an isolated and stagnant economy with a high level of poverty.

As Fafchamps and Shilpi (2003) recognize, very little is known about the way reference groups are built. The authors highlight the role of isolation in Nepalese rural communities. In these isolated villages, the reference group is their own local community, whereas for individuals living in towns the reference group is more complex and diffuse. For Clark and Oswald (1994), the reference group is formed by a peer group in the labour market. Ravallion and Lokshin

(2002a) look at the area of residence but also at the family group. They tested the impact of individuals' positions with respect to the other household members on their perception of well-being. However, in the specific case of Russia, no significant impact was found.

In the case of Russia studied by Ravallion and Lokshin (2002a) and in that of Nepal analysed by Fafchamps and Shilpi (2003), the average income of the area where households live has a negative impact on SWB, after controlling for the households' income and other socio-demographic characteristics. All things being equal, individuals living in wealthier areas will therefore have a more negative perception of their SWB. According to Ravallion and Lokshin, this explains why differences are found between objective and subjective well-being indicators in the richest regions (ibid). The scale of the negative impact of the relative income of the household/individual compared with the average income of the area increases with the area's isolation and distance from markets, to such an extent that it even counters the positive effect of the households' income on SWB, as shown by Fafchamps and Shilpi in the case of Nepal. The effect disappears in the case of households living nearer to markets, which, in these authors' view, means that these households compare themselves with other reference groups. In the case of Russia, the negative impact of the income in the area is not strong enough to counter the positive impact of the individuals' and the households' income on SWB.[4] Both studies provide empirical confirmation of the hypothesis of relative well-being to the detriment of the "tunnel effect".

6.3 Madagascar-Peru: presentation of economic context and description of data

Socio-economic context

Madagascar and Peru are, in many respects, two very different developing countries, one in Africa, one in Latin America. Their traditions have very different cultural origins, despite their common Christian background. From an economic standpoint, the first, predominantly agricultural, is one of the poorest countries in the world, whereas the second is an emerging, semi-industrialised country. The per capita GDP in Peru is 2,400 dollars, ten times higher than in Madagascar where it amounts to scarcely 250 dollars. This enormous gap in the development levels explains that there is no possible comparison between their poverty rates. In 1999, 76% of the population of Madagascar lived under the poverty line compared with 42% in Peru.

4 The cumulative effect of a rise of 1% in current and past income for the individuals and the household is 0.335, whereas the impact of the place of residence is -0.200 (Ravallion and Lokshin, 2002a).

At the time of the surveys, between 2000 and 2002, the two countries were engaged on two contrary economic paths, despite having a common matrix for public policies, widely inspired by the Washington Consensus and structural adjustment programmes: macro-economic stabilisation, internal and external liberalisation, and privatisation. In Madagascar, after a long period of recession, the trends reversed in the mid-1990s. The economic reform programme launched at the beginning of the 1980s finally began to be felt in 1997 when, for the first time in many years, the per capita GDP improved slightly (+1%). Since then, the process has accelerated and growth reached nearly 5% in 2000. This improvement is quite exceptional when seen in the light of the country's economic history: Madagascar has not known such a favourable situation since the end of the 1960s. Our study is based on the capital, Antananarivo, for which we have detailed data from household surveys, and where real wages and households' per capita income increased respectively by 43% and 35% from 1995 to 1999 (Razafindrakoto and Roubaud, 1999). This movement contrasts sharply with previous trends. Over the long term, the population's standard of living has fallen almost constantly since the country's independence, decreasing by 45% between 1961 and 1995 (Ravelosoa and Roubaud, 1998).

Following a period of strong expansion from 1993 to 1997, when per capita GDP grew by over 6% per year, the trend suddenly reversed in the second half of 1997. Economic growth in Peru slowed and then became negative following the Asian crisis, as in most other Latin-American countries. In addition to the drying up of short-term capital inflows and the drop in prices for the main exports, El Niño had devastating effects. In 1998 and 1999, the country recorded a fall in per capita GDP of -2.1% and -0.3%. Growth returned during the period 1999-2002 (with average annual growth in GDP and private consumption of 1% and 1.5% respectively), although this was not enough to recover the levels of GDP and per capita consumption recorded in 1997. The modest growth levels in households' private consumption recorded in the National Accounts are confirmed in the results of the household surveys. Per capita expenditure for urban households grew by 6% and 3% in 2001 and in 2002, but this was scarcely enough to recover the 1999 level. In 2001 and 2002, given the increase in inequality (the Gini index rose from 0.37 in 2000 to 0.42 in 2002) total poverty and extreme poverty in urban areas did not fall, or even rose slightly (but not significantly in statistical terms) reaching 36.9% and 6% respectively. From a long-term perspective, in 2002 Peruvians' per capita GDP was still around 30% higher than at the beginning of the 1960s.

Among the differences between the two countries, a certain number of characteristics strongly distinguish the two capitals, Antananarivo and Lima, on which this study is based. With over 7 million inhabitants, the population of Lima is nearly 7 times that of Antananarivo. It is important to appreciate this difference in absolute but also in relative terms. Due to the economic and demographic weight of Lima, where nearly a quarter of the population lives,

Peru is monocephalous, whereas Madagascar seems more balanced in this respect. The two metropolises also differ by their levels of ethnic heterogeneity: in the Peruvian capital, over half the population is of migrant origin, mainly from the rural Andean zones, whereas in the Madagascan capital, non-natives are a small minority, mostly coming from the country's secondary towns.

However, these differences must be put into perspective. According to Frey and Stutzer (2002a), the scale of cultural differences is often exaggerated. There are universal factors that determine happiness, which is the ultimate goal in life for all human beings, whatever their culture (Frey and Stutzer, 2002b). We examine three questions: to what extent are the characteristics and determinants of subjective poverty similar in the two countries, despite their differences? Do monetary factors count more in the poorer country? Can we see the phenomenon of aspirations adaptation, observed in nearly all studies on developed countries?

The data

In both countries, the database was collated by the National Institute of Statistics (INSTAT in Madagascar, INEI in Peru) following an original joint protocol, in the framework of the research programme coordinated by the authors of this study. Based on the observation that subjective measurements of well-being were still practically unheard of in developing countries, despite universal recognition of their analytical interest, specific ad hoc modules on *Multiple dimensions of poverty* were added to the main household survey carried out in each of the countries.

In Madagascar, the *Multiple dimensions of poverty* module was included in the 1-2-3 household surveys system in the Antananarivo agglomeration,[5] introduced by INSTAT, with support from the MADIO project, as of 1995 and repeated each year (Rakotomanana, Ramilison and Roubaud, 2000; Rakotomanana, Ravelosoa and Roubaud, 2000). The module was first experimented in 1998. Due to the technical success of the operation, the original results obtained (Razafindrakoto and Roubaud, 2000 and 2002b) and the increasing importance of the subject of poverty in developing countries in general and Madagascar in particular (PRSP and HIPC initiatives, MDG), the *Multiple dimensions of poverty* module was included in the standard survey system as of 2000.

Since then, the module has been added to the employment survey which concerns a sample of around 3,000 households and 15,000 individuals, representative of the Madagascan capital, with an area-based, stratified plan with

5 1-2-3 surveys are household survey systems developed by DIAL researchers. They are carried out in three interlinked phases : the first, an employment survey which serves as a base for phases 2 (informal sector) and 3 (consumption, poverty; Razafindrakoto and Roubaud, 2002b). In Madagascar, phase 1 is implemented annually, whereas phases 2 and 3 are carried out every 3 years (1995, 1998, 2001 and 2004).

two stages (census zone, household). As the sample is rotating, with random renewal of a third of the households each year, the survey comprises a panel component, which is used in this study. A total of 3,020 households were surveyed in 2000 and 3,019 in 2001, whereas the panel comprised 2,178 households which were surveyed both years. Concerning the *Multiple dimensions of poverty* module dealing with the general situation of the household, a qualified person had to be selected within each household to answer the questions. In two-thirds of cases (65% in 2000 and 68% in 2001), the head of household answered the survey in person. For 30% of cases, the spouse was questioned. Non availability of one or other of these respondents meant that other members of the household took part, although in a residual number of cases. We must stress that a system of this sort is quite exceptional in sub-Saharan Africa. Due to the strict control procedures at each stage (collection, checking, processing), the Madagascan data is also of much higher quality than those found in most household surveys in Africa.

The same strategy of interlinked modular surveys was implemented in the case of Peru. The subjective perception module can thus be analysed at the same time as the modules concerning the households' socio-economic characteristics, employment, income and expenditure, education, health, etc. The multiple dimensions of poverty (objective and subjective measurements) can therefore be examined simultaneously for the same households. This also enables us to study the extent to which these multiple dimensions are correlated one to the other and whether the profiles and determinants of each dimension of poverty are similar or not.

Our results are based on the ENAHO surveys carried out on a national level by the National Institute of Statistics in the last quarter of 2001 and 2002. In order to ensure the comparability with the case of Madagascar, the sample analysed is restricted to urban households only. Our results thus concern an urban sub-sample of 10,013 and 11,112 households respectively in 2001 and 2002 (including 2,486 in the capital in 2001 and 2,134 in 2002).[6] We also have a panel of 2,927 households interviewed in 2001 and in 2002, which we use to examine a certain number of shocks suffered by the households and to explain the role of the trajectories. We should point out that in the rare studies that exist for developing countries, the sample sizes are far smaller than in the case of Peru.[7] We therefore obtain far more robust results and a more sharply focused

6 Once the missing values have been excluded, the subjective perception module contained a final sample of 9,813 urban households in 2001 and 10,946 in 2002. In the capital, our final sample amounted to 2,394 households in 2001 and 2,069 in 2002.

7 In the study by Pradhan and Ravallion (2000) on Jamaica and Nepal, the national samples were 1,954 and 3,373 respectively. Kingdom and Knight (2004) worked on a sample of 8,300 South African households, whereas Lokshin et al. (2004) studied 5,080 households in Madagascar. This small sample size is even more

disaggregation of the individuals' and households' socio-economic characteristics. Contrary to the *1-2-3 survey* in Madagascar, in Peru only the heads of households were interviewed in this module. The result is a larger masculine population, on average older than in the Madagascan case. However, on the basis that the subjective perception dimension refers to the well-being of the household as a whole, we decided that the head was capable of providing an informed assessment on this question, in the same way, in fact, as the usual practice for questions concerning households' spending. Whatever the case may be, the respondents' individual characteristics are included in the econometric models in order to account for any possible biases introduced by this survey strategy.

The work done beforehand to harmonise the basic surveys (statistical protocols, questionnaires, wording of modalities) and processing procedures afterwards (building common dependent and independent variables, rigorously identical definitions and methods of calculation) guarantees the strict comparability of the results obtained in the two countries, which is one of the main strong points of our study. This special attention is all the more necessary given that experience accumulated on an international scale concerning the analysis of perceptions shows that the results obtained are particularly sensitive to the precise wording of the questions. Similarly, with the time dimension, the two panels were controlled systematically and abnormal data eliminated. By studying attrition bias, we were able to ensure the quality of the panels and the fact that they were indeed representative of the environment under review in each of the two countries.

6.4 Descriptive analyses: households' subjective evaluation of their living standards

Economists often have reservations concerning households' subjective evaluation of their own well-being, although some of them do believe that individuals are in the best position to judge their own situation (Ravallion and Lokshin, 1999). Various objections have been put forward: some doubt people's ability to assess their own situation and to express this on a single scale (Easterlin, 2001; Ferrer-i-Carbonnell, 2002). Practical difficulties and biases stemming from the survey methods (wording of questions, interaction with interviewers, etc.) also raise additional problems (Senik, 2003). It has also been suggested that comparisons between countries have little meaning due to cultural differences.[8] In fact, as several authors point out, none of these

marked in the panel component (for example, 500 households for the Peruvian panel studied by Graham and Pettinato (2001).

8 See Frey and Stutzer (2002b) for a discussion on this subject.

objections are sufficient to invalidate the subjective approach to well-being. Indeed, economists and statisticians have included analyses of perceptions and anticipations in their tool boxes in both developed and developing countries for a long time, on the theoretical front and for empirical measurements, as shown by the generalisation of studies on the overall economic climate. Without wishing to minimize the importance of measurement difficulties, we do not cover this question, which has been the subject of an intense scientific debate.[9] However, the coherence and robustness of our results can be put to the credit of those who believe that the approach is relevant, even in developing countries.

A comparison of the evolution of subjective perception and the evolution of average household income shows that the two indicators converge, to a certain extent, in both Madagascar and Peru. Similarly to observations in developed countries, we can see that when monetary income increases (or decreases), the households' perceptions change in the same direction. Also in conformity with another stylised fact observed in the industrialised countries, the average income that the households consider necessary to make ends meet grows (falls) in periods of expansion (recession).

In Madagascar, households recorded growth of over 13% in per capita income from 1998 to 2000. During the same period, the percentage of those who declared that "things are fine or fairly good" rose by 14 points, from 16% to 30%. The balance of opinion (% of positive opinions - % of negative opinions) improved by nearly 12 percentage points. On the contrary, between 2001 and 2002, real income fell by around 2% following the political and economic crisis caused by the contested presidential election in December 2001 (Roubaud, 2002). During the same period, the balance of opinion deteriorated (- 3 points). The relation between the two variables is however far from perfect, highlighting the probable impact of factors other than income on well-being. For example, although income fell slightly (-2% from 2000 to 2001, i.e. an equivalent decrease to that observed between 2001 and 2002), the perceptions continued on an upward trend (+9 points).

In the same way, we observe a positive correlation between aspirations (measured by the question on the minimum income considered necessary to make ends meet, or the Minimum Income Question, MIQ) and monetary income. However, the correlation is not perfect in this case either and is asymmetrical. The elasticity of MIQ to income seems to be lower in periods of growth than in periods of recession. Hence, the 13% increase in real income from 1998 to 2000 was accompanied by an increase of 9% for the MIQ. On the contrary, the small decrease in income from 2001 to 2002 (-2%) contrasted with a drastic drop for the MIQ (-16%). This result is perfectly in line with that obtained by Milanovic and Jovanovic (1999) in the case of Russia. Although the Russian households experienced a sharp fall in their real income between 1993 and 1996, the income that they considered as a minimum (MIQ) fell even more

9 See Frey and Stutzer (2002a) for a more detailed discussion.

rapidly. Ultimately, objective poverty had increased whereas the proportion of people who considered themselves poor (subjective poverty) was falling. In the case of Madagascar, the strong increase in inflation with the 2002 crisis probably upset the households' economic references, which partly explains the over-reaction for the MIQ.

In Peru, the income, SWB and MIQ dynamics are observed over a shorter period (2001 and 2002). Nonetheless, we found similar results to those observed in Madagascar. In both the capital and other urban areas, growth in per capita income was accompanied with an improvement in the perception of well-being and an increase in aspirations. But the relation is not linear in this case either. For example, aspirations rose more quickly than income for urban dwellers overall (+18% versus 14%), whereas the reverse was found in Lima (+16% versus +7%). Ultimately, in both countries, the evolution of income has a positive correlation with SWB and MIQ.

Subjective perception and the reference group

Two reasons are often given to explain the partial correlation between perception of living standards and monetary income. The first is the fact that households' aspirations are subject to adaptive behaviour. The second explanation is that households' subjective assessments take into account not only income, but also a series of individual and collective material conditions (unemployment, family structures, discriminations, access to public services, governance, etc.). We will come back to this second explanation in section 5, with econometric estimates of the determinants of subjective well-being, and an attempt to quantify their specific contributions. In this section, we look at households' adaptive behaviour, which may be based on an individual trajectory in terms of economic status, or on the situation or trajectory of a reference group. The identification of the latter requires clarification: it may be a social group, defined for example according to factors such as education received, age, type of job; it can also be a local, regional or even national or international community, linked with the place of residence.

We can also mention again briefly the impact of social interactions on individuals' perception of the level and evolution of their own well-being that we touched on in section 2. Individuals' SWB depends on interactions with a social group to which they feel they belong and which serves as a point of comparison. Two sorts of interactions were identified in the applied literature: first, the interdependency of preferences and aspirations, and second the tunnel effect, which attributes a cognitive value to the reference group. Depending on which type of interaction prevails, the theory predicts two opposite effects. In the first case, the individuals' SWB increases if the group's well-being is lower or evolves less quickly than their own. This hypothesis is difficult to test due to the fact that, in principle, we do not know who comprises the reference group (neighbours in the area or village, in the town or the country; individuals with

the same level of education or belonging to the same professional group, etc.). In addition, this group can vary during the life cycle or depending on how isolated the area of residence is.[10] The second hypothesis predicts a relatively positive impact of the average level of income of the group and its evolution on an individual's SWB. It is the perception of economic mobility – indicating equal opportunities – that will turn the impact of the gap between individuals' income and that of the community they belong to into a positive impact (all individuals are capable of attaining the same situation as that of their reference group).

The joint study of people's perceptions of the evolution of the living standards in their own household and that of the place of residence (here, the town where the respondents live) provides some useful food for thought on social interactions in Madagascar and Peru. In Madagascar, the balance of opinion on individual situations evolves in a similar way to that concerning the town. Given that the average income stagnated in 2001 then fell in 2002 and that during the same period the perceptions on the household and on the town went from a very negative balance to a slightly positive balance, then again to a very negative balance, we can assume that it is not very likely that there was a "rivalry" effect in determining the SWB. The perception of the town's living standards seems to have played an important role in SWB when income stagnated, otherwise how can we explain the large increase in households' SWB? The reference group of "households in the same town" apparently has a positive impact when the economic situation improves but no specific impact when it deteriorates.

In Peru, the balance of opinion on the town is less negative than on the household, both in 2001 and in 2002. At the same time, the balance of opinion on the assessment of living standards deteriorated significantly in a context where, paradoxically, real income increased. It seems that the population perceived deterioration in overall living standards, but to a lesser extent in the town than for their households. Instead of resulting in a more negative balance for the perception of the households' level of well-being, this seems to have improved it. This confirms, in a way, the results obtained by Graham and Pettinato for Peru. On the basis of a small sample of households (n=500), they found that the perception of past mobility and the prospect of upward mobility have a positive impact on SWB. However, there is a fraction of "frustrated achievers" who, in spite of upward mobility, report a negative perception of their mobility and low satisfaction concerning their living conditions (Graham and Pettinato, 2001).

The national scope of the Peruvian survey helps highlight the fact that urban households have a more pessimistic view than rural households concerning the evolution of living standards, both in their own households and for the town. In

10 See Senik (2003) and Fafchamps and Shilpi (2003) for a detailed discussion on this point.

addition, urban dwellers show a greater gap between their perception of the evolution of living standards for their household and that of their town. This fact is not surprising given the prevalence of covariant shocks in rural areas and the greater inequalities in towns. The perception of an improvement in living standards for the other households in the town when their own household stagnates or declines can be expressed by a negative assessment of their individual situation (Duesemberry's demonstration effect) or, on the contrary, by a positive feeling due to the prospect of future mobility (Hirschman's tunnel effect) for which this observation may be the signal.

Finally, it should be noted that in both Madagascar and Peru, irrespective of the real evolution in income (rise, stagnation or fall), around half the respondents stated that their living standards had stagnated. The same applies to the assessment concerning the town: in Peru and in Madagascar, it was not very optimistic given that around 60% considered that living standards were constant. We can explain this discrepancy between the observed evolution of income and people's perceptions, by returning to the hypothesis that other dimensions of well-being intervene in the perceptions, which are not accounted for by a purely economic and monetary approach.

Multidimensionality of poverty

It is clear that the perception of well-being in general involves different aspects that are not limited to the purely monetary dimension of income. In addition, following Sen's approach, we can assume that quite apart from the ability to acquire a basket of goods measured by the monetary poverty line, individuals' well-being is more closely related to the real or perceived satisfaction of the household's needs in different domains. This ability can be assessed overall or broken down into the different domains in question. For instance, good food, comfortable housing, being able to dress in a socially acceptable way, having good health and access to quality education are quite obviously among the factors that count in assessing standards of living. Van Praag, Frijters and Ferrer-i-Carbonnell (2004) used data on Germany and the United Kingdom to illustrate that the assessment of SWB is a combination of financial satisfaction, satisfaction in terms of employment, health, housing, leisure and environment, and also that people's levels of satisfaction are comparable given that satisfactions are for the most part explained by objective variables. Seen from this angle, the subjective poverty approach is not a component that is complementary to objective poverty (taken globally and in each of its aspects), but more an approach that encompasses it as a specific case. Other non-economic dimensions (violence, political freedom, pollution, governance) could also be added to subjective perception of living standards. The composite indicators of human development developed by the UNDP go in this direction. However, these multidimensional indicators are confronted with the difficulty of setting weightings that are anything other than arbitrary weights. The

econometric approach to the determinants of the subjective satisfaction of living standards provides a promising solution to this problem (Kingdom and Knight 2003; Van Praag, Frijters and Ferrer-i-Carbonnell, 2002).

In Table 5, we compare the perception of living standards with different indicators of objective and subjective poverty. Firstly, and as could be expected, there is a strong link between the general perception of living standards and all the other measures of poverty. In Madagascar, 29% of those who declare their situation to be *"very difficult"* are objectively poor (at the 1 dollar PPP), compared with only 6% of those who say that *"things are fine or fairly good"*. The gradient is even more marked when other subjective indicators are added. For example, barely 3% of those who consider that *"things are fine or fairly good"* are convinced that their living standards are low or very low, but they are 71% among those who find the situation *"very difficult"*.

Similarly, in Peru, the incidence of objective poverty defined in terms of monetary poverty, calorie deficiency or unsatisfied basic needs is far higher in the case of households which consider their situation is *"very difficult"* than for those with a more favourable perception. At the same time, the proportion of households which are obliged to dip into their savings or to get into debt is five times higher among those living in a *"very difficult situation"* than for those who declare that *"things are fine or fairly good*." However, these results show that although there is significant correlation between the different dimensions of poverty, they do not match perfectly, thus confirming the conclusions of previous work on this question (Razafindakoto and Roubaud, 2000, 2004 and 2005b; Herrera, 2001).

Apart from overall measurements of poverty, we can try to assess the relationship between households' perception of well-being and their assessment of whether or not basic needs are satisfied. In both Madagascar and Peru, the less people are satisfied regarding one or other of the basic needs, the worse the overall perception of well-being. However, and once again, the correlation is partial, a non-negligible share of households considers that *"things are fine or fairly good",* despite the fact that they are not satisfied in certain areas. On the contrary, people can find their situation *"very difficult",* although they are satisfied with respect to the five aspects identified in the survey (food, clothing, housing, health and education). This serves to prove that the assessment of well-being is indeed multidimensional and that it goes beyond the mere fulfilment of material needs.

In absolute terms, the share of the population whose needs are not satisfied is far larger in Madagascar than in Peru. The real gaps in living standards between the two countries (to the advantage of the second) are such that they "flatten" to a great extent the phenomenon of attrition of preferences, so that the Madagascans are satisfied with a more limited basket of goods and services and benefits.

6.5 Multivariate analyses: the determinants of subjective well-being

In this section, we try to estimate the factors that count most in determining levels of subjective well-being. In the battery of questions asked during the survey, we selected the most general one, which was also used for the preceding analyses. Its precise wording, both in Madagascar and Peru, was:

In view of your household's income, do you consider that:
1. you live well;
2. things are fairly good;
3. things are alright, but you have to be on their guard;
4. you live with difficulty

For the purposes of the analysis and given the low number of people in the first response modality, the first two modalities were aggregated.

The hypotheses tested

We start by exploring the extent to which the monetary approach (per capita income) is correlated with the assessment of SWB. By stages, we then estimate the impact of the households' socio-economic and demographic characteristics on the perception of well-being. What role is played by age, gender or status within the household? Does the level of education have an impact on the perception of well-being, once income and the composition of the household have been taken into account? The subjective perception of well-being depends on the gap between aspirations which are considered attainable and actual, or supposed, satisfaction in different areas judged to be consubstantial with living standards. The capacity to aspire appears, in turn, to be closely linked not only to the level of income, but also to the perimeter of the individuals' cultural environment and to the social interactions in which they are engaged, of which education appears to be a determining factor.[11] Apart from the level of education of the individual and the other household members, we also consider whether or not their needs are satisfied in terms of health, their migratory status, ethnic origin, possession of assets and the quality of housing.

It is most likely that the perception of well-being is closely linked to social interactions and in particular to the household's positioning with respect to the reference group and to the latter's characteristics. A priori, it is hard to determine the nature of this group; and we cannot rule out the fact that there may be multiple reference groups. For instance, people can compare their living standards with the age group with the same level of qualifications, with the

11 On this point, see Appadurai (2004); Ray (2004); Stutzer (2003) and Nathan (2005).

neighbours in the area or in the town, etc. We will test in particular the hypothesis whereby the reference group is comprised of the residential neighbourhood (by looking at the average level of income and inequalities in the local area). These effects must be distinguished from the specific (negative or positive) effects that the different characteristics of neighbourhoods (pollution, crime, proximity of public / private services, etc.) may have, which will be taken into account with neighbourhood indicator variables. Do we find the same results are those obtained by Fafchamps and Shilpi (2003) for Nepal or Lokshin, Umapathi and Paternostro (2004) for Madagascar, just to mention work concerning developing countries? In addition to the reference group, when it comes to the assessment of SWB, individuals probably consider a period of reference based on which they judge their current situation. Making the most of the panel component, our regressions take into account the level of past income.[12] From a psychological standpoint, according to the discrepancy theory underlined by Michalos (1985), in addition to the situation of the "other" individuals on the one hand, and their own past situation on the other, individuals' aspirations can be a third comparative norm on which to judge satisfaction. We will try to explore the impact on well-being of the households' income compared with the minimum income considered necessary to make ends meet (MIQ).

Various studies on the impact of unemployment on the subjective assessment of well-being in developed countries have highlighted a negative impact that goes beyond factors relating to the loss of income (Winkelmann and Winkelmann, 1998; Clark and Oswald, 1994). The quality of the job, the institutional sector of labour market attachment and social welfare offered by some jobs can also all be related to the perception of well-being. Vulnerability, the risk of unemployment, hard working conditions, unstable income and the weight of the hierarchy also probably have a specific impact on well-being. Finally, work is a factor of social inclusion and therefore also counts in its own right among the components of well-being.

In the case of Russia, Beuran and Kalugina (2005) found that working in the informal sector had a negative impact on the subjective perception of well-being. The authors pointed out that job insecurity and exclusion from a social benefit system led informal workers to display a lesser degree of subjective well-being than their counterparts in the formal sector. In fact, for this reason these activities can be considered to be among the survival strategies used as relief from the negative shocks in the transition period. In the case of developing countries, the impact of informal sector employment seems, in principle, more ambiguous. On the one hand, the choice of working in the informal sector appears to be made under duress due to the scarcity of more protected, better paid formal sector jobs. In this case, the informal sector amounts to a refuge for

12 Burchardt (2003) analysed how preferences adapt to variations in income in a household panel.

unskilled workers with too few assets to create formal enterprises. Alternatively, employment in the informal sector can be seen as a free decision made on account of the flexible working hours offered, the lack of heavy hierarchy, the wish to be one's own boss or a preference for a family-based work environment. We take advantage of the detailed investigation of the informal sector and the income it generates, contained in the Madagascan and Peruvian surveys, to test these hypotheses.[13]

Trajectories and social origins (measured through the father's education) will be taken into account. Their impact on well-being can come into play in particular through the building of aspirations, the extent of aversion to intergenerational reproduction, in the perspective of equal opportunities. A certain number of idiosyncratic shocks (the household is victim of violence, corruption, etc.) are also taken into account. In addition to the economic loss they cause, the latter can result in an additional loss of well-being. This assumption will be tested. The vulnerability to shocks can be attenuated if the individual can count on support from the family or associative environment. Conversely, the lack of social capital and, more broadly, social exclusion can have a negative impact on the perception of well-being. The non-participation in social and political debate, the lack of "voice" and social involvement and the quality of institutions probably also have an impact on SWB (Frey and Stutzer, 2002).

The results

One of the most uncontested stylised facts found in the empirical literature on the determinants of SWB is that there is a positive correlation with income. In all the studies where this question has been explored, a positive, significant link has systematically been found (Easterlin, 2001). In addition, income is the independent variable which always has the strongest explanatory power in econometric analyses (Senik, 2003). However, all the analyses without exception also show that income does not explain everything. A large percentage of the variance remains unexplained due to the existence of other dimensions of well-being, independent of income. With respect to developing countries, it is generally assumed that the correlation between SWB and income is stronger than in developed countries (Ferrer-i-Carbonnell, 2002).

Table 7 compares SWB levels and income. In order to make the comparison pertinent, the households have been classified in three brackets of per capita income, defined in such a way as to respect the distribution observed for SWB. Cramer's V coefficient, which measures the strength of association between the

13 The module devoted to the informal sector is aimed at reconstructing the accounts of an informal production unit by making a detailed estimate of intermediary consumption (raw materials, inputs, wages) and the turnover, by product or service offered (see Razafindrakoto and Roubaud, 2002b, for a detailed presentation of *1-2-3 survey* methodology).

subjective dimension and the objective monetary dimension of well-being, indicates that there is significant correspondence between the two dimensions, which holds for both countries. However, the association is higher in Madagascar than in Peru, as Cramer's V is 0.27 and 0.19 respectively. In both cases, the Cramer's V coefficients are higher than that obtained by Ravallion and Lokshin (2002a) for Russia (0.14). These results are therefore compatible with the assumption that the monetary dimension of income is greater in the poorest countries.

A second observation can be made when we examine the diagonal of the table. In Madagascar, the two dimensions coincide more for the extreme positions in the distribution, whereas in Peru the correspondence is better for the intermediary position. Among the possible explanations for the propensity of urban Peruvian households to see themselves in the intermediary category, two arguments can be mentioned. For those with the least resources, it can show a refusal to admit to the failure of their social mobility, at the same time avoiding the stigma associated with being poor in urban areas. At the other end of the scale, the dramatic liberalisation of the labour market that has increased the vulnerability of employees in the formal sector, including managers (middle and senior) who are precisely among the higher income brackets, has increased the feeling of professional insecurity, a worry that is reflected in the perception of well-being.

Finally, we can note that the association of SWB and income is far from perfect, given that a strong correlation would result in a Cramer's V coefficient of 1 or close to 1 (diagonal matrix). This again confirms that the monetary and financial aspects (notwithstanding the question of measurement errors for income) are only one of the dimensions of well-being.

We also find another stylised fact: the increase of aspirations as income rises, or what is known as preference drift. This phenomenon is more marked in Peru than in Madagascar as shown by the correlation coefficients between households' total monetary income and the Minimum Income Question (MIQ). In the Madagascan capital, this coefficient was 0.46 in 2000 and 0.42 in 2001 (period with slight drop in income), whereas in urban areas of Peru, it was 0.51 in 2001 and 2002. In Lima, the coefficient even reached 0.56 and 0.54 for the two years respectively. The differences observed between the two countries can also be seen between poor and non-poor households in each country. In Peru, the correlation coefficient between income and MIQ for the poorest half of the urban population is half that of the households belonging to the wealthiest half of the population (0.29 and 0.54 in 2002). The contrast between poor and rich households is even more striking in the capital of Madagascar, though seems to vary over time. For households in the lower half of the distribution, the correlation between their income and the minimum income required to make ends meet is very low. This implies that they aspire to a basic consumer basket, probably closer to a physiological minimum required for the reproduction of an

urban household. On the contrary, the correlation for the wealthiest half is positive and significant, close to that of rich Peruvian households. In 2001, the correlation fell to 0.35 in a context of stagnation in income. In fact, needs expressed in the amount considered necessary to live decently is considered more in relative terms in Peru than in Madagascar. This result probably explains why high income Peruvian households are relatively less satisfied in terms of well-being, as their aspirations have grown more quickly than their real income.

In order to assess the extent to which monetary income explains the assessment of living standards, we estimate an ordered probit model with, to start, the total income of the household as the only explanatory variable. We will then add different factors to the model, concerning the household's demographic structure, job quality, individual socio-economic and demographic characteristics (age, gender); the assets and human capital of the household (physical and social capital, level of education); health and vulnerability; absolute and relative income (past income, income of reference group, social trajectory, aspirations).

The basic model can be formalised as follows. Given w, the continuous latent variable such that:

If $w<c1$	then *SWB*=1	(very difficult situation)
If $c1<w<c2$	then *SWB*=2	(things are alright, but situation can become precarious)
If $w>c2$	then *SWB*=3	(things are fine or fairly good)

$$w = b \ln(y) + c\ln(z) + e \quad (1)$$

where z is the size of the household, y the total income of the household and e an error term.

As expected, the estimated coefficient b is positive and significant both in the case of Madagascar and Peru. The effect of the household size is negative and significant. A growth in the households' per capita income implies a rise in SWB. This confirms the important, positive role of income in determining SWB. However, we can also see that the per capita income alone cannot provide sufficient explanations to give a faithful account of the situation. Other dimensions of SWB must be taken into account apart from income.

We will therefore extend the preceding model step by step, introducing a set of variables that are likely to come into play in determining subjective well-being. Ravallion and Lokshin (2002) suggest that the determinants of SWB can be put into three groups of variables: (i) objective variables (spending, assets, individual income trajectories, education, health, employment, etc.); (ii) relative income compared with an individual or a reference group (the highest income in the household, the mean income of the place of residence) and c) attitudes

(which include future expectations, perceived insecurity concerning the risk of unemployment and whether the respondent thinks that the government cares about "people like us"). Although inspired by this typology, our classification will be slightly different, particularly to take into account the common data available for the two countries under study. The third model is written as follows:

$$w = b \ln(y) + g_1x_1 + g_2x_2 + g_3x_3 + g_4x_4 + g_5x_5 + g_6x_6 + e \quad (2)$$

with

x_1, the household's demographic characteristics.
x2, the household's economic characteristics (assets, education, health, employment etc.).
x3, the characteristics of social inclusion (social and political participation).
x4, the shocks suffered by the household or degree of vulnerability
x5, the characteristics of the points or group of reference (trajectory: past income and intergenerational mobility; income in reference group: income in local area and level of inequalities; MIQ)
x6, respondent's individual characteristics (age, gender, status in household, activity)

The results of this model are given in Table 10.

The results of this comprehensive model confirm the positive and very significant impact of income on SWB. We must stress at this point that the effect of income also goes through different variables such as assets and housing conditions (which in fact help capture the permanent income), together with the income in the previous year.[14] In more global terms, taking into account the different non monetary factors increases the explanatory power of the model very significantly. The proportion of variance explained doubles from model 1 to model 2.

Our estimates do not enable us to highlight effects relating to the scales of equivalence. Once the size of the household has been taken into account, the demographic structure of the household has no impact on SWB, except for the number of children from 6 to 10 years old in Madagascar, whose negative impact could be linked to the start of schooling. Similarly, the respondents' individual characteristics, which have an impact on their psychological profile, ultimately play a secondary role concerning the overall assessment of well-being for the household as a whole. In Peru, only the fact that the respondent was

14 It is therefore difficult to give a verdict on the relative importance of the income effect once the non monetary dimensions are taken into account.

divorced or separated had a negative impact on SWB. In Madagascar, the older the respondent the lower the SWB, thus confirming studies in this area that show, all things being equal, that the young people tend to be more optimistic about life than their elders. Those who are neither head of household nor the spouse of the head are also more pessimistic, which could reflect a degree of dissatisfaction in the face of intra-household inequalities in the distribution of resources and domestic powers within the family. More surprisingly, unmarried respondents display higher levels of well-being than those living in union. However, it is difficult to know whether, overall, these individual effects express psychological characteristics specific to the respondents or whether these variables reflect specific properties of the households to which they belong. Whatever the case may be, and from a methodological standpoint, by including these variables in the model we can eliminate the potential biases from non random selection of respondents.[15]

The kind of economic participation, notably on the labour market, has a role to play in SWB. In terms of job quality, for the same income, it appears that households whose head is under-employed often feel disadvantaged. Similarly, whatever the income and situation of the household, the presence of unemployed members in the household reduces the well-being of the whole household. This last result ties in with those found in the literature (see, for example, Clark and Oswald, 1994; Frey and Stutzer, 2002c), indicating that job loss has an impact on well-being that goes beyond the corresponding loss of income.

It is very interesting to note that public sector work status for the head of household is considered to have less value than private sector status both in Peru and in Madagascar. The depreciation in the career of civil servant following the freeze on recruitment and salaries and the lack of prospects for promotion has doubtless helped to deepen the gap between aspiration and resources for civil servants, even though public sector jobs continue to attract a large number of candidates. Neither the number of currently active members nor employment in the informal sector seems to influence the perception of well-being. We can also point out two opposite effects which cancel each other out: first, poor people are obliged to mobilise the household's secondary labour more actively and second, these households can count on additional sources of income and greater inclusion in the labour market, which has a positive impact on SWB.

Apart from the current income, households' economic situation substantially increases SWB, as shown by the very positive effect, found in a similar way in

15 We also explored the potential impact of the respondents' psychological profile on their well-being. This issue was developed in particular by Argyle (1999). We have attitude variables for Madagascar, i.e. the respondents' perception of their future prospects. We thus found that individuals with a pessimistic view of the future tended to have a lower rate of subjective satisfaction concerning their current living conditions.

both countries, of level of assets held by the household. Household conditions are also positively linked to SWB, though this impact reverts in the case of Peru when controlling by other highly correlated factors. In addition, for the same income, SWB increases with the level of schooling and above all with satisfaction concerning health needs, which have a very strong impact (0.51 in Peru and 0.28 in Madagascar), reflecting how important this dimension is in the overall assessment of the households' well-being. We must stress, nonetheless, that satisfaction concerning health needs results from a subjective assessment on the part of the respondent and not an objective indicator, which may explain the strong correlation with SWB.

The household's participation in the society is a factor which has an impact on well-being, in terms of social capital in Madagascar and political involvement in Peru. More particularly, in Madagascar, households in which at least one member belongs to a religious association are more inclined to have a favourable view of their living conditions. In Peru, taking part in local elections (non compulsory) has a positive impact, which tends to show that the additional well-being provided by political involvement does more than make up for the monetary costs involved (cost of transport, working day lost). In the past, one of the forms of social exclusion was, precisely, the exclusion of individuals as citizens, and their participation was conditioned on wealth or the ability to read and write. On the contrary, variables relating to vulnerability to shocks (measured by whether or not they have experienced violence or corruption) are not shown to be determining factors of well-being. Other indicators relating to other types of shocks should probably be explored.

The question of the reference group was explored through several possible points of comparison: dynamics of past income, inter-generational mobility and the effects of the local area. First, the previous year's income has a positive impact on the perception of well-being. This result seems to imply that the potentially positive effect of an improvement in income from one year to the next (which should result, at fixed current income, in a negative impact on SWB of the income of the previous year) is dominated by the positive effect of having benefited from a good income during the previous period, as this is apparently remembered in SWB. We must also stress the strong correlation between current income and past income; it is probable that the coefficient of past income captures part of the impact attached to current income. The results show the effects of social origin on well-being. For instance, the fact that the father of a head of household went to school gives a feeling of satisfaction, regardless of the impact that this may have on the head's personal success at school or at work. This effect may also reveal an altruistic behaviour on the part of the individuals or reflect evidence of the benefits retained from the previous generation's schooling (widening of capabilities in childhood), which may have a lasting effect on the individuals' "permanent" happiness (by analogy with the concept of "permanent income").

If we look at the approach concerning a reference group identified by the place of residence, the Madagascan and Peruvian data shows the usual effect of relative income (rivalry hypothesis). The average level of income in the area of residence has a negative, significant impact on SWB both in Madagascar and Peru.[16] In line with Fafchamps and Shilpi (2003) for Nepal, or Lokshin, Umapathi and Paternostro (2003) for Madagascar (using a database covering the whole country), households living in an area where the income levels are higher than theirs tend to feel frustrated, and this affects their well-being. This is strong evidence in favour of there being a relative norm in the assessment of subjective well-being.

However, in addition to the average level of income in the neighbourhood, we can also see that the level of inequalities in the area also has a significant impact on SWB. Whereas this impact is negative in Madagascar, it is positive in Peru.[17] This aversion for the inequality in the area may be explained in Madagascar by the greater importance given to local solidarity networks in a context of generalised poverty. We should remember that the duty to help one another ("*fihavanana*") is a fundamental value in Madagascan culture, specifically mentioned in the Constitution as a founding principle for cohesion. Lokshin et al. (2004) also found, on the national level, a negative impact of the Gini coefficient of the segment (primary survey unit) on SWB (although the coefficient is only significant in their study with respect to satisfying needs for food).

In Peru, the households have greater subjective satisfaction in terms of well-being when they live in areas with greater inequalities, probably due to the nature of social mobility and the configuration of the country's large cities. The large scale of Lima and the working class areas (the district of San Juan de Lurigancho has over 600,000 inhabitants) plus the importance of residential segregation in the process of social differentiation means that households which escape poverty and manage to move to the residential areas with their "pockets of prosperity" consider this as an improvement in their SWB. For a given household and average neighbourhood income, it is preferable for urban Peruvian households to live in areas where there are greater differences in income, as this means that they are always able to find a household poorer than

16 In Madagascar, this negative effect is higher than the direct impact of the household's income. However, we are unable to come to a firm conclusion regarding the importance of the effect of the relative income compared with the individual income given that the impact of the latter is in part captured by different variables (past income and permanent income: property, housing conditions).

17 A parallel could be drawn between this result and the observation made by Alesina, Di Tella and MacCulloch (2001) that there is an aversion for inequalities in Europe that is not found in the case of the United States where social mobility is perceived to be stronger.

theirs in their neighbourhood. For poor households in particular, the negative effect of having an income below the average in the local area is so to speak compensated for, in Peru, by the possibility of finding poorer people in neighbourhoods with greater inequalities. These areas also have pockets of prosperity whose prestige extends to the less wealthy inhabitants in the area. The stigma of uniformly poor areas and the prestige associated with neighbourhoods with strong inequalities are two sides of the same coin in Peru. We might also suggest that the high local inequalities are given a high value because they are perceived as opening the realms of possibility for those who work hard – which implies some belief in the notion of equal opportunities.

Finally, in addition to the impact of average income in the neighbourhood, we can also see the negative effect of the level of individuals' aspirations. For both Peru and Madagascar, MIQ has a negative correlation with SWB, with constant income. As we may have expected, a household whose current income is very much lower than the minimum income deemed necessary to live decently feels less happy than one with the same level of income but whose aspirations are more modest. A more detailed study of the way these aspirations are formed – other than the link with income and the reference group – may help give a better explanation of subjective well-being.

6.6 Conclusions and prospects

We have confirmed how important and interesting it is to study the non-monetary dimensions of poverty in developing countries. Qualitative studies (i.e. Narayan et al. 2000a, 2000b) had indicated that these dimensions count, even in the poorest countries. Including these dimensions in our study doubled the explanatory power of the econometric models. It is interesting to note that our results confirm overall the results obtained in developed countries. These results speak in favour of applying a methodology in developing countries that has been well-proven in developed countries. Nonetheless, a few significant specificities emerged from our study.

First, we confirm that there is a positive, significant correlation between subjective well-being and monetary income. However, it is significantly less than 1. In Madagascar, the poorer country, the strength of association between SWB and income is higher than in the middle income country, Peru. In both cases, other dimensions of well-being (such as health, education and job quality, but also family structures) play a non negligible role. We showed that social interactions and trajectories also count in the perception of well-being. With a fixed personal income, the average level of income in the neighbourhood has a negative impact on SWB, confirming the rivalry hypothesis. Past income has a positive impact in both countries, partly capturing an effect of permanent

income. Finally, social capital, social origin and the ethnic factor (in Madagascar) have a significant impact on the perception of well-being.

Apart from these common points, which prove that the results are relatively robust, we observed interesting differences between Peru and Madagascar. Whereas in Peru inequalities in the local area play a positive role in the perception of well-being, they have a negative impact in Madagascar. We put forward the hypothesis of two models of mobility and social norms: on the one hand, a Peruvian society where inequalities are apparently seen as the result of strong social mobility, given high value by the population; on the other hand, the case of Madagascar where social homogeneity (the basis and/or the result of social relationships) seems to be appreciated more.

At the end of this study, several possibilities for further research emerge. First, it is important to confirm the scope of validity of our results, which were tested on a single question (Income Evaluation Question). There is no guarantee that the determinants of other subjective measures of well-being are exactly the same. The battery of questions presented in the "Multiple Dimensions of Poverty" module (adequacy of consumption, financial situation, and minimum income question) enables us to explore this point.

Second, we only exploited the panel component (two waves) of our data so as to take into account the role of economic trajectories and demographic shocks in the labour market in determining the individual perception of well-being. In addition, although we included variables concerning individuals' and households' socio-demographic characteristics (education, health, labour market inclusion, social capital, etc.) and variables concerning the neighbourhoods (inequalities, differentiation of places of residence), we have not fully considered the individuals' and households' heterogeneity. The role of non observable factors, in particular different types of personality and psychological profiles, is highlighted by certain empirical studies on SWB. One possible extension of our work would be to take advantage of the availability of panel data (three waves) to take into account non observed heterogeneity (fixed effects), using non linear econometric methods for qualitative panel variables.

Finally, the question of the limitations in the poorest populations' "capacity to aspire" must be considered as a dimension of poverty in its own right. The implications for inter-individual comparisons of well-being must also be explored in more depth. This will help extend the geographical scope of the analysis in order to make comparisons between urban and rural households and to give a more solid foundation to international comparisons of well-being.

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Tables and Figures

Table 1 Madagascar and Peru in figures (1999)

	Mada-gascar	Peru		Mada-gascar	Peru
Surface area (1,000 km^2)	587	1 285	GDP (billions $US)	3.7	51.9
Population (millions)	14.6	25.2	Per capita GDP ($US)	250	2 130
Population growth rate (%)	2.8	1.7	Rate of investment (%GDP)	12	22
Urban population (%)	29	72	Tax burden (%GDP)	11	18
Life expectancy (years)	58	69	Foreign debt (%GDP)	123	61

Table 2 Samples used for cross-sectional and panel studies, 2000-2001

	Madagascar (capital)		Peru (urban)	
Number of households	2000	2001	2001	2002
Total sample	3 020	3 019	9 813	10 946
Panel 2000-2001	2 178	2 178	2 882	2 882

Source: *1-2-3 Surveys*, phase 1 (Employment), 2000-2001, INSTAT/MADIO, Madagascar; ENAHO Surveys 2001-2002, INEI, Peru; our own calculations.

Table 3 Evolution of subjective assessments and of average income level

	Madagascar				Peru			
	Capital				Urban		Capital	
	1998	2000	2001	2002	2001	2002	2001	2002
1. Things are fine or fairly good	16.1	29.6	33.5	31.0	5.3	9.7	4.1	9.9
2. Things are OK but precarious	34.2	18.8	19.7	22.0	67.8	77.0	67.0	77.3
3. Very difficult situation	49.7	51.6	46.7	47.0	27.0	13.4	29.0	12.8
Balance (positive-negative)	-33.6	-22.0	-13.2	-16.0	-21.7	-3.7	-24.9	-2.9
Average per capita income	115.2	130.7	128.1	125.4	450	513	568	661
Minimum income necessary (median)	133.3	144.9	156.8	132.2	1 014	1 200	1 217	1 300

Source: *1-2-3 Surveys*, phase 1 (Employment), 1998-2002, MADIO/INSTAT, Madagascar; ENAHO Surveys, 2001-2002, INEI, Peru; our own calculations.
*: For Madagascar, income is in thousands of constant Madagascan francs of 1998. For Peru, constant sols of 2002.

Table 4 Households' subjective assessment of the evolution of living standards

Madagascar

During the year, living standards have :	Evolution for own household				Evolution for town		
	1999*	2000	2001	2002	2000	2001	2002
Increased	19.7	15.9	25.2	14.0	9.6	17.8	9.0
Stagnated	46.5	56.3	51.7	48.0	64.8	65.2	53.8
Fallen	33.8	27.8	23.1	38.0	25.6	17.0	37.2
Balance of opinion	*-14.1*	*-11.9*	*+2.1*	*-24.0*	*-16.0*	*+0.8*	*-18.2*

Source: *1-2-3 Surveys*, phase 1 (Employment), 1999-2002, MADIO/INSTAT, Madagascar; our own calculations.

Note: The responses for 2000 and 2001 are drawn from the panel of individuals. * The question posed in 1999 was slightly different as the households were asked to assess the evolution of their income and not their living standards.

Peru

During the year, living standards have :	Evolution for own household				Evolution for town			
	Urban		Lima		Urban		Lima	
	2001	2002	2001	2002	2001	2002	2001	2002
Increased	8.3	10.6	7.7	10.6	5.6	8.8	6.4	9.7
Stagnated	60.0	49.8	61.1	49.8	67.0	56.8	67.6	55.7
Fallen	31.7	39.6	31.2	39.6	27.4	34.4	26.0	34.6
Balance of opinion	*-23.4*	*-29.0*	*-23.5*	*-29.0*	*-21.8*	*-25.6*	*-19.6*	*-24.9*

Source: ENAHO Surveys, 2001-2002, INEI, Peru, our own calculations.

Table 5 Cross-check of different approaches to poverty

Madagascar

	Objective indicator	Subjective indicators		
%	Incidence of monetary poverty (1$ PPP)	Difficult monetary situation*	Consider themselves poor or moderately poor**	Low or very low living standards ***
1. Things are fine or fairly good	6.0	13.5	2.3	3.2
2. Precarious situation	8.3	28.0	13.0	14.7
3. Very difficult situation	28.7	71.9	53.2	71.1
Total	17.1	43.4	28.0	37.7

Source: *1-2-3 Surveys*, phase 1 (Employment), 2001, MADIO/INSTAT, Madagascar; our own calculations.

*: Responses *"You are obliged to dip into your savings"* and *"You are obliged to get into debt"*, to the question *"What is the financial situation of your household?"* **: Responses *"the 20% poorest"* and *"the 20% moderately poor"* to the question *"In view of your living standards and those of the households in the town, do you think you belong to:"* ***: Responses "Very low" and "Low" to the question *"How do you assess your household's living standards?"* The figures in this column come from the 1-2-3 survey, phase 3, carried out in 1998.

Peru

	Objective indicators				Subjective indicators
	Incidence of extreme poverty	Total Incidence of poverty	Incidence calorie deficiency	Lack of at least one basic need	Difficult economic situation *
1. Things are fine or fairly good	4.8	17.6	16.0	14.0	10.1
2. Precarious situation	8.9	41.9	28.7	24.4	22.7
3. Very difficult situation	18.7	62.2	42.9	37.4	50.6
Total	9.8	42.2	29.4	25.1	25.2

Source: ENAHO Survey 2002, INEI, Peru, our own calculations.

*: see Madagascar.

Table 6 Perceptions of well-being and satisfaction of basic needs

Madagascar

SWB:	Not satisfied in the following areas:					Not satisfied for	
	Food	Clothing	Housing	Health	Education *	4 or 5 pts	0 or 1
1. Things are fine or fairly good	13.0	24.2	23.2	20.3	21.8	7.0	73.5
2. Precarious situation	33.0	52.5	45.0	41.2	32.1	13.3	41.2
3. Very difficult situation	75.0	83.5	67.5	60.6	59.4	48.0	11.7
Total	46.0	57.5	48.2	43.2	41.7	27.3	38.3

Source: *1-2-3 Surveys*, phase 1 (Employment), 2001, MADIO/INSTAT, Madagascar; our own calculations.

* Only concerns households with children of school age (6 to 14 years).

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Peru

SWB :	Not satisfied in the following areas:					Not satisfied for	
	Food	Clothing	Housing	Health	Education *	4 or 5 pts	0 or 1
1. Things are fine or fairly good	2,4	10,3	8,9	6,1	8,2	0,4	94,8
2. Precarious situation	7,4	25,6	10,9	15,4	9,6	2,0	82,5
3. Very difficult situation	26,0	50,5	26,7	35,5	14,1	8,0	53,1
Total	9,5	27,5	12,9	17,3	10,1	2,6	79,7

Source: ENAHO Survey 2002, INEI, our own calculations.

* Only concerns households with children of school age (4 to 16 years).

Table 7 Households' subjective well-being and income

	Madagascar				Peru			
	Per capita income				Per capita income			
SWB:	High 37%	Middle 20%	Low 43%	Total 100%	High 10%	Middle 77%	Low 13%	Total 100 %
1. Things are fine or fairly good	54%	34%	21%	36%	30%	8%	3%	10%
2. Precarious situation	25%	22%	17%	21%	66%	78%	70%	76%
3. Very difficult situation	22%	44%	62%	43%	4%	14%	26%	14%
Total	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Cramer's V	0.2670				0.1905			
Pearson chi2(4)	310 (significant Pr = 0.000)				4.1e+05 (significant Pr = 0.000)			

Source: *1-2-3 Surveys*, phase 1 (Employment), 2001, MADIO/INSTAT, Madagascar; ENAHO Surveys, household panel 2001-2002, INEI, Peru; our own calculations.

Table 8 Perceived as household's minimum necessary income and observed income

	Madagascar (capital)			
	2000		2001	
	R<Med	R>Med	R<Med	R>Med
Minimum Income (*MIQ*)	735.55	1140.66	719.47	1382.20
Corr. Coeff. (R, *MIQ*)	0.22***	0.56***	0.33***	0.35***
	Peru (urban)			
	2000		2001	
Minimum Income (*MIQ*)	926.11	1751.65	1145.07	1768.04
Corr. Coeff. (R, *MIQ*)	0.32***	0.56***	0.29***	0.54***

Source: *1-2-3 Surveys*, phase 1 (Employment), 2000-2001, MADIO/INSTAT, Madagascar; ENAHO Surveys, household panel 2001-2002, INEI, Peru; our own calculations.

R<Med: per capita income lower than median. Average Minimum Income (MIQ), FMG (Madagascar) and New Sols (Peru). *** : significant at 1%. Number of observations: 2,178 households in Madagascar and 2,927 in Peru.

Table 9 Estimate of ordered probit model of subjective well-being according to income

	Madagascar	Peru	
	Capital	Capital	Urban
Log of total household income	0.593 (17.76)***	0.671 (8.77)***	0.413 (13.46)***
Log of household size	-0.679 (12.86)***	-0.496 (4.46)***	-0.323 (7.29)***
Observations	2164	743	2882
Cut 1	2.564813	3.127262	1.404344
Cut 2	3.173415	5.732144	3.807795
McFadden's R^2	0.090	0.100	0.045
McKelvey and Zavoina's R^2	0.231	0.196	0.094
Log likelihood	-2085.8299	-482.004	-2037.0617

Source: *1-2-3 Surveys*, phase 1 (Employment), 2001, MADIO/INSTAT, Madagascar; ENAHO Surveys, 2001-2002, INEI, Peru; our own calculations.

Note: households in the panel. Robust z statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 10 Comprehensive model of subjective well-being

In view of your income. you consider that:	Madagascar (capital)		Peru (urban)	
1. Very difficult situation	**Coeff.**	**t statistics**	**Coeff.**	**t statistics**
2. Things are alright but have to be careful				
3. Things are fine or fairly good				
Log (total income of household	0.366	(6.06)***	0.289	(4.03)**
Household's demographic structure				
Log (size of household)	-0.455	(4.30)***	-0.400	(4.26)**
Proportion of under 5 year-olds	0.051	(0.27)	0.342	(1.43)
Proportion of 6 to 10 year-olds	-0.469	(2.13)**	-0.142	(0.61)
Socio-economic characteristics of head of h/hold				
Salaried job	-0.224	(2.56)**	-0.352	(2.57)*
Under-employment	-0.224	(2.67)***	-0.136	(1.77)*
Works in public sector	-0.150	(1.65)*	-0.258	(2.52)*
Works in informal sector	-0.272	(3.17)***	-0.099	(1.24)
From the ethnic majority	0.198	(2.31)**	-0.068	(1.02)
Economic characteristics of household				
Log (housing condition score)	0.240	(3.28)***	-0.299	(2.46)*
Log (assets score)	0.282	(4.28)***	0.290	(3.76)**
Number of active workers excluding head	-0.470	(4.07)***	0.017	(0.40)
Number of informal workers excluding head	-0.114	(1.43)	0.015	(0.43)
An unemployed person in household	0.139	(1.86)*	-0.040	(0.37)
A member belonging to social security system	0.663	(11.27)***	0.017	(0.24)
Log (nb years of study/potential nb years of study)	0.240	(3.28)***	0.365	(1.33)
Household satisfied concerning health needs	0.282	(4.28)***	0.508	(5.86)**
Social and political participation:				
Household is member of association (neighbour)	-0.049	(0.65)	0.007	(0.21)
Household is member of association (religious)	0.214	(3.23)***	-0.147	(1.34)
Household is member of association (professional)	-0.024	(0.25)	-0.013	(0.05)
Household is member of association (political)	-0.129	(0.95)	-0.013	(0.17)
Takes part in elections	-0.010	(0.17)	0.184	(1.84)*

Shocks / Vulnerability:				
Household victim of crime (aggression/violence)	-0.176	(1.59)	0.043	(0.26)
Household victim of corruption	-0.102	(1.12)	-0.075	(0.57)
Trajectory:				
Log (household's income in previous year)	0.210	(3.86)***	0.127	(2.39)*
Father of head went to school	0.338	(2.04)**	0.195	(2.36)*
Father of head reached secondary school	-0.003	(0.03)	0.044	(0.51)
Relative income or social comparisons:				
Log (average income in neighbourhood)[(a)]	-0.789	(2.99)***	-0.232	(2.80)**
Income inequality in neighbourhood (Gini)	-1.113	(1.76)*	0.700	(1.91)*
Log (MIQ)	-0.198	(3.87)***	-0.154	(2.67)**
Characteristics of respondent:				
Log (age of respondent)	-0.306	(2.37)**	-0.057	(0.49)
Female	-0.018	(0.14)	-0.032	(0.35)
Spouse of head of household	-0.025	(0.17)	0.051	(0.46)
Neither head nor spouse	-0.523	(2.73)***	-	-
Unmarried	0.480	(2.42)**	-0.113	(0.97)
Divorced or separated	-0.048	(0.34)	-0.285	(2.35)*
Currently active	0.016	(0.18)	0.011	(0.12)
Observations	1965		1815	
Cut1	-4.083872		-.6409468	
Cut2	-3.367335		1.980934	
McFadden's R^2	0.186		0.097	
McKelvey and Zavoina's R^2	0.424		0.191	
Log likelihood	-1691.5209		-1169.0148	

Source: *1-2-3 Surveys*, phase 1 (Employment), 2001, MADIO/INSTAT, Madagascar; ENAHO Surveys, 2001-2002, INEI, Peru; our own calculations.

Note: z statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.(a) for Madagascar, this is the average income of the "*fivondronana*" or district. *Ref.*: male, married, works in formal sector.

II.7 Geography, Livelihoods and Rural Poverty in Honduras: An Empirical Analysis using an Asset-based Approach

Hans G.P. Jansen[a], Paul B. Siegel[b], Jeffrey Alwang[c] and Francisco Pichón[d]

7.1 Introduction

Major economic, political and social changes have taken place in Central America over the past decade. While these changes have stimulated some improvements in well-being and reductions in poverty, particularly in urban areas, the region is still characterized by persistent and stark inequalities in assets and well-being (Morley, 2001). Broad-based growth is heavily constrained by unequal asset distribution. This inequality is most manifest in landholdings, but many productive, social and location assets are equally poorly distributed (Attanasio and Szekeley, 2001).

Honduras is one of the poorest countries in the Western Hemisphere and still a predominantly rural country, with about 60% of the population living in rural areas. The vast majority of rural people live in areas classified as hillside areas with limited agricultural potential (see Box 1 for definitions). The dominance of food and agriculture-related activities in the livelihoods of most rural people and the fact that most of the poor are located in hillside areas raises important questions about how agriculture can serve as an engine of growth to reduce poverty. Also, will small farms be able to survive in the future in hillside areas as trade is liberalized under the Central American Free Trade Agreement (CAFTA)?

Analysts acknowledge that new strategies are needed to promote sustainable poverty-reducing economic growth in rural Central America. A central theme of this literature is that agriculture cannot serve as the sole engine of poverty-reducing rural growth, and that balanced and integrated multi-sectoral approaches are needed (Jansen and Hazell, 2005; Cuellar, 2003; Echeverría, 2001). Such approaches should consider differences in asset endowments across space and across household groups. Variations in environmental conditions,

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access to infrastructure and services, and effectiveness of public and private institutions dictate a spatially differentiated rural strategy. Strategies should include provision of key missing assets and increase the productivity of existing assets. They should recognize how some assets complement each other and how asset bases, income-earning strategies and well-being are inter-related.

Box 1. Defining 'Hillsides', 'Hillside Areas' and 'Valleys'
'Hillsides' are areas with slopes of more than 12%. 'Hillside areas' also include flat-floored valleys, 300 to 900 meters in elevation, which are scattered throughout the interior hillsides. 'Valleys' refer mainly to the lowland areas in the north and northwest of the country, which are generally considered as high-potential areas for agriculture. In Honduras, hillside areas account for roughly 80% of the total land area where the major economic activity consists of smallholder farming focusing on production of basic grains, coffee and livestock. Agricultural potential in hillside areas varies with agro-ecological factors such as elevation, rainfall, and soil characteristics. However, compared to areas with lower slope and elevation, agricultural options in hillside areas are constrained. Rather than profit maximization, food security is the most important objective of most smallholder households living in hillsides areas. Many hillside areas also have less access to transport infrastructure and services.

The objective of this paper is to analyze the determinants of rural growth and sustainable poverty reduction for Honduras. The basic premise is that heterogeneous conditions necessitate complementary analyses of spatial determinants of growth and well-being, and better knowledge about how assets complement one another, and how household livelihood strategies, conditioned on spatial attributes and asset bases, determine well-being outcomes. The study combines geographical information systems (GIS) techniques, quantitative household analysis, and qualitative analyses of assets and livelihoods. The combination generates a description of rural space that recognizes the differential effects of policies and asset bundles across space and households.

Findings show that the economic potential of an area is unevenly distributed and that high rates of poverty persist even in rural areas with relatively high economic potential. In such areas, many households lack the assets necessary to exploit the area's potential to their advantage. Other areas have weak potential due to poor agro-ecological conditions, remoteness, or both. Investments in such areas should seek to strengthen economic mobility (e.g. investments in education and health) and policy makers need to take a long-term perspective. Included among the more important assets are human capital, land and other physical capital, and location-specific assets such as access to roads and markets. The household's livelihood strategy affects prospects for economic progress; lack of sufficient assets constrains many from adopting favorable strategies. Households may also lack the right combination of assets needed to take advantage of economic opportunity and improve their well-being.

The remainder of the paper is organized as follows: The next section provides a brief background to the economic and policy context of rural Honduras. Section 3 introduces our conceptual framework, followed by a

discussion of methods and data in section 4. In section 5 we provide a spatial overview based on GIS data which provides the foundation for the interpretation of the main analytical results. In section 6 we use household survey data to investigate the main determinants of household income and their linkages with asset endowments and livelihood strategies. Factor and cluster analysis techniques are used to identify and group different livelihood strategies; and econometric analysis is employed to investigate the determinants of different livelihood strategies and the major factors that impact on income. Finally, section 7 presents general conclusions and some implications for priority setting of investments and other appropriate interventions.

7.2 Background

Honduras has a total population of 6.8 million and a relatively high population growth rate of 2.6% per year. It is one of the poorest and most unequal countries in the Latin America and Caribbean (LAC) region. Per capita annual income in 2002 was US$ 920 (World Bank, 2004). Social indicators such as child malnutrition rate (17%), life expectancy at birth (66 years), child mortality rate (32 per 1000 births), and literacy rate (less than three-quarters of the population) are among the poorest in the LAC region. Honduras has acquired Highly Indebted Poor Country (HIPC) status and prepared a Poverty Reduction Strategy Paper (PRSP) in 2001. Honduras reached the so-called "completion point" in April of 2005 which qualifies the country for major debt relief and will allow Honduras to use its savings on debt servicing to improve essential public services.

Beginning in the early 1990s, Honduras adopted a range of macroeconomic stabilization programs as part of a continuing process of structural adjustment. The traditional economic import substitution model was gradually replaced by an export growth-led model focused on market and trade liberalization. Major elements of the reform process included reduction of trade barriers and protection of domestic manufacturers, more flexible exchange rate arrangements, financial market liberalization, adjustments of public utility tariffs, and the development of a legal framework to strengthen property rights.

Rural growth and poverty reduction have been constrained by a series of recent shocks. The decline in international commodity prices for major export crops such as coffee and bananas has severely impacted resource-poor farmers and agricultural laborers. The global economic slowdown has exacerbated problems of unemployment. Negative economic impacts have resulted from natural shocks including Hurricane Mitch, destructive and erratic rainfall, and recurrent droughts. Unequal distribution of assets and inadequate public policies dampen low factor productivity, especially land and labor productivity. Over the past decade, income distribution in rural areas has worsened (Figure 1), with

increasing numbers of people at both tails of the distribution that exhibits a virtually stagnant mean.

The economic crisis in the rural sector and is occurring at a time when adjustments are expected in comparative advantage of agricultural and other enterprises, as Honduras has committed itself to a continuation of the process of market liberalization as a part of CAFTA.[1] Sensitive commodity imports include food staples that are important for the typical Honduran diet (primarily maize, beans and rice but also dairy products and sugar), all of which are produced to a substantial extent by small farmers. Free trade of these staples could bring positive welfare effects for the poor who are net purchasers of such goods and create opportunities for growth. For others, accelerating the long deteriorating time trend of terms of trade for agriculture will critically affect the cash value of the production surplus.

As a result of slow and highly volatile economic growth in Honduras, poverty rates have remained stubbornly high and the absolute number of poor people keeps on rising. Official poverty estimates are 66% at the national level and 75% in rural areas (SAG, 2004). Tejo (2000) estimates rural poverty at 82% based on ECLAC data for 1999 (ECLAC, 2003), with about three-quarters of rural households living in extreme poverty. Estimates of rural poverty by the National Statistical Institute (INE) based on the 2001 Population Census (INE, 2002) are closer to the higher estimates by ECLAC: According to the recent poverty map at the municipal level (INE, 2003), two out of every three people in Honduras are poor (per capita income < US$ 1.50/day) and three out of every four poor people are extremely poor (per capita income < US$ 1.00/day). In all cases, regardless of the definition of poverty and the data used, there is no doubt that poverty in Honduras is highly correlated with living in a rural area: most of the poor are found in rural areas and much of the rural population is poor.

Nationally, 59% of all poor households and 65% of the extremely poor live in rural areas. As might be expected, food insecurity is also most pervasive in rural areas (GoH/WFP, 2003).

Rural poverty is particularly deep in the hillside areas: Jansen et al. (2006) estimate that more than 90% of the population located in hillside areas live on less than US$ 1.00/day/capita. In contrast to the concentration of poverty in hillside areas, most areas with lower poverty incidence are located in the "T of development" (Box 2), large parts of which are classified as urban area.

Throughout Latin America, rural households that diversify their economic activities into occupations outside the agricultural sector tend to earn higher incomes than those who rely exclusively on primary agricultural production. However, a salient characteristic of rural Honduras is the relative lack of non-

1 Honduras started negotiations for CAFTA in January 2003 and reached an agreement in December 2003. CAFTA was signed on May 28 2004 and ratified by the Honduras Congress on March 3, 2005.

agricultural activities (and corresponding employment opportunities) compared to other Central American countries. In 1997 such activities accounted for 22% of total rural income on average, compared to 60% in Costa Rica, 42% in Nicaragua, and 38% in El Salvador (Reardon et al., 2001). Non-agricultural rural activities are most common in areas located near the industrial corridor in the north of the country and near the capital city of Tegucigalpa (largely coinciding with the rural parts of the "T of Development").

Box 2. The "T of Development" in Honduras
The so-called "T of Development" in Honduras comprises 55 counties located along the fertile north coast and the central corridor area, connecting the capital city of Tegucigalpa in the south and San Pedro Sula, the industrial center of the country in the north. These are also the counties with the highest human development index (HDI) values. The HDI as calculated by UNDP (1998) for each *municipio* (equivalent to county) in Honduras is based on a composite of separate indices for income, health and education. Most counties that make up the "T of Development" are located in the valleys and/or close to urban areas. Hillside areas are by-and-large excluded from the T of development.

Agricultural sector policy reforms were also implemented in the 1990s, notably a much-reduced role of government, including drastic reductions in public sector institutions such as state extension services. In addition, after more than three decades of heavy government intervention in support of land distribution and rural credit provision, a number of land market liberalization initiatives were introduced while rural interest rates were liberalized in an effort to stimulate commercial bank lending. Also, direct support measures such as consumer subsidies on staple foods (which had a regressive effect since they mostly benefited better-off urban dwellers) and guaranteed producer prices were gradually abolished, culminating in the elimination of the former Institute of Agricultural Marketing. For a short period of time, agricultural credit was subsidized, but classic problems such as poor targeting, high default rates, and the lack of sustainable financial institutions led to the abolishment of these programs. Distortions in the markets of traditional export commodities (e.g. taxes on coffee and banana exports) were (partially) corrected, while the focus on agricultural policies shifted from a focus on food security (i.e., basic grains crops) and traditional exports to the production of high-value non-traditional export crops.

It was expected that the economic reform process would increase the competitiveness of the agricultural sector *vis-à-vis* the non-agricultural sectors, leading to higher incomes and decreases in rural poverty. But this has not been the case. Growth in the agricultural sector lagged behind other sectors in the 1990s (Table 1) and prices for most agricultural products declined, along with agricultural incomes and wages. The intersectoral terms of trade of the agricultural sector relative to the non-agricultural sectors have decreased substantially over the past two decades (Figure 2).

Within the agricultural sector virtually all sub-sectors have lost a substantial part of their purchasing power. Small farmers, whose often already poor livelihoods rely to a substantial extent on basic grains[2] production, were particularly hard-hit, losing about one-third of their purchasing power over the past twenty-some years (Jansen et al., 2002). Nevertheless and in spite of low market values for basic grains, many small farmers' primary goal (particularly in the hillsides) is still to produce food.

The decreasing terms of trade for the agricultural sector as a whole and the loss in purchasing power of virtually all sub-sectors have had a strong negative impact on the welfare of the rural population in general and almost certainly have contributed to the increase in the absolute number of rural poor. Figure 3 shows the time trends regarding real purchasing power of the rural population, in Lempiras (Lps) per person per year using the consumer price index as the deflator. Figure 3 also displays the trend in purchasing power of the agricultural sector, again in Lps per person per year but this time using the price index for non-agricultural goods as the deflator. Both trends closely follow each other, showing a rise in the mid-1970s, a collapse in the late 1970s and early 1980s, slow recovery during the late 1980s and early 1990s, and another collapse in the late 1990s. It thus seems that the following conclusion of Barham et al. (2002) is indeed confirmed: "…..the liberalized agrarian economy of Honduras shows little sign of operating in the pro-poor fashion that some have hypothesized."

7.3 Conceptual framework: The asset-based approach

Our conceptual framework is anchored to an *asset-base approach* (Siegel, 2005). The asset-base framework includes the following components: *assets* (productive, social, location-specific), the *context* (policies, institutions and risks), household behavior (*livelihood strategies*), and *outcomes* (measures of household well-being). Household and community decisions determine outcomes such as household well-being, environmental preservation, and community prosperity. The welfare-generating potential of assets depends on the asset-context interface. Policy reforms and building of assets need to be considered in tandem.

A household's **assets** consist of the stock of resources used to generate well-being (Moser, 1998, Siegel and Alwang, 1999; Rakodi, 1999). Assets span human capital including age, education and training, and family structure; natural capital (e.g. climate, land, soil water deficits, soil fertility); physical capital (equipment, livestock); financial assets (transfers, credit, savings);

2 Throughout Central America, the term "basic grains" (*granos básicos*) refers mainly to maize and beans but also includes sorghum and rice.

location-specific factors such as access to infrastructure and public services; and social capital measured by the household's participation in various types of organizations. In the asset-base framework, the poor are "asset-poor," with limited or low-productivity assets.

Certain assets are effective only if combined with others; *asset complementarity* matters. For example, access to land has different implications for well-being depending on its location relative to markets and other infrastructure, on access to credit and inputs, and on education of the land owner. Education may have markedly different implications for welfare generation depending on location and the functioning of labor markets and related institutions. Other important determinants of asset productivity include regulatory and legal systems, which determine the security and transferability of assets, and the existence of means of exclusion. These factors are part of the context.

The **context** in which households operate helps determine the welfare-generating potential of assets and prospects for improved well-being. The political, legal, and regulatory contexts affect how assets are managed and whether successful livelihood strategies can be undertaken (Zezza and Llambi, 2002).

Household management of its asset portfolio constitutes its **behavior** or **livelihood strategy**. Livelihood strategies refer to the way households use their assets such as land and labor allocations, investments in education, migration, and participation in social capital building. Livelihood strategies include a range of on- and off-farm agricultural and non-agricultural activities (Berdegué et al. 2001, Corral and Reardon 2001). Asset accumulation and livelihood strategies are important drivers of sustained improvements in well-being.

We are concerned with **outcomes** that reflect household well-being and prospects for growth over time. The asset-based conceptual framework leads us to consider a variety of measures of household well-being and to use quantitative and qualitative analyses. In addition to income and consumption, poor rural households are concerned about food security, health status, vulnerability in general, empowerment and self-esteem, participation in community affairs, environmental quality, and hopefulness toward the future (Narayan et al., 2000).

7.4 Methods and data

Implementation of the asset-based approach requires multiple analytical techniques and data sets (Table 2). Each technique helps to inform others so that the analysis is fully integrated into the spirit of the asset-based approach. We begin by examining the spatial distribution of assets and economic potential. This spatial analysis provides a broad view of rural heterogeneity in Honduras,

identifies areas where assets might be conducive to broad-based growth, and identifies potential conflicts between growth and poverty-reduction objectives in rural areas. We use geo-referenced data and GIS overlays to identify which areas are likely to be amenable to growth-oriented interventions and whether the poor are likely to benefit from such investments. The spatial distribution of poverty provides information on historical impacts of regional interventions on poverty reduction and provides guidance for targeting future investments and programs.

The quantitative analysis builds on the spatial analysis by addressing the issue of how household livelihood strategies and levels of well-being are determined within these heterogeneous rural areas. It begins by regressing household livelihood strategies on basic assets controlled by the household (see table 3 for a list of the variables included). These assets encompass the broad classes identified and discussed above (human, natural, physical, financial, locational and social capital). Subsequently we model the measure of household well-being as dependent on livelihood strategies and assets. The basic model is:

$$L_j = f(X_j, Y_j, Z_j) \qquad (1)$$

$$lnW_j = f(X_j, Z_j, L_j^*) \qquad (2)$$

where L_j represents the livelihood strategy pursued by household j, W_j the welfare measure for household j, and X, Y and Z are vectors of household-specific and location assets. The Z-vector contains, in some cases, regional dummy variables, and census segment-level, community-level or *municipio* (county)-level means of variables (such as participation in social capital-building activities, and population density and change). The function f (.) is a generic functional form and we use single equation estimators appropriate to the nature of each dependent variable. We use a multinomial logit model to estimate equation 1 since L_j is a polychotomous choice variable. We use a linear form to estimate equation 2 with OLS.

Equations 1 and 2 represent a simple model of livelihood strategy choice and production of household well-being or income. The idea is that a household's livelihood strategy is shaped by its asset portfolio and that more and better assets produce higher levels of household well-being. Assets that are especially significant or have an especially powerful effect may be targets for strengthening interventions.

Issues of exogeneity and causality are difficult to sort out in regressions of the sort of equations 1 and 2. The problem is one of theory and inference and is particularly relevant for equation 2: we wish to know, for example, whether an increase in education of the household head will lead to higher household well-being, all other assets held constant, whether education level and well-being are endogenously determined, whether the model is missing household-specific variables affecting both education and well-being, or whether errors in measurement of education levels are correlated with the error in equation 1, then problems emerge. The regression parameter will be a biased estimate of the true

(theoretical) relationship between education and well-being, and we cannot be sure if a policy to improve educational attainment will improve well-being.

This bias is likely to become more important as we investigate variables that are more subject to immediate household choice, such as livelihood strategies. We address this bias in several ways when conducting the analysis and interpreting the coefficients. For example, when we examine the impacts of livelihood choice on household well-being, we use instrumental variables based on equation 1 to purge the effects of the endogenous nature of the choice on our estimates of well-being. We account for endogeneity using a two-stage estimation process. In the first stage we estimate the determinants of the livelihood strategy (equation 1). In the second stage, when examining the impacts of household livelihood strategies on well-being outcomes, we use predicted household livelihood class on the right hand side of the well-being regression (equation 2). The variable L^* in equation 2 indicates that the livelihood choice is endogenously determined by unobserved factors. We also allow interactions between some asset variables (to measure the strength of asset complementarity). We assured proper identification of the system by including Y_j in equation 1 but not in equation 2.

The household analysis is complemented with qualitative studies that provide additional insights into household- and community-level decision making processes. These include participatory analyses of livelihoods and community-level analyses of impacts of recent projects. The qualitative assessments were designed to obtain information about which assets community members thought were most important and how they contribute to improved well-being.

7.5 Economic geography of rural Honduras

After Guatemala, Honduras is the second largest country in Central America, with a land area of about 112,000 km^2 (figure 4). About 80 percent of the country's land area west of the eastern province of Gracias a Dios consists of hillsides (interior highlands) or hillside areas, with the remaining 20 percent classified as lowland valleys (see box 1 for terminology). Within the interior highlands, numerous flat-floored valleys are mainly used for extensive livestock operations. Hillside areas are dominated by subsistence agriculture and staple food production and are characterized by small landholdings, low levels of technology, and low productivity.

Most hillside areas are not really suitable for intensive agricultural use. The reality is very different, however; despite the absence of a recent land use map, many hillside areas are known to be used for food staple production using unsustainable technologies that have led to increasing degradation of natural

resources, particularly soil, forest, and water resources (Kok, 2001; Pender et al., 2001; Jansen et al., 2005).

Average population density in Honduras is relatively low (60 persons/km^2) but given the mountainous nature of the country, the number of people per unit of arable land tends to be much higher. Over half of the population is classified as rural. Rural Honduras is characterized by substantial heterogeneity in economic potential and performance of sub-regions. Part of this heterogeneity is due to inherent differences in topography and agro-ecological conditions, and part is due to historical decisions to steer public investments toward more favored areas. In general, access to urban markets and services, and non-farm employment opportunities are very limited for most inhabitants of the interior hillside areas.

Of the total of about 4 million rural inhabitants, an estimated 80% lives in the hillside areas. The most densely populated hillside areas include the Western border with Guatemala and the Southwestern border with El Salvador. Population change between the 1988 and 2001 censuses did not follow a uniform spatial pattern. Urban areas grew faster than rural areas, in particular the areas near Tegucigalpa and San Pedro Sula. But population in most hillside areas also increased substantially, by between 1.5 and 4% per year on average during the period 1988 and 2001. On the other hand, some hillside areas with high proportions of landless people experienced much lower population growth or even population decline. Internal temporary migration has also historically been an important livelihood strategy in Honduras, with most migrants leaving rural areas in the southwestern parts of the country where land is of poor quality and the supply of basic services is limited.

Coverage of basic social infrastructure (e.g., schools and clinics) and physical infrastructure (e.g., roads, communication, water and sanitation, electrification) in rural areas expanded significantly in the 1990s, some as part of reconstruction efforts in response to damage caused by hurricane Mitch. However, there remain major gaps in the coverage and access by poor households and communities to infrastructure and public services, especially in hillside areas. Public investments have historically been skewed towards the 55 *municipios* that make up the "T of Development," stretching from the capital Tegucigalpa to the industrial center at San Pedro Sula. These municipios have relatively good natural capital, so investments there are based on growth potential. Outside the T, public investments (particularly road networks and other infrastructure) have been concentrated where agro-ecological conditions are favorable for export agriculture such as coffee (concentrated on small and medium-sized farms in the west) and bananas (mostly on large plantations in northern valleys). Most other rural areas, the hillsides in particular, are found outside the T of Development and have been largely bypassed by public investments.

Most major roads follow the valleys between Tegucigalpa and San Pedro Sula. Other major road networks head south out of Tegucigalpa to the Gulf of Fonseca near Choluteca; and eastward through the coffee producing areas near El Paraíso. The road network running parallel to the Guatemala border between San Pedro Sula and Santa Rosa de Copán serves the major coffee producing area in the country. A major road running parallel the Caribbean Sea serves the north coast, which contains significant agricultural potential. But many rural communities are isolated from major (primary and secondary) roads and/or are isolated during the rainy season when roads are impassable, especially in the hillside areas where the road network is less well developed than in the valleys. In general terms the eastern half of Honduras has very low road densities while the western half has higher densities. This result mirrors the distribution of population and shows a constraint to growth in the east due to lack of infrastructure; for example, there are no major highways in Gracias a Dios.

While about 70% of the rural population is covered by water and sanitation infrastructure, access and services are not always available. Electricity coverage in rural areas is only 20%, as opposed to 85% in urban areas (GoH, 2004). The lack of social and physical infrastructure has clear implications for the productivity and competitiveness of agricultural and non-agricultural activities in Honduras, and limits opportunities for poverty-reducing growth.

7.6 Key findings from quantitative and qualitative analyses

Unlike other Central American countries, no nationally representative household survey is available for Honduras. Therefore, the household-level analyses presented in this paper are based on data from two sub-national surveys that collected similar (though not 100% identical) information and are largely complementary in terms of their geographical coverage (see Table 2). Together these surveys cover parts of 12 (out of 18) provinces (*departamentos*), 42 (out of 298) counties (*municipios*), 206 villages (*aldeas*) and 400 hamlets (*caserios*). The total number of households (*hogares*) for the combined surveys is 1,225. Both household surveys were supplemented by adding secondary, mostly geo-referenced information that included (but was not limited to) rainfall, altitude, population density, and road density from various sources.

The first step in our household-level analysis is to categorize the livelihood strategies and understand how household well-being is related to each strategy. Livelihood strategies can be identified and characterized in a number of ways, but we begin by examining the main source of employment for all household members (table 4). Households depending on agricultural activities are worse off than others; poverty rates are higher and mean levels of well-being are lower. Figure 5 shows the full distribution of well-being by household employment class. The distributions for the agricultural-based strategy are shifted to the left

of the other strategies, consistent with higher poverty among such households shown in table 4. The non-agricultural employment strategies have lower densities of well-being at the very low end of the distribution, far to the right of the poverty line. They also have a more pronounced rightward skew with much higher densities above the poverty line. However, the nature of the difference is not dramatic: while some non-agricultural employment tends to have higher returns than agricultural employment, many non-agricultural occupations of the rural poor in the Honduran hillsides have relatively low returns (e.g., domestic services; see Ruben and van den Berg, 2001).

For our final classifications of households, we conducted factor and cluster analyses[3] of households to group them into distinct livelihood strategy categories. The identification of livelihood strategy categories is followed by the estimation of an appropriate version of equation 1 (using multinomial logit models), followed by estimation of equation 2.

Finally, the IFPRI household survey was accompanied by qualitative diagnostic surveys at the community level in the same 95 communities where the household survey was conducted between May 2001 and March 2002 with the help of local non-governmental organizations (NGOs) with long-term experience in the area. The community-based livelihood studies complement the household surveys and involved the characterization and diagnosis of problems, limitations and opportunities resulting in community profiles. Although highly participatory and informal, structured methods were used in close cooperation with a carefully selected representative group of community stakeholders of about 20 persons in each community. Key elements in each diagnostic included the history of the community, the agricultural production systems, management of natural resources, access to infrastructure, public facilities and services.[4]

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3 We used a combination of hierarchical cluster and k-means cluster analyses to create livelihood clusters. The hierarchical cluster analysis, used in the first step, efficiently grouped households together. However, hierarchical clustering can give rise to misclassification of observations at the boundaries between clusters and the k-means analysis, which is iterative, eliminates these problems (Wishart, 1999). The IFPRI households were clustered on the basis of time allocation and land use patterns, and the Wisconsin households on the basis of similar land use patterns and income shares.

4 Examples of specific information sought include major occupations of the community's inhabitants, dominant land use types, land tenure arrangements; perceptions regarding natural resource degradation, market access, health and education; forms of community-based organization and collective action, and influence of external projects and programs. For details and an econometric analysis of the community-level information, see Jansen et al. (2003).

Identification of key livelihood strategies and household groups

The IFPRI households were grouped into seven clusters, each representing a separate livelihood strategy (Table 5). Livelihood strategies in hillside areas mostly revolve around agricultural and small-livestock activities, with relatively few households engaging in higher-return activities such as production of vegetables or non-farm activities. Over one-half of households pursue a livelihood strategy that centers on basic grains production (livelihood clusters #1 and #2), whereas households in other livelihoods groups also tend to produce basic grains. Livestock is also an important livelihood strategy (clusters #1 and #5), and to a lesser degree coffee production (and employment in coffee plantations). Perhaps surprisingly and certainly shockingly, none of the livelihood strategies followed by the IFPRI households in the hillside areas was able to generate an average annual income above the extreme poverty line of US$ 365/capita (US$ 1.00/person/day), let alone above the poverty line of US$ 550/capita annual income (figure 6). Differences in outcome variables can be regarded as the result of differences in asset endowments that, in turn, are causal factors for differences in livelihood strategies represented by the clusters.

The Wisconsin households were clustered into six livelihood strategies (Table 5). About one-quarter of households pursued a diversified livelihood strategy and nearly 30 percent are coffee producers. Basic grain production and livestock production are also important livelihood strategies. In contrast to the IFPRI livelihood strategy group clusters, the Wisconsin sample includes households whose livelihood strategies are dominated by a business or receipt of remittances. In general terms, the Wisconsin households are considerably less poor than the IFPRI households (Figure 7), mainly due to better asset endowments. However, also in the Wisconsin sample there are distinct differences according to livelihood strategies.

Determinants of livelihood strategies

The results of the multinomial model estimation (equation 1) are shown in tables 6 and 7. Together the explanatory variables reflect the main elements of the household asset portfolio. The model results generally support our use of an asset-based approach as the fit was relatively good and the results are plausible. The variables included in each model were chosen based on availability within the data set, model misspecification tests, and consistency with the asset-based framework.[5]

Better-educated families are more likely to depend on remittances (table 7). In the IFPRI sample, which mainly included agricultural producers, education

5 Several variants of each equation were examined, including instrumental variable estimates for the "endogenous" variables—education, access to infrastructure, and participation in social capital, quantile regressions, addition of cluster-level variables, etc. The models were subjected to misspecification tests. Reported results are robust to alternative specifications.

does not have a strong impact on the choice of one agricultural-based livelihood strategy over another (Table 6). The diversified basic grains/livestock/farm worker strategy is more common among households who own more land, are male headed but have more female adults, have more migrants, and where the head is older. This livelihood strategy appears to represent one destination in a household's life cycle; as households become more mature, they seek and are able to diversify into off-farm activities as well as livestock. Hillside households with migrating members find it easier to diversify away from basic grains towards more remunerative livelihood strategies based on livestock, coffee or off-farm work.

Among agricultural households, land ownership increases the likelihood of a diversified livelihood strategy (LS 5 in Table 6) while making the low profitability basic grains-based livelihood less likely (Table 7). Access to titled land has a similar effect, increasing the probability of coffee growing in the hillsides (Table 6) while also making diversification and livestock growing more likely (Table 7).

Natural capital has less impact on choice of livelihoods than expected *a-priori*: elevation stimulates coffee-based livelihoods while fewer problems with water are associated with more off-farm work and less dependence on basic grains (Table 6).

Several location-specific assets, including access to technical assistance and distance to key facilities affect livelihood choices. The results from the Wisconsin household sample suggest that higher population densities can stimulate households to pursue market production and move away from less remunerative livelihood strategies based on basic grains production for food security. Market access and access to credit are important for a coffee-based livelihood strategy even though the latter may reflect reverse causality (coffee producers have easier credit access).

Finally, social capital is an important determinant of livelihood strategy choice. Households that are a member of a financial organization are more likely to pursue a livelihood based on economic activities outside agriculture (LS 5 in Table 7) while most community organizations seem to be stimulating agriculture-based livelihood strategies (Table 6). Not surprisingly, livestock ownership is important in livestock-based livelihoods while coffee growers have more physical capital.

Determinants of household well-being

Rural household livelihood strategies can have major impacts on outcomes such as levels of well-being, rates of poverty, and an area's growth potential. In the asset-based framework, livelihood strategies reflect conscious household decisions about allocation of their primary productive resources, mainly labor and land. But, as shown above, the specific strategy adopted by households depends on other assets, including natural, human and social capital, and

location specific assets. A major issue is whether the assets themselves cause improved well-being, or it is only through adoption of a livelihood strategy. Livelihoods are closely related to household well-being, but the nature of causality is open to question: do better-off households engage in certain strategies because they are better off, or does the strategy "cause" the household to become better off? To shed light on this question, household income was hypothesized to depend on the household's livelihood strategy and asset portfolio.

To assure proper identification, we excluded from the well-being regression asset-related variables that can reasonably be assumed to affect income only through their influence on livelihood strategies. In addition to the effects on income of individual assets, we investigated a number of interaction effects, in order to identify possible synergies and/or substitution between pairs of assets. These interaction effects included land ownership and credit, farm size and market access, farm size and education, market access and education, and land ownership and soil fertility. The regression results for equation 2 are presented in table 8 and show how livelihood strategies, individual assets as well as asset interactions impact on rural household well-being.[6]

Livelihood strategies

After controlling for other assets, the livelihood choice is a relatively limited determinant of household well-being. In the Wisconsin sample, households that are able to follow a livelihood strategy based on extensive livestock farming earn significantly higher incomes, which allow them to rise above the extreme poverty line (but not above the poverty line).

Human capital

Even though the estimated coefficient of the average level of household members' education is not statistically significant for the poorest agricultural households in the hillsides (most likely due to low variation combined with low average values in the IFPRI sample), the results based on the Wisconsin data suggest an elasticity of household well-being to years of education of around 0.9. Other research suggests that in Honduras every year of additional education increases income by about 10%, with upper secondary education having the highest returns.[7] Acquiring professional skills (agriculture-related or not) allow people to sell their labor at a higher price.

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6 The measure of well-being is total household income defined as the sum of the net value of crop and livestock production (revenues minus costs), off-farm salaried work, own business and transfers. Own production, whether consumed by the household or sold, is included in the calculation of household income.

7 Source: Presentation by Guillermo Perry and Felipe Jaramillo at the Third Regional Conference on Central America "Economic Growth and Issues in Bank

Household dependency has a strong negative impact on well-being with an elasticity of about -0.2. Older household heads are associated with lower levels of well-being (elasticity of about -0.6). Hillside households (IFPRI sample) whose members spend more time migrating have higher levels of well-being, but the income-migration elasticity is low (< 0.1).

Physical assets

Soil fertility has a strong and significant impact (elasticity of about 0.4) on well-being in the hillside areas where most livelihood strategies are agriculture-based. The results for the Wisconsin households suggest an elasticity of well-being to land ownership of about 0.35.

The interaction between the amount of land owned by the household and access to credit exerts a positive effect on income. This suggests the existence of a synergy effect between owned land and credit, i.e. land ownership (physical capital) and credit (financial capital) are complementary assets. On the other hand, the negative and significant coefficient of the interaction between the amount of land farmed by the household and the average level of formal schooling is suggestive of a substitution effect, i.e. schooling can to some extent compensate for a lack of market access and vice versa.

The impact of land on household well-being depends critically on two factors: its productivity and its location. The amount of non-land physical assets owned by the household (machinery, equipment, transportation) has a positive effect on income of hillside households (elasticity around 0.4), most likely because it increases labor productivity. Livestock is also a significant asset but with low well-being elasticity (around 0.05).

Location-specific assets

The significant and negative coefficient of the market access variable, together with the positive coefficient for road density in the Wisconsin sample confirm the negative influence of isolation on well-being. The positive interaction effect between the education and market access variables suggests that, in terms of their effect on household well-being, good market access can compensate to some extent for less education.

Social capital

Participation in community organizations has a positive effect on household well-being. The negative and statistically significant coefficient for household participation in financial organizations may reflect the fact that these organizations mostly focus on the poorest (basic grains-dependent) hillside

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Resolution" sponsored by The Central American Monetary Council and the International Monetary Fund and hosted by the Central Bank of Honduras on July 8-9, 2004 in San Pedro Sula.

households. The qualitative analysis at the community level confirms the quantitative finding of a positive and significant coefficient for external organizations obtained in a reduced form of the income regression (not reported). Some of these organizations play a key role in promoting sustainable agricultural practices among hillside farmers while others are crucial for making the necessary marketing contacts to enable farmers to switch to more remunerative livelihood strategies.

7.7 Summary and conclusions

In this paper we developed and applied an appropriate conceptual and analytical framework to better understand how prospects for growth and poverty reduction can be stimulated in rural Honduras. Anchored in an asset-based approach, our framework uses a combination of economic geography, quantitative household analysis and qualitative methods at the community level to generate a number of key findings with important strategic implications.

Rural areas and households in Honduras are characterized by significant heterogeneity in terms of their endowments of natural and other types of assets. This heterogeneity is particularly stark in hillside areas. Natural assets define agricultural potential and absolute advantage of a given area, and together with socio-economic conditions determine its comparative advantage. Economic potential is thus determined by the interaction between natural assets and other asset types. As a result of this heterogeneity across space and households, economic potential has a strong spatial pattern in Honduras, with most high potential areas located close to the main cities and along the Northern Coast. Public investments in human and physical assets in Honduras have been skewed towards the so-called "T of Development" which comprises 55 counties located along the fertile north coast and the central corridor area, connecting the cities of Tegucigalpa in the south and San Pedro Sula in the north. Outside the "T", public investments (particularly road networks and other infrastructure) have been concentrated where agro-ecological conditions are favorable for export agriculture such as coffee (concentrated on small and medium-sized farms in the west) and bananas (mostly on large plantations in the northern valleys). Most other rural areas have been relatively excluded from public investments. This, together with highly heterogeneous conditions in rural areas, has resulted in poverty being highest and deepest in the hillsides and hillside areas.

Hillsides and hillside areas account for the majority of land area and often have agro-ecological constraints that make them less suitable for agriculture. The rural poor tend to have small and fragmented land plots. Production is often limited to a single rain-fed growing season. The poorest of the rural poor live in isolated areas with poor market access and few roads. These factors constrain potential gains from adopting improved technologies and limit opportunities to

diversify agricultural production systems. As a result, many people are locked into strategies based on production of basic grains and small livestock for subsistence needs in areas that are not suited for such strategies. Under these circumstances, achieving sustainable agricultural growth is challenging.

But rural poverty can be high even in areas with relatively favorable biophysical and socio-economic conditions. For example, hillside areas along the Guatemalan and Salvadoran borders in western and southwestern Honduras have relatively good access to infrastructure (e.g., relatively well-developed road infrastructure in coffee producing areas), favorable bio-physical conditions and good economic potential, but also high rates of poverty. In particular, the Copán area has substantial tourism potential, but despite good locational conditions, measures of well being are lagging far behind potential. Persistent high rates of poverty show that this potential is not being realized -- and the extent to which it is being realized, the poor are not participating. Most hillside households have limited assets on which to base their livelihood strategies. Moreover, high inequalities in asset distribution constrain how the asset-poor can share in the benefits of growth, even under appropriate policy regimes. In the specific example of the counties bordering Guatemala and El Salvador, lack of feeder roads within these mountainous counties increases transaction costs and makes it difficult for poor households to participate in the market economy. Thus, public investments are needed to strengthen the asset bases of the poor before they can benefit from growth-related spillovers.

Based on our analyses in the previous sections of this paper, we offer the following conclusions and policy recommendations:

1) Hillsides and hillside areas should be a major target of national rural poverty reduction strategies

In section 2 we show that most of the poor are found in rural areas and that the vast majority of the rural poor live in areas classified as hillsides or hillside areas. The analysis in section 6 reveals that most rural poor in these areas are also extremely poor. This should make hillsides and hillside areas a natural target of national rural poverty reduction strategies.

2) Within the hillsides and hillside areas, public investments should focus on high poverty rate-high poverty density areas since investments there should reach significant proportions of the country's rural poor

Many hillsides and hillside areas in Honduras show both high rates of poverty and high population densities (leading to high poverty densities). For example, the western areas around Copán, the southern areas in Valle and Choluteca, and the Province of Comayagua have both high poverty rates and high poverty densities. By targeting these areas, significant proportions of the rural poor can be reached. The problem of leakages to the non-poor in these areas will be minimized because of high poverty rates. The geographic correspondence

between high poverty rates and high poverty density means that there is little tradeoff in targeting high poverty areas for poverty-reducing interventions. Since several of these areas have relatively good-quality infrastructure and access to markets, they make good candidates for poverty-reducing investments.[8]

3) Agriculture-based growth should form an integral part of the rural development strategy for hillsides and hillside areas

In section 2 we showed that over the past 25 years, agriculture has not been a strong engine of growth in rural Honduras. In section 6 we found that land and labor productivity are particularly low in the hillsides and hillside areas and that off-farm work (even if it is mostly limited to agriculture-related work) is more remunerative than primary production of basic grains on the own farm. This result points towards the critical importance of income from off-farm work for many households in hillsides and hillside areas that have insufficient land to meet their basic food security needs given their use of traditional production technologies. On the other hand, households with a certain minimum landholding size tend to stay on their farms. The emphasis on food security of most hillside households combined with low land and labor productivity locks these households into a cycle of poverty. Breaking this cycle, freeing up more labor for off-farm work and achieving broad-based agricultural growth require substantial increases in the productivity of both land and labor. The analysis in section 6 suggests that labor productivity can be increased through the provision of physical assets such as agricultural tools and machinery. Land productivity will have to be raised through increased adoption of improved land-saving production technologies. The econometric analysis in section 6 also shows the importance of maintaining soil fertility for increasing incomes.

8 On the other hand, low population densities in the eastern part of the country lead to much lower poverty densities and a tradeoff between poverty rates and poverty densities. Even though these areas were not part of our study, it is likely that because of the high poverty rates in some of these areas, investments need not have a complicated explicit targeting mechanism; leakages to the non-poor are reduced in areas with higher rates of poverty. But because population densities are low, investments in these areas should be spatially targeted to specific population clusters, or the types of investments should be selected based on low per unit costs of delivery over space. For example, investments like health-related services should obviously be targeted to population clusters. Others, such as education should be located to guarantee a reasonable degree of access, even in low population density areas.

4) Public investments in access to land alone have limited impact on household income and therefore should be combined with investments in human and financial capital

Land ownership has a strong direct effect on well-being, and it also increases the likelihood that a household follows a more diversified livelihood strategy that is more remunerative than basic grains farming. We also showed that access to land combined with access to credit has a significant and positive effect on household income; and that households with land titles are more likely to follow more remunerative livelihood strategies that are not basic grains-based and therefore earn higher incomes. Therefore, efforts to facilitate access to land need to include titling programs and be combined with investments aimed at improving the financial and human asset bases of rural households.

5) Investments in infrastructure are urgently needed in the hillsides and hillside areas

Livelihood strategies based primarily on agriculture will not be adequate for many households in hillside areas. However, non-agricultural activities are relatively rare in rural Honduras because of the physical distances from urban centers and towns and the lack of good road infrastructure and transport services. Our econometric analyses in section 6 show that better market access and higher road densities have a string direct effect on income levels. The same analyses also show that, to a certain extent, improved market access can compensate for low levels of education. Investments in rural infrastructure therefore deserve high priority in Honduras' rural development strategy.

6) Need to capitalize on the full potential of the migration phenomenon

Temporary and permanent migration within Honduras and abroad are part of the livelihood strategies of rural households in hillside areas. The primary causes of migration are poverty and land degradation, not lack of land access per se. For example, people from hillside areas in the west and south–where soils have been exhausted and eroded – frequently migrate to the north and northeast regions. Our results in section 6 indicate that migration is significantly less common among low-income households that follow livelihood strategies based on basic grains production. We also found evidence that households with more migration assets have higher income (all other factors equal). A major question therefore is: how to capitalize on the full potential of the migration phenomenon? Currently remittances mostly serve as a source of finance for food and other goods which can be expected given that poverty is deep among hillside households (Jansen et al., 2006). But remittances are a potential source of finance for market-oriented productive activities and household diversification. To maximize returns from migration, the government should consider providing basic training to assist prospective migrants, assist community-based initiatives

aimed at investing remittances in a productive way, and improving financial systems to lower the transaction costs and risks associated with remittances.

7) Stimulating the formation of social capital is important for increasing the welfare of rural households

Participation in community organizations has both a direct and an indirect positive effect on income (the latter through increasing the likelihood of a household following a more remunerative livelihood strategy). Moreover, our community-level analysis confirmed that in the absence of formal institutions in isolated rural areas, these organizations can fill a critical role and are a potentially important factor in stimulating more remunerative, market-oriented production activities.

8) Efforts to curtail rural population growth are important

Our analysis in section 6 indicates that households with higher dependency ratios earn lower incomes. Public programs aimed at reducing fertility rates in rural areas therefore seem important.

9) Move from geographically untargeted investments in single assets to a more integrated and geographically based approach of asset enhancement with proper complementarities

In our final conclusion and recommendation we argue that while some public investments in household assets programs should be national in nature (such as education and health), others (such as investments in infrastructure, and productive and social capital assets) require more local adaptation and must be carried out in tandem, according to specific needs of regions and households. Household-level heterogeneity limits the appropriateness of "cookie-cutter approaches" to policies and programs designed to foster broad-based growth. Investment strategies should be formulated on broad regional bases, but options within regions should be tailored to local asset bases and other conditions.

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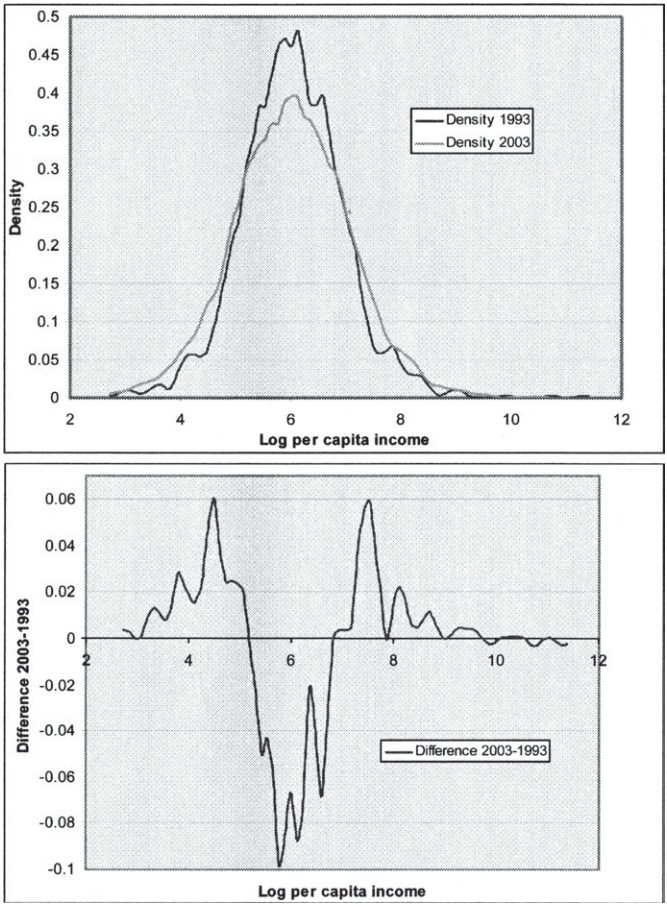
Tables and Figures

Figure 1 Changes in income distribution in rural Honduras, 1993-2003



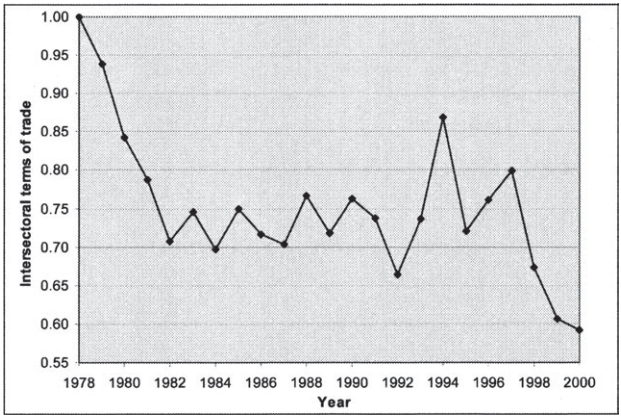
Source: Based on data from the Permanent Household Surveys 1993 & 2003, National Statistics Institute (INE), Honduras

Table 1 Shares in GDP and growth rate by economic sector in Honduras, 1983-2003

	GDP % shares			Annual % Growth Rates	
	1983	1993	2003	1983-1993	1993-2003
Agriculture	21.2	20.6	13.5	3.8	2.2
Industry	25.3	30.1	30.7	3.9	3.2
Services	53.5	49.3	55.8	3.4	3.6

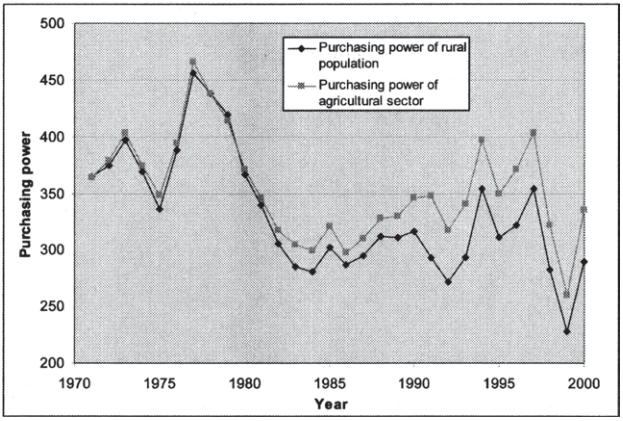
Source: www.worldbank.org/data/countrydata/aag/hnd_aag.pdf

Figure 2 Terms of trade of the Honduran agricultural sector, 1978-2000



Source: Based on data in Table A11 in Cotty et al. (2001).

Figure 3 Purchasing power of the rural population and the agricultural sector in Honduras, 1971-2000 (Lempiras of 1978/capita/year)



Source: based on data in Table A15 in Cotty et al. (2001)

Table 2 Description of techniques and data used, by study component

Study Component	Data used
Spatial analysis	*Sistema Nacional de Información Territorial* (SINIT) and *InfoAgro*, the Ministry of Agriculture's GIS unit. Supplemented with the 1988 and 2001 population censuses, and maps from the World Food Program's vulnerability assessment (GoH/WFP 2003).
Quantitative household analysis	Two sub-national surveys: (i) conducted in 2000-01 for a land tenure and rural finance study of the University of Wisconsin, in both hillside areas and valleys; (ii) carried out in 2001-02 by the International Food Policy Research Institute in cooperation with Wageningen University and PRONADERS (National Program for Sustainable Rural Development), in hillside areas only. Together they cover parts of 12 provinces, 42 counties, 206 villages and contain observations on 1,225 households (Jansen et al. 2005).
Qualitative analysis	The IFPRI household survey was accompanied by qualitative diagnostic surveys in the same 95 communities, using local NGOs supervised by staff from PRONADERS. They involved the characterization and diagnosis of problems, limitations, and opportunities resulting in community profiles (Jansen et al. 2003). Stocktakings for the following World Bank projects: Honduras Rural Land Management project; Project Access to Land (PACTA); and Biodiversity and Priority Areas Project (PROBAP).

Table 3 Description of variables used in analysis of household livelihood strategies and well-being

Dependent variables	Variable names	Variable description
Natural assets	natass1-5	1) Average altitude of farmer's plots (in feet); 2) Annual rainfall in mm (Wisconsin households); 3) Natural log of summer rainfall in mm; 4) Water deficit for maize during October-January in mm (IFPRI households); 5) Natural log of soil fertility (IFPRI households, see Jansen et al. 2005 for details)
	land	Quantity of land (manzanas (mz), 1 mz = 0.7 ha))
	ownland	Quantity of land owned (manzanas)
	landtitle	Quantity of land titled (manzanas)
Human assets	mhh	(=1 if male-headed)
	hsize	Number of household members
	deprat	Dependency (household members < 12 or > 70 yrs)/(members between 12 and 70 yrs)
	ed	Median years of schooling of household members > 7 yrs
	age	Natural log of head's age (years)
	migrant	IFPRI households: average % of time that an adult lives and works outside the household. Wisconsin households: Total number of man-months spent outside the household by household members
	femadult	% of females (>12) in household
	training	(=1 if HH has received agricultural training)
	techass	(=1 if HH has received extension visits)
Physical assets	busassets	Value of machinery, equipment and transportation (Lempiras[1], L.)
	livestock	Value of livestock (L.)
Location assets (all variables defined at local level)	distance	Natural log of market access (index of travel time to nearest market)--IFPRI households; distance to daily market, km--Wisconsin households
	popdens	Natural log of population density at community level
	road	Road density at community level (= km of roads/km^2, IFPRI households)
	capdist	Distance between community and county capital or capital of another county (if closer), in km; Wisconsin households only
Social capital	socap	Various dummy variables representing household participation in community, agricultural, savings and loan, and other organizations.
Financial capital	credit	Dummy variable (=1 if household has access to any form of credit)
Livelihood strategies		See Table 5
Interaction terms		land*credit; natural log of land*distance; land*ed; ed*distance; ownland*natass5 (IFPRI households only)

[1] One US$ = 16 L.

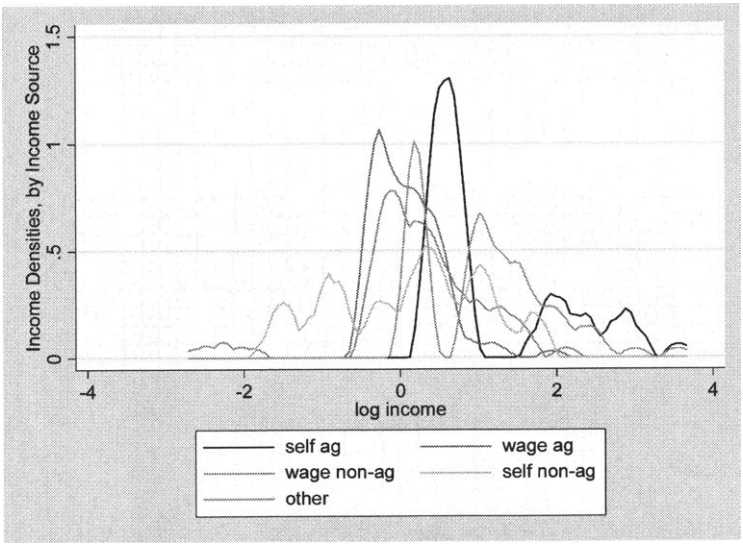
Figure 4 Map of Honduras

Source: University of Texas map collection

Table 4 Indicators of rural well-being by main source of employment

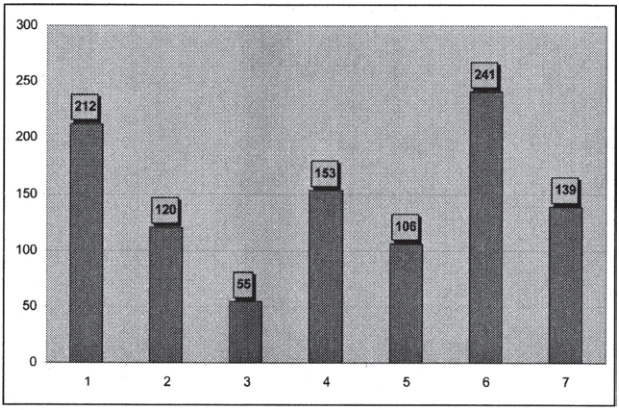
Main source of employment	Percent obs.	Percent poor	Percent extremely poor
Agriculture, self employed	36.9	87.7	80.6
Agriculture, wage employed	18.8	98.2	96.9
Non-agriculture, wage employed	9.6	85.3	75.7
Non-agriculture, self employed	3.5	74.7	62.8
Transfers, other	31.2	88.9	82.6

Figure 5 Well-being density by major source of employment strategy, rural Honduras



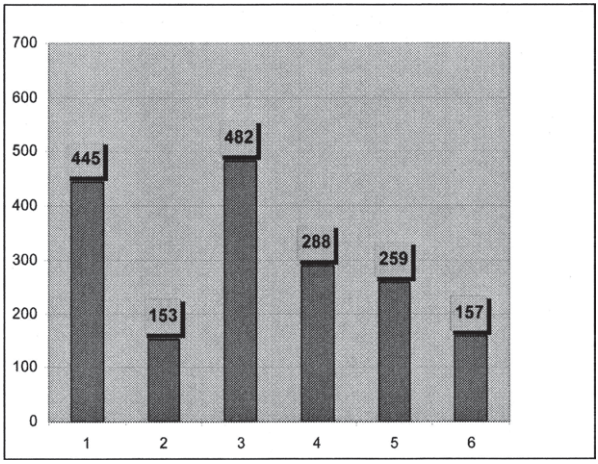
Note: kernel density estimates using the Epanechnikov kernel.

Figure 6 Annual per capita income in US$, by livelihood strategy (IFPRI households)



1 = large livestock producers
2 = coffee producers
3 = small basic grains farmers
4 = very small basic grains farmers/farm workers
5 = mixed basic grains/livestock farm workers
6 = very small permanent crop producers
7 = small vegetable producers

Figure 7 Annual per capita income in US$, by livelihood strategy (Wisconsin households)



1 = diversified strategy
2 = basic grains farmers/farm workers
3 = livestock producers
4 = coffee producers
5 = own business
6 = remittances

Table 5 Description of livelihood strategies

Livelihood strategy (LS)	LS1	LS2	LS3	LS4	LS5	LS6	LS7
IFPRI household sample	*Livestock producers*	*Coffee producers*	*Basic grains*	*Basic grains & farm workers*	*Mixed basic grains, livestock & off-farm work*	*Tree producers*	*Vegetable producers*
Description	Extensive livestock farming on larger holdings located at lower altitudes (average 32 ha). Highest income cluster in sample.	Relatively small holdings (average 3.5 ha), located at higher altitudes. Low incomes due to coffee crisis.	The poorest farmers among all livelihood groups. Mostly basic grains production. Small farms (average 2 ha), located at high elevations with steep slopes, geographically isolated, with limited off-farm opportunities.	Smallest landholdings (< 2 ha). Subsistence farmers earning higher incomes than cluster 3 by working outside the own farm (mostly in agriculture).	Subsistence farmers with larger land holdings (average farm size > 10 ha). Hire labor and devote more time to livestock. Work outside own farm.	Small holdings, produce fruits, oil palm etc. Located in more favorable agro-ecological areas with high population densities and good access to paved roads. But still very poor.	Most labor devoted to working on own farms. Surprisingly poor.
% of sample	15.6	7.4	18.1	22.6	30.9	3.2	2.1
Wisconsin household sample	*Diversifiers*	*Basic grains & farm workers*	*Livestock*	*Coffee*	*Own business*	*Remittances*	
	Larger farms (average 43 ha), diversified farm operations, off-farm work in agricultural and nonagricultural occupations. Less poor.	Subsistence farmers very similar to livelihood 4 in the IFPRI sample. Very poor.	Medium-size cattle farms (average 25 ha). Little off-farm work but less poor.	Similar to livelihood 2 of the IFPRI sample but larger farms (average 12 ha) resulting in somewhat higher incomes.	Own business generates most income, despite relatively large farms (average 38 ha). But still very poor.	Live on remittances, despite average land holdings of 12 ha. Household head is often female. Little off-farm work. Poorest households in the Wisconsin sample.	
% of sample	13.5	26.1	11.5	28.4	6.8	10.7	

Table 6 Multinomial logit model, IFPRI households (livelihood strategy #3 is comparison group)

Cluster	1 Livestock producers			2 Coffee producers			4 Basic grains /farm workers			5 Mixed basic grains/livestock/ off-farm work		
No of HH	58			28			85			116		
Explanatory variables	**Estimate**	**Std. error**	**p-value**	**Estimate**	**Std. error**	**p-value**	**Estimate**	**Std. error**	**p-value**	**Estimate**	**Std. error**	**p-value**
intercept	-0.644	2.534	0.799	1.300	2.916	0.656	2.946	1.729	0.088	-3.119	1.795	0.082
deprat	-0.194	0.379	-0.609	-0.677	0.498	0.174	-0.344	0.288	0.232	-0.045	0.269	0.867
hsize	-0.007	0.107	0.944	-0.134	0.135	0.322	0.012	0.083	0.883	-0.403	0.082	0.623
mhh	0.451	0.972	0.642	2.215	1.439	0.124	0.160	0.685	0.816	**2.369**	**0.929**	0.011
femadults	-2.523	1.832	0.169	0.534	1.200	0.789	**-3.347**	1.472	0.023	0.820	1.478	0.579
age	0.009	0.0183	0.642	0.013	0.021	0.525	-0.010	0.014	0.482	**0.029**	**0.014**	0.033
ed1	-0.194	0.154	0.210	-0.226	0.173	0.193	-0.113	0.123	0.357	-0.020	0.119	0.867
migrant	**6.505**	3.084	0.035	**6.760**	3.165	0.033	**6.551**	3.086	0.034	**5.160**	**2.993**	0.085
ownland	0.145	0.092	0.113	0.052	0.113	0.642	-0.162	0.148	0.272	**0.156**	**0.091**	0.086
landtitle	0.846	0.917	0.356	**2.067**	1.004	0.039	0.628	0.927	0.498	0.375	0.803	0.640
natass1	0.001	0.001	0.173	**0.003**	0.001	0.001	0.000	0.001	0.626	**0.002**	**0.001**	0.000
natass3	0.000	0.001	0.910	**-0.004**	0.002	0.068	-0.001	0.001	0.288	0.001	0.001	0.347
natass4	-0.004	0.006	0.515	-0.068	0.067	0.307	**-0.008**	0.004	0.071	-0.007	0.005	0.124
natass5	0.000	0.0004	0.997	-0.000	0.000	0.335	0.000	0.000	0.853	-0.000	0.000	0.817
popdens	-0.002	0.005	0.651	-0.010	0.007	0.135	-0.002	0.003	0.509	-0.006	0.004	0.102
distance	0.059	0.054	0.275	0.042	0.081	0.604	0.040	0.048	0.400	0.050	0.050	0.308
roads	-0.245	0.217	0.260	0.093	0.229	0.684	0.039	0.153	0.797	-0.215	0.153	0.161
busassets	**-0.00006**	0.00003	0.048	-0.000	0.000	0.690	**-0.001**	0.000	0.002	**-0.00003**	**0.00002**	0.080
livestock	**0.00009**	0.00002	0.000	-0.000	0.000	0.922	-0.000	0.000	0.502	**0.00004**	**0.00002**	0.047
credit	0.447	0.601	0.457	-0.285	0.671	0.671	0.477	0.446	0.285	0.624	0.446	0.162
training	-0.171	0.658	0.795	0.385	0.673	0.568	-0.821	0.520	0.114	-0.113	0.470	0.809
techass	0.124	1.015	0.903	-0.377	1.130	0.739	1.320	0.836	0.114	0.165	0.788	0.834
socap1	**3.031**	1.277	0.018	2.221	1.371	0.105	**2.143**	1.249	0.086	**1.963**	**1.125**	0.081
socap2	-0.701	0.611	0.251	0.241	0.748	0.748	-0.209	0.477	0.662	-0.394	0.496	0.427
socap3	**-2.700**	1.336	0.043	-1.358	0.957	0.156	**-1.994**	0.772	0.001	**-1.837**	**0.707**	0.009
socap4	0.800	0.786	0.309	0.857	0.910	0.347	**1.179**	1.729	0.026	0.790	0.537	0.141
Diagnostics of Fit	**Mean predicted probability**	**Actual Proportion**	**% Difference**	**Mean predicted probability**	**Actual Proportion**	**% Difference**	**Mean predicted probability**	**Actual Proportion**	**% Difference**	**Mean predicted probability**	**Actual Proportion**	**% Difference**
	0.159	0.165	4.4	0.097	0.078	19.6	0.217	0.238	9.7	0.343	0.325	5.2

Table 7 Multinomial Logit model, Wisconsin households (livelihood strategy #2 is comparison group)

Cluster	1 Diversified producers			3 Livestock producers			4 Coffee producers			5 Own business			6 Remittances		
No of HH	222			98			242			58			91		
Explanatory variables	Estimate	Std. error	p-value	Estimate	Std. error	p-value	Estimate	Std. error	p-value	Estimate	Std. error	p-value	Estimate	Std. error	p-value
intercept	-3.659	1.946	0.060	-5.798	2.283	0.011	-3.782	1.866	0.043	-3.823	2.604	0.142	-7.064	2.286	0.002
deprat	-0.089	0.349	0.799	-0.014	0.411	0.972	0.101	0.335	0.763	-0.049	0.533	0.927	0.187	0.375	0.617
hsize	0.034	0.055	0.539	-0.063	0.064	0.322	-0.065	0.055	0.235	0.053	0.075	0.477	0.018	0.064	0.773
mhh	-0.432	0.518	0.404	0.076	0.644	0.906	-0.056	0.529	0.916	-0.332	0.724	0.646	**-1.438**	0.543	0.008
femadults	-0.011	0.015	0.483	0.011	0.017	0.534	-0.001	0.015	0.938	-0.010	0.021	0.644	-0.019	0.017	0.275
age	0.014	0.014	0.286	0.019	0.015	0.207	**0.029**	0.013	0.027	-0.000	0.019	0.984	**0.038**	0.015	0.014
ed1	-0.037	0.103	0.719	-0.086	0.115	0.451	0.138	0.100	0.167	0.169	0.127	0.185	**0.258**	0.113	0.022
migrant	-0.026	0.027	0.333	-0.013	0.324	0.685	0.014	0.024	0.568	0.012	0.030	0.692	**-0.132**	0.054	0.014
land	**0.422**	0.081	0.000	**0.421**	0.081	0.000	**0.390**	0.081	0.000	**0.420**	0.081	0.000	**0.387**	0.081	0.000
landtitle	**1.170**	0.503	0.020	**1.887**	0.542	0.001	0.477	0.504	0.344	0.835	0.617	0.176	**0.971**	0.558	0.082
natass1	0.000	0.001	0.812	0.000	0.001	0.694	0.001	0.001	0.175	-0.001	0.001	0.410	-0.000	0.001	0.831
natass2	0.000	0.001	0.938	-0.000	0.002	0.936	0.002	0.002	0.189	0.000	0.002	0.839	-0.001	0.002	0.713
natass3	0.001	0.001	0.217	0.002	0.001	0.120	-0.000	0.000	0.618	0.000	0.001	0.872	0.001	0.001	0.159
popdens	**0.007**	0.003	0.022	**0.011**	0.004	0.002	**0.011**	0.003	0.001	**0.012**	0.005	0.013	0.005	0.004	0.168
distance	-0.003	0.005	0.531	-0.001	0.005	0.797	**-0.014**	0.005	0.003	-0.010	0.010	0.129	-0.007	0.006	0.217
capdist	-0.002	0.008	0.846	-0.003	0.010	0.790	**0.019**	0.008	0.018	0.003	0.013	0.843	0.006	0.010	0.512
roads	-0.103	0.098	0.293	**0.287**	0.136	0.035	**-0.579**	0.114	0.000	**-0.369**	0.177	0.037	-0.118	0.117	0.311
busassets	0.001	0.217	0.997	-0.000	0.218	1.000	0.001	0.217	0.997	0.001	0.217	0.997	0.001	0.217	0.997
livestock	-0.000	0.000	0.122	-0.000	0.000	0.124	**-0.0001**	0.00002	0.022	-0.000	0.000	0.124	-0.000	0.000	0.184
credit	-0.500	0.355	0.159	0.299	0.406	0.462	**0.798**	0.339	0.019	-0.124	0.495	0.801	-0.142	0.417	0.733
socap1	-0.169	0.900	0.851	-0.137	0.932	0.883	0.914	0.862	0.289	0.465	0.968	0.631	0.407	0.954	0.670
socap2	-0.333	0.350	0.342	-0.571	0.412	0.166	-0.479	0.340	0.159	-0.224	0.485	0.644	-0.680	0.425	0.109
socap3	1.362	0.948	0.151	1.040	1.163	0.371	0.130	1.023	0.899	**2.571**	1.069	0.016	1.229	1.078	0.254
socap4	-0.035	0.793	0.965	0.716	0.812	0.378	0.277	0.691	0.688	-0.393	1.221	0.748	**1.538**	0.761	0.043
Diagnostics of Fit	Mean predicted prob.	Actual prop.	% Diff.	Mean predicted prob.	Actual prop.	% Diff.	Mean predicted prob.	Actual prop.	% Diff.	Mean predicted prob.	Actual prop.	% Diff.	Mean predicted prob.	Actual prop.	% Diff.
	0.252	0.269	6.7	0.123	0.119	3.3	0.292	0.293	0.3	0.066	0.070	5.7	0.109	0.110	0.9

Table 8 Determinants of well-being (structural model results)

Dependent variable	Log annual household income per capita			
	IFPRI households		Wisconsin households	
Explanatory variables	Coefficient	t-statistic	Coefficient	t-statistic
intercept	7.449	2.77	7.273	1.69
Livelihood Strategies				
LS 1	0.074	0.13	-0.299	-0.42
LS 2	0.637	1.13		
LS 3			**1.454**	1.94
LS 4	0.263	0.50	-0.240	-0.42
LS 5	0.133	0.31	1.944	1.42
LS 6			-0.182	-0.20
Natass2			0.785	1.50
Natass3	-0.364	-1.33	**-0.617**	-1.86
Natass4	-0.001	-0.91		
Natass5	**0.387**	1.93		
deprat	**-0.181**	-2.17	-0.114	-0.88
hsize	-0.011	-0.45	-0.033	-1.52
ed1	0.045	1.00	**0.181**	3.65
age	-0.159	-0.85	**-0.593**	-2.30
migrant	**0.941**	2.06	0.003	0.27
femadult	-0.453	-1.12	-0.008	-1.57
training	-0.001	-0.01		
techass	0.087	0.43		
busassets	**0.000**	2.38	0.000	0.19
livestock	0.000	0.96	**0.000**	2.77
ownland	-0.002	-0.16	**0.016**	2.91
distance	-0.162	-1.19	**-0.006**	-1.70
road	0.007	0.17	**0.080**	2.23
capdist			0.000	0.03
socap1	-0.063	-0.28	**0.433**	1.93
socap2	-0.007	-0.06	-0.059	-0.45
socap3	**-0.410**	-1.97	0.015	0.04
socap4	-0.002	-0.01	0.213	0.72
ed1*distance	**0.007**	1.91	**0.001**	1.79
ownland*credit	0.002	0.22	**0.008**	2.42
land*distance	0.036	0.51	0.061	0.98
land*ed1	-0.001	-0.62	**-0.002**	-4.36
ownland*soil	0.000	0.78		
N	315		525	
R^2	0.254		0.345	

III.8 Trade versus Migration, and the Role of Diversity: A Simple Analytical Framework

Leonardo Auernheimer[a]

Qui se ressemble, s'assemble

8.1 Introduction

One of the pillars of classical trade theory is the general proposition that trade in commodities is a substitute (a perfect substitute, under certain conditions) for factor movements --the so-called "factor price equalization theorem" being associated with it.[1] Given the simple assumptions of the traditional trade model, of course, there are infinite combinations of trade and factor movements which are equally "efficient" and equivalent from a welfare point of view. The purpose of this paper is to explore an extremely simple framework in which this equivalence does not hold, and in which factor movements (labor movements, more specifically) responds not only to real wage differentials, but also to what we call "diversity", for lack of a better name. Assuming that the world is populated by workers of different types, such diversity is measured by the proportion of individuals of a particular type residing in a particular country vis-à-vis the rest of that country's population. More specifically, we will assume that utility of individual workers of a certain type i will depend on consumption and such diversity coefficient, which can range from 0 (when no individual of type i resides in the country in question) to 1 (when all other individuals are of type i). This can be written as

$$U_{ij}(c, z_{ij}) \qquad U_c > 0,\ U_{cc} < 0,\ U_z > 0,\ U_{zz} < 0,\ U_{cz} > 0$$

where c is consumption, i is the individual worker's "type", j is the country where the individual worker resides, and

$$z_{ij} = \ell_{ij} / (\ell_j),$$

where ℓ_{ij} is the number of workers of type i residing in country j, and ℓ_j is total labor in country j.

Notice that we have assumed that utility depends positively on the coefficient z, i.e., workers have a taste for "homogeneity" (i.e., a high z), rather than for

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1 One of the most elegant exposition, among many others, is probably the one in Mundell [1957].

"diversity".[2]

What is the rationale for such measure, what does it intend to reflect, and which is the motivation for including it in the utility function? There are two sets of possible justifications for the use of the term. The first one is the idea that different "types" generate externalities of a "cultural", social interaction nature "atmosphere" or "cultural environment" could be appropriate words-- including habits, language, religious beliefs, even institutions. These are of the nature of "public goods", in the sense that they are produced simply by the "presence" of individuals of a given type. A second possible rationale is that the term can be an imperfect but simple manner in which "network effects" can be captured. There is of course a vast literature on networks, and several empirical pieces intended to measure network effects on population location,[3] but barely any literature on a formal specification of the precise mechanism and its integration in the decision process leading to agent's decisions on where to locate. Being this the case, the inclusion of the argument in the utility function can be justified as a procedure which would summarize the benefits of networks and yield reasonable predictions.[4] Notice that "language", alluded before as a "cultural" element, could also be an important component of networking.

There is, of course, a profuse volume of literature related to some of the topics that explicitly or implicitly are touched in this paper: migration, integration, networks, and the treatment of social interaction. We will not try to survey or even refer to this literature, except for mentioning that we have not found a simple framework as the one we are attempting to sketch.[5] A notable exception and the work that probably has the most in common with this paper is Schelling [1969], who analyzes the question of integration/discrimination in a context in which two different "types" (black and white) are characterized by a given "level of tolerance" to integration ratios (our z coefficients).

An important clarification is in order. In the analysis that follows labor is assumed to be mobile, and capital immobile. For purposes of simplicity, we will be assuming that output is the same single good everywhere, so that "trade" (in commodities) does not take place in any non-trivial sense. Within this simplified

2 Strictly, the term "diversity" is not a good one, neither is "homogeneity". Both are too general, and are usually associated with idiosyncratic individual attributes --tastes, behavior towards risk, expectations formation and beliefs. See, for example, Fernandez and Levy [2005] for an example where the term "diversity" is used with a very different connotation than here.

3 See, for example, Munshi, K. [2003] and references therein.

4 This is somehow similar to the justification for introducing real money in the utility function: while not solving the problem of defining money and the reasons why it is held in rigorous terms, it yields a highly plausible reduced form for the demand for money.

5 To mention a few pieces, see, for example, Manski [2000], Kreps [1997], Lindbeck [1997] on social interaction, Munshi [2003] on networking, Boeri and Brücker [2005] on coordination failure and Bolt and Permentier [2004] on integration.

framework, we will take the case of perfect capital mobility as a proxy for the "trade" equilibrium solution --an assumption that would be valid for as long as the necessary conditions for factor price equalization are met.

Although our analysis could be generalized to "n" countries and individual types, in what follows we consider the simple two-country model, with two types of individuals. The analysis will not be symmetric: after the initial general presentation, we will elaborate only on the case of unidirectional or "one way" migration, i.e., on the case in which only one of the two types of labor is mobile (type a), with individuals of type b remain in country 2 throughout.

8.2 A Simple 2- Country Model

Consider the case of two countries, 1 and 2, with fixed endowments of capital k_1 and k_2, respectively. There are two continuous of workers, each in fixed quantities, one of type a, with mass a_o, and another of type b, with mass b_o, which are assumed to be initially located in countries 1 and 2, respectively.

The two different types of agents are defined by their preferences, which are assumed to be

[1] $U_{ij}(c,z_{ij})\ i = a, b;\ j = 1, 2 \quad U_c > 0,\ U_{cc} < 0,\ U_z > 0,\ U_{zz} < 0,\ U_{cz} > 0$

where c is consumption, and

[2.1] $z_{aj} = a_j / (a_j + b_j)$

[2.2] $z_{bj} = b_j / (a_j + b_j)$.

Each country is endowed with a fixed stock of capital, k_j, which is immobile, while labor can freely migrate. Assume also that there is a single good being produced by either of the two countries, according to the same constant returns to scale production technology

[3] $y_j = F(k_j, \ell_j)$

where y_j is output in country j, and $\ell_j = a_j + b_j$ is total labor in each of the two countries.

Throughout this work we will be concerned only with the welfare (utility) of the single representative worker of each type, and we will refer to those workers as "populations". Owners of capital "have no soul" --their utility depends only on their consumption (wages of capital), equal to whatever happens to be the marginal product of capital.

Labor wages in each of the two countries are given, of course, by the marginal product of labor, i.e.,

[4.1] $w_1 = \partial y_1 / \partial \ell_1 = F_{\ell_1}(k_1 / \ell_1)$

[4.2] $w_2 = \partial y_2 / \partial \ell_2 = F_{\ell_2}(k_2 / \ell_2)$

which, given the constant returns to scale assumption, depends only on the capital-labor ratios.

We further assume, as customary in the traditional international trade model, that output is instantaneously perishable and hence non-storable. Then, there are no savings, and consumption equals the real wage. Utility functions for type a and type b agents, located in countries 1 and 2, then, can be written as [6]

[5.1] $U_{a1} = U(w_1, z_{a1})$
[5.2] $U_{a2} = U(w_2, z_{a2})$
[5.3] $U_{b1} = U(w_1, z_{b1})$
[5.4] $U_{b2} = U(w_2, z_{b2})$

8.3 Long-Run Equilibrium

Labor mobility will allow the possibility of a long-run equilibrium at which utility for each type will be the same in the two countries, i.e.,

$$U_{a1}(w_1, z_{a1}) = U_{a2}(w_2, z_{a2})$$
$$U_{b1}(w_1, z_{b1}) = U_{b2}(w_2, z_{b2})$$

We call this an "interior solution", which may exist for either one or both types, or for none of the two. More specifically, a "full interior solution", for which both equations are satisfied, will be associated with the case where $a_0 > a_2 > 0$ and $b_0 > b_1 > 0$, while "partial interior solutions" (when only one of the equations is satisfied) with the case in which only one of these inequalities holds. Obviously, the case in which none of the two inequalities holds will be associated with $a_2 = b_1 = 0$ (autarky).

Replacing real wages by their values as given by [4.1] and [4.2], yields

[6.1] $U_{a1}(F_{\ell_1}(k_1/\ell_1), z_{a1}) = U_{a2}(F_{\ell_2}(k_2/\ell_2), z_{a2})$
[6.2] $U_{b1}(F_{\ell_1}(k_1/\ell_1), z_{b1}) = U_{b2}(F_{\ell_2}(k_2/\ell_2), z_{b2})$

These two expressions contain the six variables: ℓ_1, ℓ_2, z_{a1}, z_{a2}, z_{b1}, z_{b2}. By construction, $z_{b1} = 1 - z_{a1}$ and $z_{b2} = 1 - z_{a2}$. It is also easy to show that $z_{a2} = (a - \ell_1 z_{a1}) / (\ell - \ell_1)$. Then, by appropriate substitutions, the two expressions [6.1]-[6.2] can be reduced to functions of the two variables ℓ_1 and z_{a1}. The system is "solvable", although this does not guarantee a unique solution, or even a solution at all. Since the attainment of an equilibrium at which these expressions are satisfied will in general require movement of labor starting from autarky, it is clear that it would be easy to specify basic parameters (such as the capital stocks and total labor of the two types), and/or production and preference functional forms, for which labor has no initial incentive to move in either direction.

Interesting cases, though, are those in which there is a gain from migration. Although, despite its non-linearities, the system is amenable to an analytical solution, at this stage we chose to specify some particular functional forms, a

6 Since we are dealing with only 2 countries and 2 types, in what follows we write all relevant expressions in a detailed rather than a compact form.

simpler procedure that will allow us to generate some preliminary results.

Consider the following particular forms for the production and utility functions. Assume the Cobb-Douglas production function

$$y = k^{\alpha}\, \ell^{(1-\alpha)}$$

and the utility functions for type a and type b workers

$$U_{aj} = c^{\gamma_a} \quad z_{aj}^{\delta_a}$$
$$U_{bj} = c^{\gamma_b} \quad z_{bj}^{\delta_b}.$$

Labor wages in countries 1 and 2 are, then,

[4.1.1] $w_1 = \partial y/\partial \ell_1 = (1-\alpha)\,(k_1/\ell_1)\alpha$

[4.2.1] $w_2 = \partial y/\partial \ell_2 = (1-\alpha)\,(k_2/\ell_2)\alpha$

Then, equating consumption to wages, equilibrium requires

$$w_1^{\gamma_a} \quad z_{a1}^{\delta_a} = w_2^{\gamma_a} \quad z_{a2}^{\delta_a}$$
$$w_1^{\gamma_b} \quad z_{b1}^{\delta_a} = w_2^{\gamma_b} \quad z_{b2}^{\delta_a}$$

Substitution for the level of wages given in [4.1.1] and [4.2.1], yields

[6.1.1] $((1-\alpha)(k_1/\ell_1)^{\alpha})^{\gamma_a} z_{a1}^{\delta_a} = ((1-\alpha)(k_2/\ell_2)^{\alpha})^{\gamma_a} z_{a2}^{\delta_a}$

[6.2.1] $((1-\alpha)(k_1/\ell_1)^{\alpha})^{\gamma_b} z_{b1}^{\delta_b} = ((1-\alpha)(k_2/\ell_2)^{\alpha})^{\gamma_b} z_{b2}^{\delta_b}$

For the same reasons explained before, this system can be expressed in the two variables ℓ_1 and z_{a1}.

A special (but reasonable) case is when preferences of type a and type b agents are of an identical functional form, i.e., when $\gamma_a = \gamma_b = \gamma$ and $\delta_a = \delta_b = \delta$. In this case, it is straightforward to show that, if a full interior solution exists, it will satisfy

$$a_1 / a_2 = a_2 / b_2 = a_0 / b_0$$

what also implies

$$z_{a1} = z_{a2}$$
$$z_{b1} = z_{b2}$$
$$w_1 = w_2$$

Since labor wages depend only on the capital/labor ratio and therefore those ratios will be the same in both countries (and equal to the overall ratio) this implies that, in this case, wages will be the same as in the "trade" or perfect mobility of capital solution, but utility will be lower for both types, since all $z_{ij} < 1$. Notice that this is a "stable" equilibrium, in which labor would have no incentive to move, but neither would capital, if capital mobility were allowed starting from this equilibrium.

The basic conclusion is that migration, even when a full interior solution is attained, is welfare inferior to the capital mobility ("trade" solution). This is almost an obvious conclusion once we introduce the z factor in the worker's preferences.

8.4 The Simplest Case of One-way Migration

A particular and simpler instance of the 2-country case results if we assume that only one of the two types of workers (say, type a) is mobile, while workers of the other type (b) remain at their initial location (say, country 2).

In this case,

$$b_1 = z_{b1} = 0,\ b_2 = b_0,\ z_{a1} = 1,\ z_{a2} = a_2 / (a_2 + b_0)$$

Utility of the type a individual worker is therefore given by

[5.1.1] $U_{a1} = U_a (w_1, 1)$

if the individual resides at country 1, and by expression [5.2] if residing at country 2, with expression [5.4] describing utility of the immobile type b workers at country 2.

With immobility of type b workers, wages in countries 1 and 2 can be written as a function of the number of type a workers in each of the two countries,

[7.1] $w_1 = w_1 (a_1)$
[7.2] $w_2 = w_2 (a_2 + b_0)$

Substitution of these last two expressions into [5.1.1] and [5.2] yields

[8.1] $U_{a1} = U_a (w_1 (a_o - a_2), 1)$
[8.2] $U_{a2} = U_a (w_2 (a_2 + b_o), a_2 / (a_2 + b_o))$

which are functions of a2 .

8.5 Long Run Equilibrium

In the long run, unidirectional movement of type a workers may (or may not) result in

[9] $U_{a1} = U_{a2}$,

i.e., an equilibrium at which utility of type a is the same in both countries – the "interior solution" we defined before, now restricted, of course, to the case of type a workers. If we use the same functional forms for the production and utility functions that we specified in the general 2-country case, expressions [8.1]-[8.2] become

[8.1'] $U_{a1} = (1-\alpha)(k_1 / (a_o - a_2))^{\alpha \gamma_a}$
[8.2'] $U_{a2} = (1-\alpha)(k_2 / (b_o + a_2))^{\alpha \gamma_a} (a_2 / (b_o + a_2))^{\delta_a}$

It is easy to verify that under certain conditions

$$\partial U_{a1} / \partial a_2 > 0,\ \partial^2 U_{a1} / \partial^2 a_2 > 0$$
$$\partial U_{a2} / \partial a_2 > 0,\ \partial^2 U_{a2} / \partial^2 a_2 < 0$$

i.e., U_{a1} is convex and U_{a2} is concave. In economic terms, as a_2 increases (and consequently a_1 decreases), the real wage in country 1 rises at an increasing rate,

while the corresponding z coefficient remains constant at unit, so that utility of the representative worker remaining in country 1 increases at an increase rate --despite decreasing marginal utility, for "reasonable" parameter values. As a_2 increases, wages fall in country 2, but at a decreasing rate, while the coefficient z_{a1} increases at a decreasing rate. For U_{a2} to be rising as a_2 increases all what is needed is a sufficiently high coefficient δ a, i.e., for the "diversity" coefficient z_{a1} to be "sufficiently important" – a condition that we assume obtains.

Notice also that utility of the immobile workers of type b decreases as a_2 increases, since wages in country 2 fall, and so does the z_b coefficient.

The equilibrium condition [9] results in

[9.1] $$(k_1/(a_o - a_2))^{\alpha\gamma_a} = (k_2/(b_o + a_2))^{\alpha\gamma_a} (a_2/(b_o + a_2))^{\delta_a}$$

Examination of [9.1] reveals that there are four possible interesting outcomes, depending on the exact form of the production and preference functions and the magnitude of the various parameters involved:

(i) $U_{a1} > U_{a2}$ for all and any a_2, and no equilibrium exists at which [9.1] is satisfied;

(ii) $U_{a1} > U_{a2}$ for all except one value of a_2 , at which $U_{a1} = U_{a2}$, and a unique equilibrium exists at which [9.1] is satisfied ;

(iii) $U_{a1} < U_{a2}$ for any $a_2 < a_2^*$ and $U_{a1} > U_{a2}$ for any $a_2 > a_2^*$, with $U_{a1} = U_{a2}$ for $a_2 = a_2^*$, and a unique equilibrium exists at which [9.1] is satisfied;

(iv) $U_{a1} = U_{a2}$ for $a_2 = a_2^*$ and for $a_2 = a_2^{**} > a^*$, with $U_{a1} > U_{a2}$ for $a_2 < a_2^*$ and for $a_2 > a_2^{**}$, and $U_{a1} < U_{a2}$ for $a_2^* < a_2 < a_2^{**}$; in this case two equilibria exist.

The graphs in Figures 1 to 4 depict the possible configurations of the left and right hand sides of expression [9.1], corresponding to these four possible outcomes. These graphs measure the terms U_{a1} and U_{a2} as functions of a_2.

Consider now each of the four possible outcomes. In the first case (i), depicted in Figure 1, there is no equilibrium satisfying [9.1], simply because at no level of migration (i.e., a_2) the gains in real wages from migrating are sufficient to compensate for the lower utility resulting from a lower z_{a2} coefficient. This is clearly a case in which the result may be due exclusively to the impact of "diversity".

The second case, shown in Figure 2, reflects the (unlikely) case in which there is a unique value of a_2 for which [9.1] obtains (point A in Figure 2), but $U_{a1} > U_{a2}$ for all other values. Notice the stability properties of this case: if $a_2 > a_2^*$ then type a workers in country 2 would have an incentive to return to country 1, so that the equilibrium is locally stable; if $a_2 < a_2^*$, the same incentive would operate, so that, to the left, the equilibrium is unstable.

The third case, depicted in Figure 3, is one in which also there is a unique value a_2^* for which equilibrium [9.1] obtains, but with all $a_2 < a_2^*$ yielding $U_{a1} < U_{a2}$, and with all $a_2 > a_2^*$ yielding $U_{a1} > U_{a2}$. This is clearly a case in which the wage differential dominates, and migration always takes place. Notice also that the unique equilibrium (point A in Figure 3) is stable.

The most interesting case is case (iv), depicted in Figure 4. There are two

values of a_2 at which equilibrium [9.1] obtains (points A and B in Figure 4). For easiness of reference, call a_2^A and a_2^B the values corresponding to these points A and B, respectively. For values $a_2 < a_2^A$, $U_{a1} > U_{a2}$, and there will be no incentive for type a workers to migrate. In fact, at any point in this range any type a worker located at country 2 would return to country 1. The equilibrium at A is "unstable" on its left-hand-side. In the range $a_2^A < a_2 < a_2^B$, $U_{a1} < U_{a2}$, and there will be an incentive for type a workers to migrate to country 2. Equilibrium at point A is also "unstable" on its right-hand-side. Finally, for values $a_2 > a_2^B$, $U_{a1} > U_{a2}$ and, once again, type a workers, if residing in country 2, will have an incentive to return to country 1. Notice that therefore, equilibrium B will be "stable".

There are a couple of comments to be made concerning the last case. The first, and obvious, is that in an initial position at which $a_2 = 0$, there will be no incentive for any type a worker to migrate, as the gains in real wages are not sufficient to compensate for the fall in utility generated by the lower homogeneity coefficient z_{a2} in fact, $z_{a2} = 0$ for an individual worker when $a_2 = 0$. Notice that this happens despite the fact that, from the viewpoint of type a workers, the equilibrium at $a_2 = a_2^A$ is clearly welfare superior than at $a_2 = 0$. The "coordination problem" can only be resolved with a minimum initial migration $a_2 < a_2^A$. The second comment is with respect to the characteristics of the "stable" equilibrium at point B, with $a_2 = a_2^B$. Notice that, in this case, further migration (i.e., an increase in a_2) would benefit both those who have already migrated to country 2 and those remaining in country 1; yet, no single type a worker will have an incentive to migrate.

Also with reference to case (iv), it is interesting to note what happens to workers of type b in country 2. Figure 5 reproduces Figure 4, with the addition of the behavior of the utility level of those workers. Obviously, as the level of type a workers residing in country 2 increases, type b's workers utility decreases for two reasons: the z_{b2} decreases and so does the capital/labor ratio and hence labor wages. Figure 5 also shows what is labeled as "Utility with Trade", as a horizontal line. This is the level of utility for workers of type b that would obtain under perfect mobility of capital – which, as mentioned before, we take as a proxy for "trade" in commodities. Note that in the graph of Figure 5 the levels for $a_2 = 0$ are those that obtain in "autarky", i.e., before any migration takes place. It is clear that type b workers are better off in autarky than under trade – they would oppose trade, and in fact they would prefer "some" migration to the trade solution. As migration proceeds and the number of type a workers in country 2 increases, their utility will fall to the free trade level, and still beyond, so that after that point they will prefer free trade to migration. Notice how, despite its simplicity, the model suggests some propositions that are both interesting and testable.

8.6 Concluding Remarks

We have presented a "minimalist", very simple model that hopes to provide an initial framework for the analysis of migration as being influenced not only by

wage differentials but also by social interaction factors. At the same time, despite its simplicity, the framework has a few testable implications. One should also note that immigration issues related to the social interactions that we attempted to model are pervasive, and appear in such diverse contexts as within Latin America, Latin America vis-à-vis the USA, as well as within the European Union --witness the recent "no" vote in France and the Netherlands.

At the theoretical level, a more detailed analysis of the full 2-country model (with by-directional rather than uni-directional labor mobility) needs to be put in place, perhaps with a more complete specification in which two commodities exist so that the trade solution can be analyzed, even at the risk of some computational complications.

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Tables and Figures

Figure 1

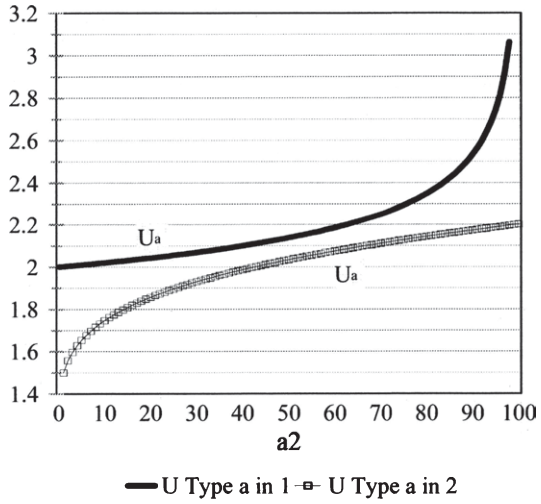


Figure 2

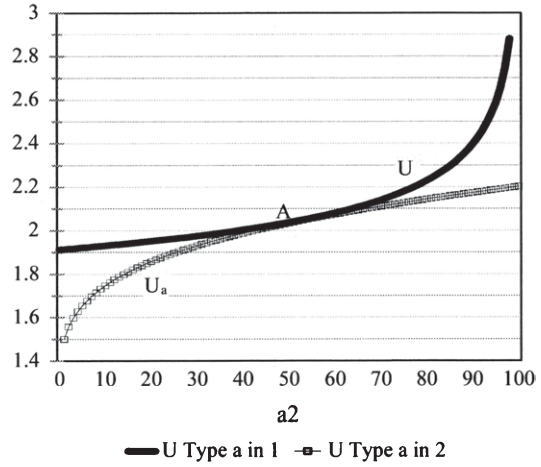


Figure 3

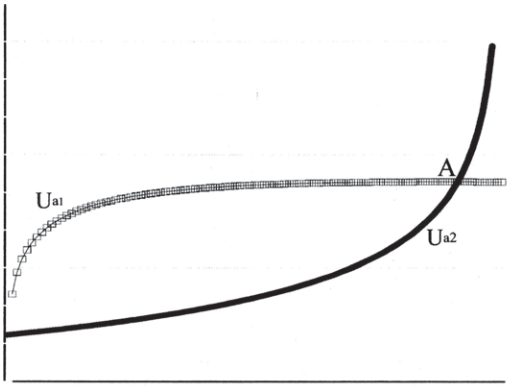


Figure 4

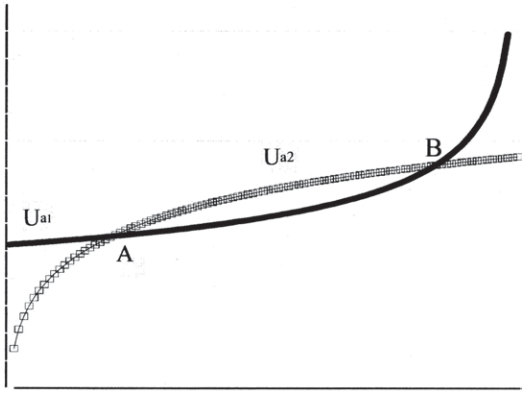
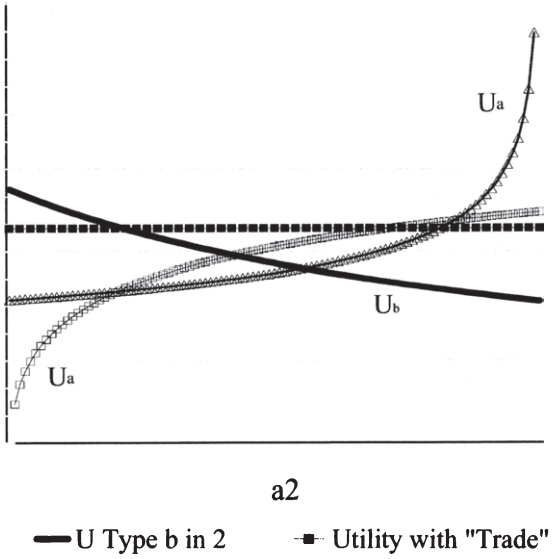


Figure 5



III.9 South-South Trade Agreements, Location of Production and Inequality in Latin America

Alessia Lo Turco[a]

9.1 Introduction and Literature Review

The aim of this paper is to evaluate the relationship between South-South trade agreements, industrial location, and inequality in Latin America.

The location of production is determined by country-specific features such as factor endowments, policy frameworks, the technological level, and the size of the internal market. However, when accounting only for country-specific characteristics it is impossible to explain why very similar countries often show very different production structures. The fact that some countries show higher shares of industrial production than others, for example, can be explained by industry-specific characteristics that work together with geography to generate agglomeration forces. In this sense, the presence of transport costs, economies of scale, and backward and forward linkages can create concentrations of production in a few locations. When wages become unsustainable in one of these, production simply moves to another, lower-wage economy. Thus, as Puga and Venables (1998) point out, "growth in world manufacturing relative to other tradable industries does not lead to a steady development of low wage economies, but instead to rapid industrialization of countries in turn."

While Puga and Venables (1998) focus on the role of developing countries' unilateral trade policies for industrial development, Venables (2002) analyzes the effect of the negotiation of a Customs Union (CU) on industrial development both in symmetrical and asymmetrical agreements.[1] The idea is that the formation of a CU among countries with a similar comparative advantage would cause the latter to be altered, benefiting the country with an intermediate comparative advantage with respect to the partners and the rest of the world and at the expense of partners with an extreme comparative advantage. Preferential tariffs can therefore affect production location via their effect on the structure of regional comparative advantages. In this context, a change in regional comparative advantage together with the above-mentioned country and industry

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1 The terms symmetrical and asymmetrical are used to describe to the level of development of countries involved; thus, a South-South CU would be a symmetrical agreement between developing countries.

characteristics determine production patterns. Thus, ceteris paribus, countries with a higher share of skilled labor would see their share of skilled-labor-intensive industries increase after the formation of the CU.

From an empirical point of view it is important to consider how the regional integration process together with a preexisting difference in trade specializations among partners can affect the location of production.

Some empirical papers address these issues. Midelfart-Knarvik et al. (2000) analyze the determinants of location of production across Europe. Their dependent variable is the share of industry *k* production in country *i* relative to the size of the industry *k* across Europe and country *i*'s total production. They test a series of country and industry determinants together with several interactions between the former and the latter. They find that the EU's cross-country variation in industrial structure can be explained by comparative advantage combined with transport costs and geography. Factor endowments, in particular skilled labor, are important in attracting high-skill-intensive industries. Forward and backward linkages also matter. Finally, decreasing trade costs as well as government intervention make economic forces more important in determining location. Recently, Sanguinetti et al. (2004) focused on industry relocation following the formation of Mercosur. Using data on Argentina, Brazil, and Uruguay over the period 1985–1998, they found that preferential trade liberalization has favored a reshaping of manufacturing and production according to regional comparative advantages in labor and skilled labor. In addition, declining internal tariffs have weakened agglomeration forces determined by the distribution of market sizes. Their dependent variable is the country share production of industry *k* over the whole regional manufacturing product. The main contribution of this paper is the detection of the agreement effect via the introduction of the preferential margin and its interactions with country and industry-specific characteristics in the regression.

Within this framework, the present work's main contribution is its focus on the relationship between regional partners' trade specialization patterns and the localization of industry and inequality across Latin American sub-regions, (Mercosur, Andean Community and the Central American Common Market) before and after the negotiations of the early nineties.

In the first part of the chapter, we use industry-level data to examine the relationship between the formation of trade agreements, trade specialization, and the location of production, controlling for the role of trade integration by introducing three variables. Firstly, for each industry, regional output growth is introduced, the idea being that if the preferential tariff structure causes an industry to relocate among countries with the same agreement, a significant relation has to exist between regional output growth in industry *k* and localization of industry *k* in country *i*. Therefore, if localization is increased, a positive relationship can be expected. Secondly, the Balassa Revealed Comparative Advantage (RCA) index of trade specialization with respect to the sub-region is calculated for each industry: if countries enjoying a comparative

advantage in some goods are favored in the relocation of production following the formation of the integrated area, then the probability that industry k will be located in country i will be higher. Finally, the ratio between the RCA calculated for the whole region with respect to trade with the rest of the world and each country's regional RCA is introduced as a regressor in the empirical model to test Venables's model prediction: if the formation of the integrated area causes countries with an intermediate comparative advantage to do better, then the less country i is specialized in product k with respect to partners in the region, the less likely it is that industry k will be localized there.

The second part of the studychapter, in contrast, is focused on detecting the impact of trade agreements on overall inequality using aggregated country data on real GDP per capita. Following Slaughter (1998) the σ-convergence of regional groups is tested via a difference-in-differences technique.

The study is organized as follows. Section 2 deals with a description of the changes in trade and production patterns. Section 3 presents the empirical model, describes the data and discusses the results. Finally, some conclusions are presented in section 4.

9.2 Trade and Production Patterns in Latin American Sub-Regions

Figure 1 shows the increase in the relative importance of the intra-regional market for the South American manufacturing industry.[2]

In general, after the nineties, partners in the agreements become the favorite destinations for exports of manufactured goods. Table 1 shows a symmetric version of the reorientation index proposed by Yeats (1998):

$$RI_i = [(x_{mr}/x_r)-1]/[(x_{mw}/x_w)-1] \quad \text{(a)}$$

Here, x_{mr}/x_r is the share of manufacturing exports to partners over total exports to the sub-region, and x_{mw}/x_w is the share of manufacturing exports to the world over total exports to the world. The index ranges between -1 and 1, with 0 indicating geographic neutrality.

A strong reorientation process towards partners in the agreement emerges for Ecuador, Argentina, Uruguay, and Costa Rica. Colombia, Venezuela and Brazil did not substantially change the direction of their exports, while Bolivia and the remaining CACM countries seem to have redirected exports to destinations outside the region. One might conclude that the formation of the agreement did not bring about great changes for most of the bigger countries like Colombia, Venezuela and Brazil, which already held a high share of total regional trade. For the remaining countries in South America such as Argentina and Ecuador, it may have represented the chance to reach a wider market. The rest of the countries may have been neutral to the formation or renegotiation of

2 The definition of manufacturing used here is that of UNCTAD / World Bank.

the integrated area, as was the case for those Central American countries that already enjoyed a higher level of integration and also actively traded with countries outside the region.

For Mercosur and Andean countries, many traditional industries[3] redirected exports towards the sub-region.[4] Ecuador redirects the most industries (mainly electric machinery and transport equipment) to its partners, while Bolivia does this to the least extent.

For CACM countries in general, the redirection process takes place among more dynamic industries,[5] with El Salvador havingthe largest number of industries reoriented to the sub-region.

Tables 2-4 show the absolute variation in the Herfindahl index for the three sub-regions before and after the nineties. The Herfindahl index is calculated as:

$$HERFINDAHL_{rk} = \sum s_{ik}^2 \qquad (b)$$

Where $HERFINDAHL_{rk}$ is the Herfindahl index for industry k in region r and s_i is the production share of partner i over the whole of regional production in industry k. Only those industries where localization of production increased are presented.

Table 5 shows for each country within each agreement the change in the degree of specialization with respect to the whole region and the growth of the overall share of regional manufacturing production.

The specialization index is a modified version of the Hoover Balassa index, which provides a country specialization measure relative to the region. It is calculated using the following formula:

$$SI_i = \frac{\sqrt{\sum (x_{ik} - x_{rk})^2}}{k} \qquad (c)$$

where SI_i is the specialization index for country i, x_{ik} is country i's production share of industry k over country i's total manufacturing, and x_{ir} measures region r's production share of industry k over the whole region's manufacturing production. k measures the total number of industries.

In the nineties, the degree of introversion increased in the Andean Community and Mercosur, and to a lesser extent in the Central American Common Market (Figure 1). From Tables 2 to 4, we see that the bigger partners in South American RTAs that already played a major role in regional trade flows did not change the direction of their exports, but that the remaining countries (apart from Bolivia in the Andean Community) did see some changes. In general, all the exports redirected to the region belonged to industries where

3 For example, food, beverages and textiles.

4 Tables on the evolution of the reorientation index for those ISIC manufacturing industries which experienced a redirection towards the sub-regional markets can be obtained from the author upon request.

5 That is, electrical machinery and professional and transport equipment.

countries gained ground in regional production; this was true especially for Uruguay within the Mercosur and for Ecuador, which increased several industry shares in the nineties and sold these to partners in the region.

For the Central American countries, manufacturing exports were mainly redirected outside the region and, in contrast to the South American countries, the region became a favorite destination for exports of electrical machinery and professional and transport equipment. There is almost a perfect matching between reoriented exports and an increasing number of industries in regional production. Local concentration of production increases in several industries and the main contributors to this pattern are Costa Rica and Guatemala.

In general, then—and despite local concentration increases in several industries—this pattern is caused by the fact that different countries gained ground in different industries. In Mercosur, regional production seems to have spread out across partners, especially Argentina and Brazil, while Uruguay lost some industries and became more specialized while gaining in those industries whose exports were redirected to the sub-region. In the Andean Community, location of production seems more dispersed after the nineties than in the previous period, with Ecuador gaining ground in several industries, although Venezuelan production shares dramatically increased in several of the industries as indicated by the increased regional Herfindahl index. In the Central American Common Market, regional production in the nineties was spread across Costa Rica, Guatemala, and El Salvador. The degree of specialization in the region decreased thereafter, showing a more diversified production structure. The first two countries gained more in regional shares than the last. Honduras lost ground in regional production although its degree of specialization did not increase in the nineties.

9.3 Empirical Framework

The empirical procedure is based on the estimation of two different empirical models. Firstly, an empirical model based on industry-level data will be estimated in order to test the relationship between economic integration and localization of production within each agreement. Secondly, an empirical model using aggregated data on per capita income levels will be estimated in order to detect, via a difference-in-differences technique, whether the negotiation of the agreements brought about an increase in overall inequality.

9.3.1 The Empirical Model I

Midelfart-Knarvik et al. (2000) study the determinants of production location across Europe and use the share of industry k production in country i relative to the size of the industry k across Europe and country I's weight in European industrial production. They test a series of country and industry determinants together with several interactions between the former and the latter. They find

that the EU's cross-country variation in industrial structure can be explained by comparative advantage combined with transport costs and geography. Factor endowments, in particular skilled labor, are important in attracting high-skill-intensive industries. Forward and backward linkages also matter. Finally, the fall in trade costs and government intervention make economic forces become important in determining location.

Recently, Sanguinetti et al. (2004) investigated the relocation of industry following the formation of Mercosur. Their dependent variable was the country share production of industry k over the whole regional manufacturing product. Using data on Argentina, Brazil, and Uruguay over the period 1985–1998, they found that preferential trade liberalization has favored a reshaping of manufacturing production according to regional comparative advantage in labor and skilled labor. In addition, declining internal tariffs have weakened agglomeration forces determined by the distribution of market sizes. The main contribution of this paper is the detection of the agreement effect via the introduction of the preferential margin and its interactions with country and industry-specific characteristics in the regression.

Within this empirical framework, in order to explain industry location in Latin American RTAs, the basic specification is:

$$s_{ikt} = \alpha_0 s_{ikt-1} + \sum \beta_j X_{it} + \sum \gamma_j I_{kt} + \sum \delta_j X_{it} I_{kt} + \theta_i + \eta_k + \tau_t + \varepsilon_{ikt} \quad (1)$$

where, following Midelfart-Knarvik et al.(2000), the dependent variable $s_{ikt} = \frac{q_{ikt}/Q_{kt}}{q_{it}/Q_t}$ measures the share of country i's industry k in the total regional industry k production (q_{ikt}/Q_{kt}), with q_{ikt} measuring country i's industry k production and Q_{kt} measuring the regional production of k (normalized by the country weight in total manufacturing in the region (q_{it}/Q_t), with q_{it} measuring the total country i's manufacturing production and Q_t measuring the total regional manufacturing production).[6] X_{it} and I_{kt} are country i and industry k's characteristics affecting the location of k production in i, the following term, θ_i, is the interaction between the previous ones, η_k and τ_t represent country and industry-specific fixed effects, and finally, ε_{ikt} is a time-varying shock.

Model 1 is a dynamic panel data model: the lag of the dependent variable appears among the regressors, creating a source of correlation between the lag of income and the error term.

In this framework, the First Difference GMM (Arellano and Bond, 1991) estimator has been used extensively for the estimation of growth regressions

6 It is worth noticing that the dependent variable can be interpreted both as a specialization and a localization measure.
As a matter of fact $s_{ikt} = \frac{q_{ikt}/Q_{kt}}{q_{it}/Q_t} = \frac{q_{ikt}/q_{it}}{Q_{kt}/Q_t}$ so that it represents an index of country i's production specialization in industry k and the localization of industry k in country i relative to the localization of activity as a whole in i.

despite its very poor performance, with a high persistence in the series.[7] To overcome this problem, the System-GMM estimator (see Blundell et al., 2002) could be used, although it performs very poorly in small panels. Furthermore, as Nerlove (1992) has pointed out, the inconsistency of the Least Square Dummy Variable (LSDV) estimator in dynamic panel data models disappears as the time dimension of the data set increases. When the time span is short, however, inconsistency severely affects the results unless the Kiviet Correction (Kiviet, 1995) to the LSDV estimator is used.

Considering the data at hand, both the First Difference and the System GMM would perform poorly because of some persistence in the series and the overall small size of the sample. Furthermore, the time span is too short to grant consistency of LSDV estimator.

Therefore, the choice here is to use the Kiviet Correction to LSDV and to control for endogeneity of regressors via the use of lagged values of the right-hand-side variables.

9.3.2 The Data

The data on manufacturing output is from UNIDO and covers the period 1970 to 2000. Since observations are not available for all countries, industries, and periods, some countries are not included in the analysis[8] and a panel with a maximum of 2,546 observations is used.

Data on country-specific characteristics are from ECLAC covering the period 1970 to 2000 and data on trade are from TradeCAN (ECLAC). Finally, data on real GDP per capita from 1960 to 2000 are from PWT version 6.1.

In Model 1, variables explaining the location of production are in logs and their lagged values are used. They can be divided into four main groups:[9]

- **Country-specific factors**: the share of agriculture over GDP (*agr. gdp*), the population's education level (*edu.*, measured as the secondary school enrolment rate), the size of the economy (*mkt pot.*) measured via GDP in order to detect a country market potential and the total labor force (*lab. force)* are introduced.

7 If this is the case, the lagged values of the variables are very unlikely to serve as good instruments for first differences.

8 Mercosur data for Paraguay are not available and for CACM, data on Nicaragua are only available up to 1985 so these two countries were dropped from the analysis. For the remaining countries, data were available from 1970 to 1998, and up to 2000 in some cases. We used only those years where all, or almost all, of the countries within an agreement were present. Thus, Mercosur data for the years 1985, 1990 and 1993-1995 were used. For the Andean Community, data on output values are available for all the countries from 1970 to 1998. Finally, for CACM, data are available for all of the countries (i.e., either four or three out of four countries) for the periods 1971–75, 1981–85 and 1991–95.

9 The variable labels reported in the result Tables 6–10 are in parenthesis.

- **Industry-specific factors**: labor intensity (*lab. int.*) is measured as the number of employees, skill intensity (*skill int.*) as the productivity level of employees, backward and forward linkages (*link.*) are represented by the total production in the rest of manufacturing. The idea is that if backward and forward linkages are at work, the more the industrial structure expands and grows, and the more industry *k* will increase within country *i*; thus, a positive sign is expected. Finally, economies of scale (*sc. econ.*) are measured with a dummy variable taking value 1 for those industries classified as scale economy industries according to the Pavitt classification.
- **Interactions**: country-specific factors are interacted with industry-specific factors. A country's labor force is interacted with labor intensity. The education level of its population is interacted with skill intensity, and market potential is interacted with the scale economy dummy.
- **Integration variables**: the increasing level of economic integration among partners is measured with three variables to add to the basic specification of model 1.

Firstly, for each industry *k* in each country, the growth rate of industry *k* (*reg. ind. gr.*) in the whole sub-region is introduced in order to check the relation between the development of the industry in the whole region and the same industry location in country *i*.

Secondly, since the evolution of comparative advantages is expected to affect production patterns among partner countries, the Balassa Revealed Comparative Advantage (*reg. RCA*) index for trade with the sub-region is used:

$$reg.\,RCA_{ik} = \frac{x_{ik}}{x_i} / \frac{x_{rk}}{x_r} \tag{2}$$

here $\frac{x_{ik}}{x_i}$ measures country *i*'s industry *k* exports directed to the sub-region over total country *i*'s exports to the partners and $\frac{x_{rk}}{x_r}$ measures the sub-regional industry *k* exports over the total sub-regional exports. If trade integration causes comparative advantages to change, then industry *k* location of production is expected to increase in locations enjoying a higher specialization compared to that of the partners.

Finally, a ratio (*R*) is calculated according to the following formula

$$R = RCA_{rk} / reg.\,RCA_{ik} \text{ with } RCA_{rk} = \frac{x_{rk}}{x_r} / \frac{x_{wk}}{x_w} \tag{3}$$

using the RCA_{ik} index and the Balassa RCA index for the whole region, RCA_{rk},[10]

10 Here $\frac{x_{rk}}{x_r}$ again measures the sub-regional industry k exports over the total sub-

to check whether the concentration of production is more likely to occur in countries with a comparative advantage that is intermediate between the partners and the rest of the world.

$RCA_{rk} < RCA_{ik}$ for countries that are relatively more specialized than their partners. The opposite holds for countries with an extreme comparative advantage (disadvantage): for $0 < R < 1$, countries enjoy an intermediate comparative advantage, while for $R > 1$, countries have an extreme comparative disadvantage. As a consequence, if the formation of South-South RTAs brings about a localization of production in countries with an intermediate comparative advantage, then the ratio R is expected to show a negative sign predicting delocalization in countries with high values of the ratio.

9.3.3 Results

Tables 6-10 show results for the Andean Community and the Central American Common Market.[11] Each table shows Kiviet Corrected LSDV coefficient estimates and standard errors.

Table 6 shows the results for CAN for the whole period 1970–1998. The three sets of columns present results when the regional industrial growth, *reg. sect. gr.*, the RCA index with respect to the region, *reg. RCA*, and the ratio between countries and regional specialization indexes in industry k, R, are introduced in the regression.

The results indicate that labor-abundant locations seem to attract labor-intensive industries: the coefficient on the cross-effect *lab.force*lab.int.* is always positive and significant. However, the same does not hold for skilled-labor-abundant locations and skill-intensive industries or for countries with large market potential and scale economy industries. The regional industrial growth rate positively affects the localization of production of industry k in country i. The *reg.RCA* index shows a positive sign, suggesting that a higher trade specialization of country i in industry k leads to industry k being more localized in country i. Finally the coefficient on the ratio R is significant and negatively related to the localization of production, thus confirming that the more extreme country i's disadvantage is with respect to partners in the agreement, the less k production will be localized in it.

Table 7 presents the estimation results of model 1 when the sample is separated between the pre- and post-agreement periods. The interaction coefficient of labor intensity with labor force abundance is no longer significant, while regional industrial growth is always significant and higher in the post-agreement period. These findings are confirmed by Table 8, although in the post-agreement period the regional RCA does not turn out to be significant, and

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regional exports and $\frac{x_{wk}}{x_w}$ the world industry k exports over total world exports.

11 For Mercosur, the time-span data was not enough to attempt an estimation of model 1.

the significance of the ratio *R* decreases with respect to the first period and to the results in Table 6.

Table 9 shows the results for CACM: once more, the estimated coefficients indicate that labor-abundant locations attract labor-intensive industries, but the same does not hold for skilled-labor-abundant locations and skill-intensive industries, or for countries with large market potential and scale economy industries.

The coefficient for regional industrial growth is positive and significant, but when the regional RCA and the ratio *R* are introduced, it is no longer significant. Moreover, these two variables turn out to be non-significant as well.

Table 10 shows the regression results for the pre- and post-agreement periods when only regional industrial growth is introduced. For the remaining two variables, there are in fact no sufficient pre-agreement observations. The significance of the interaction between labor intensity and labor force abundance is confirmed in the second period, while in both periods, regional industrial growth is not significantly related to the localization of production.

The aim of the above empirical analysis was to ascertain whether South-South RTAs caused production to be localized in partners enjoying a superior position to the sub-region in terms of comparative advantages. To sum up, the comparison between the pre- and post-agreement period estimation results (Tables 7 and 8) shows that there is some evidence of increased localization of production in the Andean Community after the nineties. It seems, moreover, that production tends to be localized in countries with a higher specialization compared to the partners in the region: the coefficient of the ratio *R* is always negative and significant, although it is only slightly significant after the nineties. For CACM, the relation between the regional industrial growth and the localization of production is not robust, while the regional RCA and the ratio *R* are never significant.

9.3.4 Patterns of Inequality

This section presents a brief analysis of the literature on the relationship between economic integration and inequality. The previous sections do not show clear evidence of diverging production patterns after the agreement: after 1991, industrial location does seem to spread across countries within the same agreement. Now, aggregate data on per capita GDP are used for an overall analysis of inequality in Latin American agreements. A diverging pattern in per capita income might be driven not only by localization of production but by localization of services as well.

Within the branch of the empirical growth literature focusing on the relation between openness and convergence in income levels, a pioneering work was that of Ben-David (1993), who focused specifically on the experience of the European Community. Following a non-parametrical approach, Ben-David analyzes dispersion in per capita income levels in the region, comparing this to the timing of evolution of the EEC. From the before/after comparison of the

dispersion in income levels for the European countries, he concludes that the dispersion decreased after the EEC was formed and that this pattern was not only a long-term trend. More recently, Slaughter (1998) examined the same issue using a difference-in-differences approach, and using 10,000 randomly chosen control groups to infer which pattern of convergence in the European Countries would have prevailed in the absence of the agreement. He also focused on the formation of the European Free Trade Area (EFTA), the agreement between EFTA and EEC, and the Kennedy Round tariff cuts under the GATT. Slaughter's (1998) conclusions are that "trade liberalization does not trigger convergence in any of the four cases, if anything it seems to have caused income divergence. In all the four cases, the large majority of the 10,000 difference-in-differences estimates are not significantly different from zero and the average among the significant estimates indicates that trade liberalization tends to diverge incomes."

9.3.5 The Empirical Model II

Following Slaughter (1998), the empirical model is based on the reconstruction of a natural experiment setting via the use of the difference-in-differences approach (Blundell et al. (2000, 2002)). The formal model is the following

$$\sigma_{jt} = \alpha_0 + \alpha_1 D_t + \gamma_0 D_t * G_i + \beta_0 t + \beta_1 t * D_t + \beta_2 t * D_t * G_i + u_i + \varepsilon_{it} \quad (4)$$

σ_{jt} measures the per capita income dispersion within each group of countries (Andean group, Central American Common Market, Mercosur Group, Control Group). This is calculated as the standard deviation of the log of the real income per capita of the countries in the agreement. On the right-hand side, we have the time dummy D_t, taking value 1 from the date of the agreement onwards, and its interaction with the group dummy, G_i=1 for the agreement group, and G_i=0 for the control group. The other components of the right-hand side are a time trend, t , its interaction with the time dummy D_t, and its interaction with the agreement indicator D_t*G_i. This last term is introduced in order to investigate whether the three South-South Regional Trade agreements have contributed to convergence or divergence in income levels among the countries involved. The parameter of interest here is β_2. A negative value indicates that the rate of dispersion has decreased during the period under observation. Table 11 shows the different intercepts and convergence rates for the agreement and the comparison groups.

The interaction of the time trend with the treatment indicator will indicate whether the agreement has contributed to increasing or decreasing the rate of convergence, whereas the coefficient on the interaction between the time dummy and the trend will show the pattern of the rate of convergence in the same period in the absence of the agreement. The unobserved heterogeneity and the endogenous selection are caught in the country-specific time-invariant effect u_i that is wiped out through the use of the within-group estimator. For the choice of the control group, the dispersion for 204 random groups of countries that did not undergo any of the three agreements was calculated and estimations were

repeated 204 times in order to check for the robustness of the results.

9.3.6 Basic Results

Figures 2-4 show the pattern of income dispersion among the countries in the three agreements. On the y axis, the standard deviation from the regional mean of the log of the real GDP per capita is measured. For Mercosur, Figure 2 shows a sharp decrease of dispersion until the end of the eighties, but after 1991 there is a clear and strong tendency towards increasing deviation of the member countries' income per capita levels from the mean.

For the Andean Community, dispersion in per capita GDP tends to decrease after 1969, remains quite stable during the eighties, and after a positive peak in the beginning of the nineties goes down again.

Finally, for CACM, the pattern of the standard deviation is quite stable until the first half of the seventies, then decreases and in the nineties increases dramatically.

Tables 12-14 show the results from the estimation of equation 4 for three different measures of real GDP per capita.[12] The average[13] of the significant estimates of the additional rate of convergence is shown in the second column, while the final column shows the number of trials where the additional rate of convergence is not significant. Although from the estimated coefficients, negotiations of CACM and Mercosur seem to have fostered divergence and the renegotiation of the Andean Pact seems to have enhanced convergence, the third column indicates that the number of trials with insignificant coefficients is much larger than the number of trials with significant estimates and that this is valid for each measure of GDP per capita used. There is no conclusive evidence on increased inequality in income levels due to South-South trade agreements, thus confirming results from the previous sections.

9.4 Conclusion

This paper addresses the issue of South-South integration, trade specialization, location of production, and inequality in Latin America. The empirical evidence on trade and production data shows that the degree of introversion increased in Latin American sub-regions after the negotiation of the trade agreements in the nineties. These countries redirected some exports—mainly from traditional industries in South America and from more dynamic industries in Central America—to the sub-regions and, according to data on production, concentration increased in a number of sectors, especially in the Central

12 In Tables 12 and 13 respectively, the Laspeyres and the current price real GDP per capita are used. In Table 14 real GDP per worker is used instead.

13 The model estimation was repeated 204 times with 204 different random control groups of the same size as the agreement groups.

American Common Market and the Andean Community. In the nineties, some countries became more specialized. Some of these had already been highly specialized before this period (e.g., Colombia, El Salvador, Costa Rica) but others gained ground after the negotiation of the agreement (e.g., Ecuador and Guatemala).

To estimate two different empirical models, we used, on the one hand, disaggregated data on trade and production to check whether industrial localization was affected by increasing economic integration and trade specialization patterns. Three different variables were used to check for the role of regional integration: regional industrial output growth, RCA with respect to the region, and the inverse of the ratio between this and the whole region's RCA with respect to the rest of the world. Only for the Andean Community did we find evidence of a localization of production increasing with the enlargement of the market. Moreover, countries with intermediate comparative advantages seem to do better than the rest of the region. However, this effect is not strongly significant after the nineties.

On the other hand, an empirical model based on aggregated data was estimated to investigate whether the negotiation of the agreements increased the divergence in per capita incomes among partners. The evidence that emerges from the use of 204 different random control groups suggests that for the majority of the estimations, the effect of the agreements on the rate of convergence is not significantly different from zero, and the average of significant estimates indicates that Mercosur and CACM have led to divergence, while CAN has enhanced convergence. Considering all the evidence together, there is no strong evidence that South-South RTAs lead to an increase in the concentration of production or to income divergence.

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Tables and Figures

Table 1 Re-orientation of manufacturing exports

country-year	1985	1990	1995	2001
bolivia	0.59	0.27	-0.32	-0.44
colombia	0.63	0.46	0.39	0.43
ecuador	0.70	0.47	0.74	0.62
venezuela	0.65	0.68	0.57	0.62
argentina	0.17	0.14	0.17	0.22
brazil	0.25	0.21	0.23	0.21
uruguay	0.14	0.05	0.06	0.10
costarica	0.17	0.22	0.47	0.50
el salvador	0.51	0.36	0.25	0.04
guatemala	0.50	0.24	0.06	-0.10
honduras	0.61	0.27	0.24	0.04

Table 2 Mercosur-regional Herfindahl Index

ISIC-year	85-90	90-95
Food	-0.22	0.01
Glass	-0.19	0.04
Industrial chem.	-0.21	0.01
Miscellaneous petr.and coal prod.	-0.07	0.08
Paper and prod.	-0.14	0.01
Petroleum ref.	-0.13	0.03
Pottery	-0.15	0.11
Rubber prod.	-0.21	0.08
Textiles	-0.23	0.05
Transport equipm.	-0.08	0.01

Table 3 CAN-regional Herfindhal Index

ISIC-year	75-90	90-98
Food	-0.04	0.01
Glass	-0.09	0.06
Iron and Steel	-0.09	0.16
Leather Prod.	0.02	0.04
Machinery, electric	-0.04	0.06
Machinery,exc.electrical	-0.02	0.00
Non-ferrous metals	0.34	0.09
Other chem.	-0.05	0.01
Plastic prod.	-0.09	0.05
Pottery	0.04	0.06
Printing and Publish.	-0.07	0.02
Professional and Scient. eq.	0.00	0.31
Rubber prod.	-0.03	0.33
Tobacco	0.01	0.48
Wearing app.,ex.footwear	-0.10	0.11
Wood prod.	-0.13	0.01

Table 4 CACM-regional Herfindahl Index

ISIC-year	71-90	90-95
Food	0.04	0.01
Glass	-0.16	0.04
Leather Prod.	0.03	0.07
Machinery, electric	0.15	0.05
Miscellaneous petr.and coal prod.	-0.49	0.91
Other chem.	-0.06	0.07
Petroleum ref.	0.00	0.06
Plastic prod.	0.08	0.02
Pottery	-0.08	0.02
Printing and Publish.	0.06	0.01
Professional and Scient. eq.	-0.02	0.36
Rubber prod.	0.00	0.37
Transport equipm.	-0.14	0.08

Table 5 Specialization Index and Regional Shares

	Spec.	Index	share of	reg.prod.
cty-year	**85-90**	**90-95**	**85-90**	**90-95**
ARG	0.003	-0.008	0.12	0.01
BRA	0.005	-0.001	-0.13	-0.02
URY	-0.011	0.011	0.01	0.00
cty-year	**75-90**	**90-95**	**75-90**	**90-98**
BOL	-0.010	0.008	0.01	0.00
COL	0.003	-0.001	0.09	-0.04
ECU	-0.012	0.024	0.02	0.04
VEN	0.007	0.006	-0.13	0.00
cty-year	**71-91**	**91-95**	**71-90**	**91-95**
CRI	-0.001	-0.005	0.06	0.00
GTM	-0.002	-0.001	0.03	0.03
HND	-0.011	0.000	0.04	-0.02
SLV	0.023	-0.007	-0.13	-0.02

Table 6 Results CAN I

N.Obs.	2546		1345		1345	
Groups	108		107		107	
	Coef.	**St.Err.**	**Coef.**	**St.Err.**	**Coef.**	**St.Err.**
s_{ikt-1}	0.84***	0.04	0.58**	0.08	0.57***	0.08
agr.gdp	-0.28***	0.06	-0.11	0.10	-0.13	0.10
edu.	1.38**	0.50	1.13	1.04	1.01	1.04
mkt pot.	-0.50***	0.16	-0.68*	0.34	-0.60*	0.34
lab.force	-4.17**	1.49	-15.50***	3.57	-15.61***	3.56
link.	0.05	0.06	0.23*	0.14	0.21	0.13
lab.int.	-1.77***	0.55	-5.63***	1.31	-5.82***	1.32
skill int.	0.21	0.14	0.08	0.27	0.05	0.27
*lab.force*lab.int.*	0.46***	0.14	1.48***	0.32	1.53***	0.32
*edu*skill int.*	-0.11**	0.05	-0.06	0.86	-0.05	0.08
*sc.econ.*mkt pot.*	0.19**	0.07	0.14	0.14	0.12	0.14
reg. ind.gr.	0.44***	0.05	0.34***	0.07	0.33***	0.01
reg. RCA			0.02**	0.008		
R					-0.02***	0.006

Table 7 Results CAN II

N.Obs.	1687		859	
Groups	108		108	
	Coef.	**St.Err.**	**Coef.**	**St.Err.**
	1970-1990		**1991-1998**	
s_{ikt-1}	0.81***	0.06	0.38***	0.10
agr.gdp	-0.35***	0.08	0.41*	0.23
edu.	1.26	0.86	8.89***	2.33
mkt pot.	-0.45*	0.24	-1.59**	0.62
lab.force	-0.90	3.54	-31.25***	9.15
link.	-0.01	0.09	0.51**	0.22
lab.int.	-0.18	1.13	-3.06	3.02
skill int.	0.13	0.25	1.39***	0.48
*lab.force*lab.int.*	0.04	0.29	0.87	0.74
*edu*skill int.*	-0.09	0.08	-0.46***	0.15
*sc.econ.*mkt pot.*	0.18	0.14	0.05	0.27
reg. ind.gr.	0.20**	0.08	0.49***	0.08

Table 8 Results CAN III

N.Obs.	845		845	
Groups	107		107	
	Coef.	**St.Err.**	**Coef.**	**St.Err.**
	1991-1998		**1991-1998**	
s_{ikt-1}	0.34***	0.10	0.34***	0.10
agr.gdp	0.43*	0.23	0.42*	0.23
edu.	7.28***	2.37	7.29***	2.36
mkt pot.	-1.46**	0.63	-1.39**	0.63
lab.force	-33.16***	9.23	-33.54***	9.21
link.	0.45**	0.23	0.44**	0.23
lab.int.	-4.11	3.03	-4.17	3.03
skill int.	1.03***	0.49	1.02***	0.48
*lab.force*lab.int.*	1.14	0.74	1.16	0.74
*edu*skill int.*	-0.34***	0.15	-0.34***	0.15
*sc.econ.*mkt pot.*	-0.02	0.27	-0.03	0.27
reg. ind. gr.	0.41***	0.09	0.41***	0.08
reg. RCA	0.02	0.01		
R			-0.03*	0.01

Table 9 Results CACM I

N.Obs.	757		299		299	
Groups	110		102		102	
	Coef.	**St.Err.**	**Coef.**	**St.Err.**	**Coef.**	**St.Err.**
s_{ikt-1}	0.69***	0.07	0.81***	0.28	0.79**	0.28
agr.gdp	-0.53**	0.21	2.50	5.30	2.47	5.29
edu.	1.87***	0.58	-6.96	60.3	-6.44	60.3
mkt pot.	-0.40	0.57	4.89	18.7	4.90	18.7
lab.force	-12.35***	2.97	-72.00	83.9	-71.36	83.8
link.	-0.49**	0.18	1.31	1.44	1.30	1.44
lab.int.	-3.40**	1.23	-10.29***	3.37	-10.21***	3.37
skill int.	0.07	0.09	-1.19**	0.59	-1.18*	0.58
*lab.force*lab.int.*	0.84**	0.31	2.46***	0.84	2.45***	0.84
*edu*skill int.*	-0.09***	0.03	0.28	0.22	0.28	0.22
*sc.econ.*mkt pot.*	-0.10	0.14	-1.28	1.24	-1.19	1.25
reg. ind.gr.	0.34***	0.10	0.27	0.30	0.26	0.30
reg. RCA			0.03	0.07		
R					-0.04	0.05

Table 10 Results CACM II

N.Obs.	458		299	
Groups	105		102	
	Coef. 1971-1990	**St.Err.**	**Coef. 1991-1995**	**St.Err.**
s_{ikt-1}	0.56***	0.10	0.83***	0.28
agr.gdp	0.03	1.18	2.45	5.29
edu.	1.84	1.16	-6.23	60.2
mkt pot.	0.12	1.48	4.92	18.7
lab.force	-11.59	14.7	-71.79	83.7
link.	-0.28	0.35	1.35	1.44
lab.int.	-7.79	5.81	-10.24***	3.37
skill int.	0.21*	0.12	-1.21**	0.58
*lab.force*lab.int.*	1.96	1.47	2.44***	0.84
*edu*skill int.*	-0.14***	0.04	0.28	0.22
*sc.econ.*mkt pot.*	0.14	0.26	-1.37	1.23
reg. ind.gr.	0.32**	0.12	0.30	0.30

Table 11 Groups and Regimes

COUNTRY GROUP / REGIME Model (4)	INTERCEPT	RATE OF CONVERGENCE
Treatment group before the agreement	α_0	β_0
Treatment group after the agreement	$\alpha_0 + \alpha_1 + \gamma_0$	$\beta_0 + \beta_1 + \beta_2$
Control group before the agreement	α_0	β_0
Control group after the agreement	$\alpha_0 + \alpha_1$	$\beta_0 + \beta_1$

Table 12 Results I: dependent variable real GDP per capita I

agreement	average additional rate of convergence	n.of non sign. estimates
mercosur	0.04	144
can	-0.01	120
cacm	0.04	144

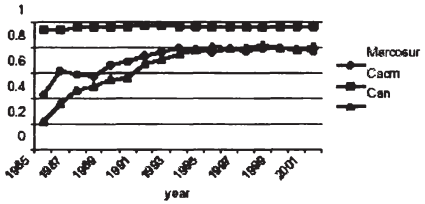
Table 13 variable real GDP per capita II

agreement	Average additional rate of convergence	n.of non sign. estimates
mercosur	0.05	128
can	0.00	121
cacm	0.05	156

Table 14 variable real GDP per capita per worker

agreement	Average additional rate of convergence	n.of non sign. estimates
mercosur	0.04	104
can	-0.01	101
cacm	0.05	141

Figure 1 Introversion Indexes for LAC agreements



Source: ECLAC and own calculations.

Figure 2 Mercosur σ-convergence

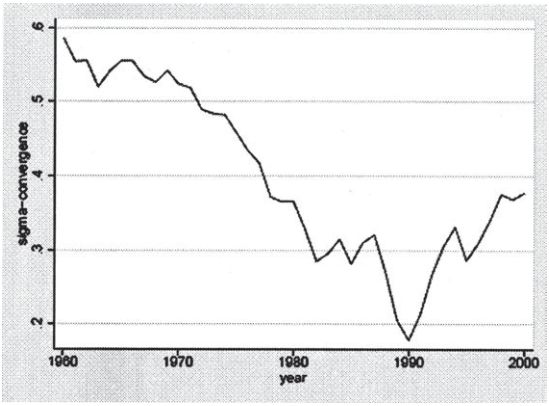


Figure 3 CAN σ-convergence

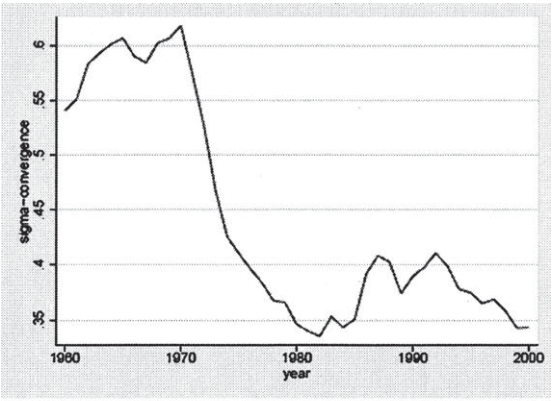
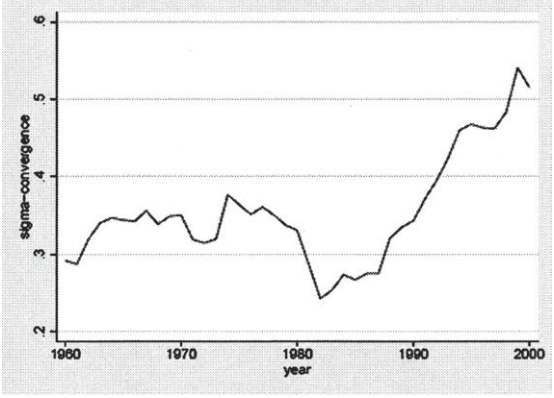


Figure 4 CACM σ-convergence



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