Pro-poor Growth:
Policy and Evidence

By

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Lukas Menkhoff

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Foreword

By *Lukas Menkhoff,* Hannover

Worldwide poverty forms one of the greatest problems of our present economic and social life. Whether you take the United Nations human rights declaration, the German constitution ("Grundgesetz") or any other commitment to ethical standards – the banishment of poverty is unequivocal. Accordingly, the de facto existence of large-scale poverty – i.e. the violation of basic rights – in a globalizing world that seems to be richer then ever, may well be seen as a puzzle.

This puzzle does not become easier to tolerate when we look at two details (*Besley* and *Burgess,* 2003): first, while talking about poverty in developing countries we do not talk about relative poverty as in rich countries (often defined as having less than 50% of the median income). The poor in developing countries are not relatively disadvantaged; they are poor in a very basic sense. An intuitive indicator is the fact that these people spend most of their income for food, even though they will often stay hungry. At the same time, rich countries have the problem of large-scale obesity. Second, poverty is a permanent phenomenon. There are areas in the world, in particular in Sub-Saharan Africa and South Asia, where the probability of being poor is very high and where the hope for improvement is low. At the same time people in industrialized and industrializing economies get used to ever increasing aspiration levels with respect to material aspects of life.

Indeed the embarrassing living conditions of more than one billion poor people in developing countries in combination with the increasing gap of living standards between the poor and the rich, has provided a strong motivation for development policy to change this situation. From its beginning, policy has aimed for stimulating economic growth in order to improve living conditions for everyone. The endurance of poverty, however, has motivated to extend the traditional "growth is good for the poor" (*Dollar* and *Kraay,* 2002, *Kraay,* 2006) by a more targeted policy that combines growth with a particular emphasis on improving the situation of the poor (*Besley* and *Burgess,* 2003). This is exactly the objective of "pro-poor growth", a term that became popular during the late 1990s and which seemed to dominate the stage with the propagation of the Millennium Development Goals, including its goal to halve poverty by 2015.

This volume contains six papers that address various core issues of pro-poor growth policies. These papers were presented at the annual meeting of the Re-

search Committee Development Economics (Ausschuss Entwicklungsländer des Vereins für Socialpolitik) in 2005. All papers were lively discussed at the meeting and later on improved by comments from anonymous referees. I would like to thank the authors, discussants as well as the referees for their most helpful contributions in order to meet serious academic standards.

All authors have done extensive research in the field of pro-poor growth, including field studies. Accordingly, their contributions – reflecting this knowledge and proficiency – pick up recent developments in the field. The discussion of most appropriate pro-poor growth policies is an ongoing process which has been documented by a growing literature, including some earlier collected volumes (e.g. *Krakowski* 2004, *Tungodden* et al., 2004, *Besley* and *Cord,* 2006). The value added of the present volume is obviously not to be more comprehensive than others but rather to continue the line of work by bringing some recent research findings to a broader audience. As papers are introduced by an abstract each, I do not want to highlight their contents and findings here but restrict the introduction to relating the papers to each other.

The volume is opened by the survey article of *Rainer Klump* and *César A. Miralles Cabrera* (Goethe University Frankfurt / Main). The authors introduce the concept of pro-poor growth including the main measurement controversy which is exemplified by a nice simulation exercise. The main emphasis is based upon deriving policy implications from theoretical work and from 14 country studies on pro-poor growth coordinated by the World Bank.

The following article by *Michael Grimm* (Georg-August-University Göttingen) deepens the question how to measure pro-poor growth. Whereas Klump and Miralles Cabrera discuss the conceptual debate between UNDP and the World Bank, Grimm shows that pro-poor growth measurement should be based on individual data if possible. Theoretical and applied work demonstrates that information on individual mobility is important to assess the pro-poor impact of growth appropriately.

A different issue of pro-poor growth measurement is focused by *Stefan Klonner* (Cornell University). His concern implies that ideal household data (as used in Grimm's contribution) are usually not available when long-term studies are conducted. Another concern being the unwanted effect in traditional growth regressions that poverty elasticities depend on the ex ante distribution. In order to appropriately assess a pro-poor development in time-series data Klonner suggests a new approach and applies it to Indian data from the 1950s to the early 1990s.

The next three papers accept existing measures of pro-poor growth and examine further issues. *Rainer Thiele* (Kiel Institute for the World Economy) demonstrates how a dynamic Computable General Equilibrium (CGE) framework can be used to analyze pro-poor growth. An application to the case of Bolivia shows, how this instrument can simulate and asses various policy measures with respect to their impact on the poor.

One particular policy measure which has often been mentioned to pay a double dividend – that is to foster growth and to be of particular advantage to the poor – is the improvement in primary education. *Jean Bourdon* (University of Bourgogne), *Markus Frölich* (University College London) and *Katharina Michaelowa* (Hamburg Institute of International Economics) examine an important option for developing countries, i.e. to complement (expensive) teachers within the public service sector by (cheaper) contract teachers. Careful examinations for Niger show that this seems to be an instrument to realize pro-poor growth.

Another issue of pro-poor growth which might yield a double dividend is discussed by *Stephan Klasen* (Georg-August-University Göttingen). It is known that women are positioned in precarious situation quite often, hence a gender-sensitive design of growth policies could target growth and gender objectives simultaneously. Klasen's evaluation of 14 country studies shows that this is not an easy task but that country clusters seem to emerge. Nevertheless, despite varying country experiences there are clear signs that measures to reduce the gender gap often also reduce poverty and promote growth. Thus they can create a highly warranted pro-poor growth effect.

Finally, I gratefully acknowledge the important contributions from three sides which have made the first international conference of the Research Committee Development Economics (Ausschuss Entwicklungsländer des Vereins für Socialpolitik) in July 2005, hosted by the Kiel Institute of World Economics, a great success and which have motivated to continue this experiment. First, the conference had been perfectly organized by the local organizer Rolf Langhammer (Vice-President of the Kiel Institute for the World Economy), Ingrid Lawaetz (Kiel Institute for the World Economy) and Daniela Beckmann (Manager of our research committee, University of Hannover). Second, we had received most useful financial support by Wissenschaftsförderung der Sparkassen-Finanzgruppe e.V., Gesellschaft zur Förderung des IfW, Wirtschaftswissenschaftlicher Club des IfW, Commerzbank Private Banking Kiel, Sparkasse Kiel, as well as Palgrave MacMillan. Third, I would like to thank the members and friends of our group who served as referees for this volume as well as for the papers submitted to the conference:

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References

Besley, Timothy / *Burgess,* Robin (2003): Halving Global Poverty, Journal of Economic Perspectives, 17:3, 3 – 22.

Besley, Timothy / *Cord,* Louise (eds.) (2006): Pro-Poor Growth – Lessons from the 1990s, Washington / New York.

Dollar, David / *Kraay,* Aart (2002): Growth is Good for the Poor, Journal of Economic Growth, 7:3, 195 – 225.

Kraay, Aart (2006): When is Growth Pro-Poor? Evidence from a Panel of Countries, Journal of Development Economics, 80:1, 198 – 227.

Krakowski, K. (ed.) (2004): Attacking Poverty: What Makes Growth Pro-poor?, Baden-Baden: Nomos Verlagsgesellschaft.

Tungodden, B. / *Stern,* N. / *Kolstad,* I. (eds.) (2004): Toward Pro Poor Policies – Aid, Institutions, and Globalization, New York: Oxford University Press.

Contents

Pro-poor Growth: Theory,
Measurement, and Policy Implications*

By *Rainer Klump* and *César A. Miralles Cabrera,* Frankfurt

Abstract

The conceptual basis and the practical implications of the concept of pro-poor growth have been highly debated over the last years. This paper aims at: (i) presenting a theoretical framework that explains under what circumstances growth becomes more pro-poor; (ii) comparing and testing the robustness of the two most important measures of pro-poor growth, the rate of pro-poor growth (RPPG) and the poverty equivalent growth rate (PEGR) (iii) investigating the most likely policy instruments that qualify for a support of pro-poor growth strategies; and (iv) proposing a framework for pro-poor growth diagnostics, which might help to prioritize pro-poor growth policy instruments. By simulating several forms of the Growth Incidence Curve, we demonstrate that the RPPG is biased, so that the higher the initial mean income level of the poor, the higher would be this measure in absolute terms. We also explain why macro stability, public investment in both human and physical capital as well as pro-poor policies (i.e. safety nets and targeted interventions) are the most efficient policy instruments for promoting pro-poor growth processes in developing countries.

A. Introduction

The concept of pro-poor growth as a suitable normative guideline for practical development economics is intrinsically linked to the "Post-Washington Consensus". The original "Washington Consensus" (*Williamson,* 1990) had formulated ten policy prescriptions for economic development based on liberalization, privatization and deregulation which were meant to foster economic growth in the developing countries. The structural reforms which IMF and World Bank implemented along these lines had led, however, to growing criticism about their effects on poverty und income distribution. Therefore ways had to be found to link the interest in a further promotion of growth with a particular focus in poverty reduction.

The following decisions, declarations and insights contributed to the emergence of the pro-poor growth paradigm:

- In a speech given 1998 at the World Institute for Development Economics Research (WIDER) in Helsinki, titled "More Instruments and Broader Goals: Moving Towards the Post-Washington Consensus", the then World Bank Chief Economist Joseph Stiglitz proposed the so-called "Post-Washington Consensus", which introduced three new dimensions of development: (i) sustainable development, which includes preserving natural resources; (ii) equitable development, which ensures that all groups in society enjoy the fruits of development; and lastly (iii) democratic development, in which citizens participate in making the decisions which affect their lives (*Stiglitz,* 1998).

- In 1999, the World Bank makes the formulation of Poverty Reduction Strategies (PRS) a pre-condition for obtaining debt rescheduling in the Heavily Indebted Poor Countries Initiative, HIPC, which the World Bank and the International Monetary Fund (IMF) had been carrying out in 42 poor countries since 1996, the majority of which are located in Africa. Since then, a Poverty Reduction Strategy Paper (PRSP), approved by the boards of the IMF and the World Bank, opens the doors to debt rescheduling as well as to increased flows of bilateral and multilateral aid. PRSPs were meant to replace ineffective Structural Adjustment Programs (SAPs) and should follow five principles: They should be (i) country-driven, (ii) results-oriented, (iii) comprehensive, (iv) partnership-oriented and (v) long-term. Today, PRSPs are being elaborated in close to 60 countries in Africa, Asia and Latin America as well as in East and Central Asia and other transition economies (*Hermele,* 2005)

- In September 2000 the world leaders signed "The United Nations Millennium Declaration" in order to commit their nations to strengthening global efforts for peace, human rights, democracy, strong governance, environmental sustainability and poverty eradication, and to promote the principles of human dignity, equality, and equity. The "UN Millennium Declaration" brought forward the importance and the essential of eradicating poverty and promoting development to achieve sustainable and broad-based economic growth[1]. Later on, in September 2001, eight "development goals" and 18 "targets" were firstly documented and classified[2]. All of them are causes and dimensions of poverty, such as income, level of health and education, gender discrimination against women, and environmental vulnerability. For example, the first goal, the eradication of extreme poverty and hunger aims at two targets, to halve the proportion of people with income no more than one dollar a day and the proportion of people who suffer from hunger between 1990 and 2015.

- The World Development Report (WDR) "Attacking Poverty: Opportunity, Empowerment, and Security" (*World Bank,* 2000) explicitly proposed a strategy for

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[1] See the United Nations Millennium Declaration (*UN,* 2000) and the Report (*UN,* 2001): "Road map towards the implementation of the United Nations Millennium Declaration" on the following web pages: www.un.org / millenniumgoals / and www.developmentgoals.org.

[2] See the Report of the Secretary-General: "Road map towards the implementation of the United Nations Millennium Declaration" (*UN,* 2001).

attacking poverty with three key principles: (i) promoting opportunity by stimulating economic growth, making markets work better for poor people, and building up their assets, (ii) facilitating empowerment by making state and social institutions more responsive to them, and (iii) enhancing security by reducing vulnerability and risks of such events as wars, disease, economic crises, and natural disasters.

• The 1990s been a period of new worldwide growth (*Zagha,* 2005) but also growing intra- and international inequality. The successful development of the East Asian "miracle countries" (*World Bank,* 1993) had supported the idea, however, that by means of an appropriate economic policy a sharing of the growth dividend among rich and poor might be possible (*Klump* and *Menkhoff,* 1995). Of course, the idea of linking growth to redistribution in order to fight poverty is much older and goes back at least to *Ahluwalia* and *Chenery* (1974).

As it stands now poverty reduction has become a central element of the "Post-Washington Consensus" and the achievement of pro-poor growth has become the new "Holy Grail" (*Klasen,* 2003) of international development economics. Over the recent years the empirical meaning, the conceptual basis and the practical implications of the concept of pro-poor growth have been highly debated. *Eastwood* and *Lipton* (2000) and *Klasen* (2003), among many others, have already provided excellent summaries. A recent series of 14 country studies initiated by the World Bank and national development agencies, supplemented by further empirical evidence and theoretical concept papers, has aimed at synthesizing this discussion and contributing to a better operationalization of pro-poor growth policies (*Cord,* 2005). Even if the high ambitions in this project have not been met, the results of this comprehensive work are a natural starting point for the analyses in our paper.

The paper is organized as follows. Chapter 2 aims at developing a theoretical framework that explains under what circumstances growth becomes pro-poor or not. Chapter 3 deals with the important issue of how to define and how to measure pro-poor growth (PPG). As it happens very often in applied economics the way how goals are defined has already important implications for the choice of appropriate policy instruments. Chapter 4 discusses the possible policy instruments that qualify for a support of pro poor growth strategies. Chapter 5 presents two approaches which might help to prioritize pro-poor growth policy instruments, and Chapter 6 concludes.

B. How to explain
why and when growth becomes pro-poor?

A specific theory of pro-poor growth is still lacking. Such a theory should explain how the same rate of aggregate growth could be achieved together with different speeds in poverty reduction. Unfortunately, the "Operationalizing Pro-

Poor Growth" (OPPG) project of the World Bank was not able to derive from the various country case studies some new elements of such a theory. Therefore it seems wise to construct it instead on established insights from modern growth and development theory. As a starting point there seems to be a divide between those sources of pro-poor growth which are more based on a particular growth dividend for the poor and those sources which rely more on redistribution of some aggregate growth dividend towards the poor. The first group of determinants can be called direct, while the second group are the indirect elements of a pro-poor growth strategy.

A general conceptual framework for a theory of pro-poor growth has been proposed by *Klump* and *Bonschab* (2004). This framework is further developed in *Figure 1*. It identifies the most important building blocks which such a theory should contain. In the centre of the diagram stand the factors, sectors and areas of production and income generation. If growth is wanted to be directly pro-poor, this calls for a specific mix of factors, sectors and areas of production. Unskilled workers in agriculture in remote rural areas are presumably the most targeted group in every pro-poor growth strategy. On the other hand this simple scheme also gives an idea of how a higher pro-poorness of growth could be achieved: by combining unskilled labour with land, human capital and real capital; by substituting agriculture by industry and services, transforming informal in formal employment, supporting the emergence of a viable private enterprise sector, and by linking rural to urban growth dynamics.
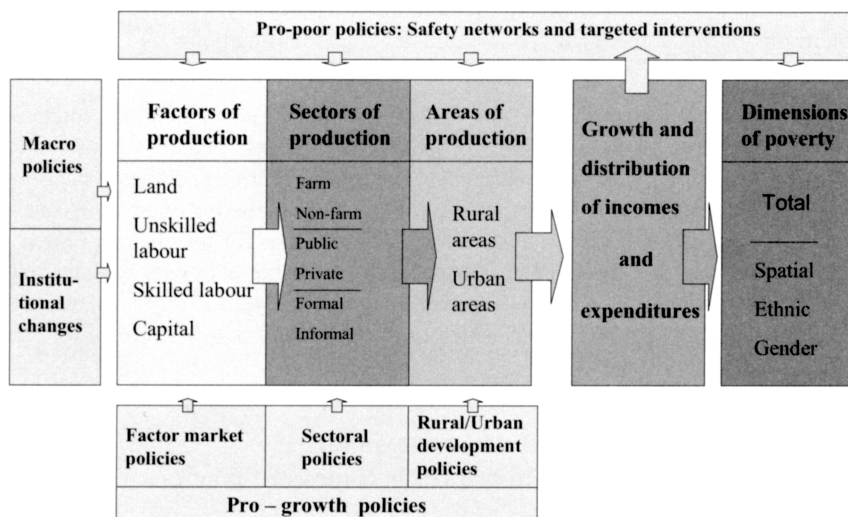
Source: Based on *Bonschab* and *Klump* (2004)

Figure 1: A general conceptual framework for pro-poor analysis

The other building blocks reunite the most important institutional and macro policies, which are relevant for aggregate growth. They contain for example good governance and macroeconomic stability. They are responsible for the general growth climate in a country and should not per se have a particular pro-poor bias. This is the major difference with regard to the third building block which stands for all the particular pro-poor interventions. They consist of social policy programs and targeted pro-poor spending for particular groups via the public budget which are financed from redistributive taxation of general income.

The aim of all pro-poor growth strategies is the sustainable reduction of poverty in all its many dimensions. This conforms not only to the "Millennium Development Goals" (MDGs) but also to the general interest of promoting sustainable long-term development. Given the diverse linkages between growth, inequality and poverty – often summarized in the concept of a "poverty-growth-inequality triangle" (*Bourguignon,* 2004) – it seems rather clear that persisting poverty in a fast growing economy caused by rising income and asset inequality would endanger future growth dynamics. Several channels link poverty and inequality to the sources of growth[3]:

- Poor entrepreneurs have limited access to credit implying that capital is not allocated efficiently[4].

- Poor families often have to interrupt the schooling of children , leading to inefficient investment in human capital (*World Bank,* 1990).

- Poor farmers are forced to choose crops with lower expected returns and to diversify less making agriculture less productive (*F.A.O,* 2002).

- By reducing the political influence of the poor[5], lasting poverty can prevent necessary political support for the promotion of growth policies based on human capital accumulation and innovations.

- Poverty erodes the social capital of a society and the trust in political institutions leading to political tensions[6], riots and civil wars.

Little is said in the pro-poor growth literature so far about possible negative allocative effects of targeted redistribution. There seems to be either the conviction that the positive allocation effects of redistribution and poverty reduction prevail

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[3] See The World Development Report "Equity and Development" (*World Bank,* 2006).

[4] See *Hoff* and *Stiglitz* (1990), and *F.A.O.* (2002) for a more details on imperfect information and credit markets in rural areas.

[5] Empowerment of the poor, by removing barriers-political, legal, and social-, that works against the poor, represented one of the three pillars in the World Bank's Poverty Reduction Strategy at the WDR 2000 (*World Bank,* 2000) to combat the voicelessness and powerlessness of the poor in most developing countries.

[6] *Persson* and *Tabellini* (1994) suggested that in a society where distributional conflict is important, political decisions produce economic policies that tax investment and growth-promoting activities in order to redistribute income.

or it is implicitly assumed that redistribution can be financed in a non-distortionary way, in particular via VAT. This calls, of course, for necessary institutional changes in the existing structure of taxation in many developing countries.

C. How to define and measure pro-poor growth?

I. Definition: Relative versus absolute concepts of pro-poor growth

Policy documents point out that pro-poor growth is considered as growth that benefits the poor and gives them more access to economic opportunities (*UN,* 2000; *OECD,* 2001). What this really means in terms of a precise definition is, however, highly debated. Two major strands in this debate relate to a relative and an absolute concept of pro-poor growth.

According to the absolute definition of pro-poor growth, which is broadly used in documents of the World Bank, growth is pro-poor if it reduces poverty, regardless of the developments on the inequality front (*Ravallion,* 2004; *Ravallion* and *Chen,* 2003; *Dollar* and *Kraay,* 2002). As long as the income of the poor grows, growth is pro-poor. Therefore growth is non pro-poor, only if the income of the poor stagnates or declines. In this context income equality contributes to lower poverty but is not an objective per se. Thus growth would be considered as pro-poor even if average income rose by 6 percent and the income of the poor only be 0.1 percent.

The relative definition of pro-poor growth which is used e. g. by the United Nations Development Programme (UNDP) is more restrictive and requires aggregate growth to be combined with an increase in the relative income share of the poor[7]. Hence growth is only pro-poor, if income inequality falls (*White* and *Anderson,* 2001; *Kakwani* and *Pernia,* 2000; *McCulloch* and *Baulch,* 1999). The World Bank heavily opposing this concept has always pointed out that it risks to give up growth opportunities. A growth outcome with average income growth equal to 2 percent and the growth of the income of the poor equal to 3 percent would be preferred to a scenario where average income growth is 6 percent and the income of the poor grew by only 4 percent.

The MDGs clearly calls for a reduction in the incidence of poverty (number of the poor) rather than a reduction of income inequality. This supports the World Bank's view of promoting the absolute concept of the rate of pro-poor growth. On

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[7] *Kakwani* et al. (2004) distinguish between a weak definition (growth is pro-poor if it reduces poverty) and a strong definition of pro-poor growth (growth is pro-poor if inequality falls). Among the strong definition of pro-poor growth, they distinguish between a relative definition of pro-poor growth (if growth improves relative inequality) and an absolute definition of pro-poor growth (if absolute inequality falls in the process of growth).

the other hand one may wonder whether the more general concept of promoting opportunity, facilitating empowerment and enhancing security for the poor can really be achieved without considering their relative income position. Social coherence, political stability and the long-term sustainability of the market system would certainly profit if high growth were not accompanied by a massive worsening of the distribution of income. Political economy considerations speak generally in favour of none or not so much increasing inequality and are thus much more supportive of a relative concept of pro-poor growth.

II. Measurement: Rate of pro-poor growth versus poverty equivalent growth rate

Also the adequate measurement of pro-poor growth depends on the chosen definition and hence on crucial assumptions about the relationship between growth, poverty and inequality. Among a multitude of possible concepts we concentrate on those two which are theoretically the most advanced and also representative of two different strands of the discussion. UNDP (*Kakwani* et al. 2004) propagates the use of the so-called "poverty equivalent growth rate" (PEGR) g_K, while the World Bank (*Ravallion* and *Chen,* 2003; *Ravallion,* 2004; Cord, 2005) strongly favours the "rate of pro-poor growth" (RPPG) g_R. Both concepts are similar in that they correct the growth rate of mean income g_Y by a factor measuring the "pro-poorness" of growth. The conceptual origin of the two correction factors, however, is different.

The "Kakwani School" derives the correction factor from a decomposition of the growth elasticity of poverty:

$$(1) \qquad \kappa = g_Y \cdot \phi, \quad \text{where } \phi = \frac{\eta}{\eta_g} = \frac{\eta_g + \eta_I}{\eta_g}$$

Here, η describes the total growth elasticity of poverty, and η_I is the "inequality effect" or the proportional change in poverty when inequality changes but the real mean income does not change. The "income effect" η_g is always negative, which implies that growth will always reduce poverty when the relative inequality does not change. By contrast, the "inequality effect" η_I can be either negative or positive, being negative when growth leads to a change in the distribution of income in favour of the poor, and being positive when the change in income distribution is pro-rich or benefits proportionally the rich more than the poor. The following three cases can now be distinguished:

- If $\phi > 1$, where $\eta_I < 0$, growth would be clearly pro-poor in the absolute and in the relative sense. Hence income of the poor would increase and inequality would fall.

- If $0 < \phi < 1$, where $\eta_I > 0$, growth is still pro-poor in the absolute, but no longer in the relative sense. In this case, the poor benefit from growth proportionally less than the non-poor (trickle down growth).

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- If $\phi < 0$, the beneficial impact of growth is more than offset by the adverse impact of rising inequality (immiserizing growth). Here, the growth process would be again pro-poor in the absolute sense, but not in the relative sense.

The problem with the growth elasticity of poverty, however, that it is highly sensitive to the initial levels of income and inequality (*Son* and *Kakwani,* 2004; *Bourguignon,* 2003). It is, therefore, not surprising to find that different countries have vastly different rates of poverty reduction with the same growth rate, because they are at different levels of economic development and have different levels of inequality. Cross-country regressions may give only the average elasticity, and conceal the considerable actual variation across countries.

The "Ravallion School" starts from an inspection of the growth incidence curve (*Ravallion* and *Chen,* 2003) which indicates the rate of growth in income or expenditure between two points in time at each percentile of the income distribution. The rate of pro-poor growth is then defined as the mean of the growth rates of the poor percentiles. This is the integral under the growth incidence curve below the poverty line divided by the headcount. This can also be formulated in terms of the Watts Index (*Watts,* 1968):

$$(2) \qquad\qquad g_R = g_Y \cdot \psi, \quad \text{where } \psi = dW_t / dW_t^*$$

Here: $W_t = \int\limits_0^{H_t} \log\left(\dfrac{z}{y(p)}\right) dp$ represents the Watts Index, z denotes the poverty line, $y(p)$ household or individual's incomes at the pth quantile, H_t the Headcount Index. The ratio $\dfrac{dW_t}{dW_t^*}$ compares the actual change in the Watts Index with the change in the Watts Index, which would have been observed if poor households had increased their incomes at the same rate than the mean income growth rate in the economy. We next distinguish possible values for ψ:

- If $\psi > 1$, mean income of the poor would increase at a higher rate than the mean income in the whole economy. This would represent "real pro-poor" growth in the absolute sense, and in some cases even in the relative sense. However, since we consider growth rates, the exact impact on income inequality is not clear and would depend, firstly, on the level of the initial mean income of the poor, and, secondly, on the actual differences between mean income growth in the poor and mean income growth in the whole economy.

- If $0 < \psi < 1$, mean income of the poor would increase at a lower rate than the mean income growth rate in the whole economy. Unlike the case above, the impact on in income inequality is rather clear, and this growth process would cause an increase in income inequality. Therefore, in this case growth would be pro-poor in the absolute sense, but no longer in the relative sense (trickle down growth).

- Lastly, if $\psi < 0$, the economy would suffer a process of "immiserizing" growth, in which despite of a positive mean income growth rate in the whole economy, the poor would experience a decrease in their incomes.

In order to test the robustness of the RPPG we are concerned with the two following questions: (i) how correlated is the RPPG with changes in poverty and inequality?, and secondly, (ii) is the magnitude of the RPPG affected by the initial level of inequality and the initial level of development in the economy?

The first question appears to be partially answered by recent analytical work, which suggests that changes in the Watts Index and therefore changes in the RPPG are not correlated with the number or incidence of the poor[8]. Since the RPPG equals the mean income growth rate of poor households, a reduction of the number of the poor would crucially depend on the distance or gap between the income of the richest households among the poor and the poverty line. Therefore a positive RPPG is a necessary but not a sufficient condition to be successful at reducing the number or the incidence of poverty. One could find the case, in which a positive mean income growth rate of the poor is not enough to push the incomes of some poor households across the poverty line. By a similar analysis, we find that the RPPG is also a necessary but not sufficient condition to reduce the level of income inequality in an economy. It can be demonstrated that the Watts Index fails the transfer axiom[9] among the poor. In other words, income transfers from the richest poor households to the poorest poor households are not captured by the Watts Index. Therefore the RPPG does not tell us anything about what happened to income distribution among the poor households in an economy.

By simulating data, we can also show that whenever some poor households cross the poverty line, the actual change in the Watts Index – at least at it is defined by Ravallion and Chen – is generally biased. This is very intuitive, since the Watts Index makes use of the natural logarithm function. This mathematical function will provide negative values for poverty line-income gaps lower than unity. Ravallion and Chen calculate the actual change in the Watts Index by holding constant the number of poor households. In the special case, in which some of the poor households cross the poverty line, the logarithms of the gap for these households would be negative. Thus, by calculating the Watts Index by the sum or integral for all natural logarithms of the gaps, one would obtain a lower Watts Index than the Watts Index that one would have obtained if one would have allowed for changes in the number of poor households (Headcount Index).

As we already noted, Ravallion and Chen define the actual change in the Watts Index as the area under the GIC and the RPPG simply as the area under the GIC up

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[8] *Kakwani* et al. (2004) pointed out that the RPPG does fail the monotonicity axiom, and provide an example, in which the Watts index increases despite of a decrease in the incidence of poverty.

[9] *Ravallion* and *Chen* (2003) noted in their article that if they fixed the headcount index, the RPPG would fail the transfer axiom.

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to the Headcount Index normalized by the initial Headcount Index. This procedure would lose generality if the number of poor increased or decreased between the periods of interest. If the Headcount Index is not fixed, the actual change in the Watts Index should be written as:

$$
(3) \qquad \frac{dW_t}{dt} = \int\limits_0^{H_t} \frac{d\left[\log\left(\frac{z}{y(p)}\right)\right]}{dt}\, dp - \int\limits_0^{H_{t-1}} \frac{d\left[\log\left(\frac{z}{y(p)}\right)\right]}{dt}\, dp
$$

It follows from this calculation that the actual change in the Watts Index would not represent the area under the GIC curve at the starting period, but rather the differences between two areas: the area under the GIC up to the headcount at the starting period minus the area under the GIC up to the headcount at the end period. If one calculated the RPPG simply by dividing this expression by the Headcount Index at the starting period, one would not obtain the mean income growth rate of the poor as Ravallion and Chen suggest. It should thus be noted, that the Watts Index and the RPPG are not directly correlated with the degree of inequality among the poor and the number or incidence of poverty in an economy.

Regarding the second question, for a given mean growth rate of the poor, the initial level of mean income of the poor crucially influences the magnitude of the RPPG. This proposition can be easily demonstrated by the fact that for a given income growth rate, the higher the level of initial income, the higher would be the change in income in absolute terms. In other words, a one percent income increase in a non-poor household would cause a higher increase in absolute terms in mean income than this one percent increase for an ultra poor household. By the same way, an overall one percent income increase for the poor would provide a higher actual change in the Watts Index depending on the initial mean income of the poor population. One can see from the simulations in *Table 1* that the higher the initial mean income of the poor, the higher would be (in absolute terms) the RPPG. By a similar simulation analysis, the initial level of income inequality does not appear to affect the RPPG. This proposition is less intuitive but can be also demonstrated if we analyse the actual change in the Watts Index. The Watts Index measure of poverty does not account for transfers among the poor. If we transferred dollars from the poorest to the richest poor households without altering mean income of the poor, the Watts Index would not capture any distributional shifts among the poor and thus the RPPG would remain constant.

Table 1

The rate of pro-poor growth and the initial level of development

	Economy A				
	Initial	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Headcount Index	0,5	0,5	0,5	0,5	0,5
Mean Income Level	6,85	7,06	7,00	7,12	7,18
Mean growth rate (%)	–	3,00	2,22	3,89	4,78
Watts Index	30,10	28,82	26,76	29,67	30,54
dW/dt (a)	–	–1,28	–3,34	–0,43	0,44
dW^*/dt (b)	–	–1,50	–1,11	–1,95	–2,39
Correction Factor (a/b)	–	0,86	3,01	0,22	-0,18
RPPG	–	2,57	6,68	0,86	-0,87

	Economy B (with higher initial mean income than A)				
	Initial	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Headcount Index	0,5	0,5	0,5	0,5	0,5
Mean Income Level	10,28	10,58	10,50	10,67	10,77
Mean growth rate (%)	–	3,00	2,22	3,89	4,78
Watts Index	48,85	43,83	35,78	47,16	50,56
dW/dt (a)	-	–5,02	–13,07	–1,69	1,71
dW^*/dt (b)	–	–1,50	–1,11	–1,95	–2,39
Correction Factor (a/b)	–	3,35	11,78	0,87	–0,71
RPPG	–	10,04	26,14	3,38	–3,41

Scenario 1: mean income growth rate of the poor equal to the mean income growth rate of the non-poor.

Scenario 2: mean income growth rate of the poor higher than mean income growth rate of the non-poor (real pro-poor growth).

Scenario 3: mean income growth rate of the poor lower than mean income growth rate of the non-poor (trickle down growth).

Scenario 4: negative mean income growth rate of the poor combined with a positive mean income growth rate of the non-poor (immiserizing growth).

Source: Own simulations (see appendix for the assumptions).

D. How to support pro-poor growth
by adequate policies?

I. Pro-growth policies: Factor related, sector related
and area related policies

Since most of the poor usually live in remote areas, work in agriculture and are only endowed with unskilled labor the pro-growth element of a pro-poor growth strategy has to rely on this particular factor, sector and area characteristics. Pro-growth policies should lead to higher income growth of the poor without challenging the general growth dynamics of the country. Among the factors of production it is not particularly pro-poor to reduce population growth and increase domestic saving and investment, the two basic strategies based on traditional neoclassical growth theory. Rather, it is necessary to increase those factors of production which are complementary with the basic asset of the poor, unskilled labor. Those factors are land and human capital, whereas real capital is rather a substitute. The sector which is most relevant for the poor is agriculture but with a higher level of development also industry and services can play an important role. Sectoral policies also include the treatment of the public versus the private domestic sector with regard to the poor and strategies to turn informal into formal employment. Finally, spatial policy considerations concern not only the rural development strategy but also the problem of how to better link poor households in the poor rural areas to the urban growth centers.

If unskilled labor is the major asset of the poor the income of the poor will not be increased by higher labor productivity alone but by combining high labor productivity with an even higher productivity of the main complementary factor, land. Together this means an increase of agricultural employment and higher agricultural incomes (Byerlee et al., 2005). Poor households are typically land poor or landless. When the poor do own land, it is often unproductive and frequently lies outside irrigated areas. Many of the poor have access to land without having ownership rights. Tenancy is not common, it does not provide collateral or a secure hedge against risk, and access to the land from one year to the next is often uncertain. In other cases the poor have access to land that is owned by the community or is common property, but the population pressure, the over-exploitation of resources, and the deterioration of the environment make this common property resource not sustainable. Therefore land access and tenure security issues constitute an important constraint for the poor in most developing countries. For instance, in Tunisia, access to land remains a huge constraint, which prevents households from participating fully in agricultural growth. In 1990, more than 2/3 of the farmers in Tunisia owned about 10 percent of the total land, while 1.2 percent of the richest farmers owned more than 22 percent[10]. On the contrary, in Vietnam, a successful land reform was one of the key elements of the country's highly successful poverty reduction.

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[10] See *Ayadi* et al. (2004) for more details about Tunisia's economy.

Many of the poor are located in regions where arable land is scarce, agricultural productivity is low, and environmental degradation is common. Others among the poor live in regions that are more endowed with natural resources, which are unequally distributed. In both cases, there is often a lack of access to public services (education or health), and infrastructure (electricity, irrigation, roads, or market centres). In addition, policies that would expand tenancy, provide clear land rights, and improve the management of common property resources should create opportunities for many of the rural poor and are expected to promote pro-poor growth.

Denying large segments of rural society more equitable access to land and to the benefits of secure tenure can be a major contributing factor to extreme poverty, dependence, social instability, rural migration or land abandonment. On the other hand, more equitable access to land and other assets can play a role in stimulating faster and broad-based economic growth. Access to land can be provided systematically through land reform interventions by national governments, often as a result of policies to correct historic injustices and to distribute land more equitably[11]. Such land reforms usually occur in situations where much of the land is owned by a relatively small number of land owners and the land is idle or under-utilized.

Land access and tenure security programs should aim at providing the rural poor with access to land and promoting efficiency and investment in agriculture. The impact of the implementation of these programs on growth would depend on their effect on the subsequent increase in investment and efficiency. Such reforms change the structure of land ownership by transforming poor land workers into owners. Some recent land reform initiatives have been designed so that beneficiaries can negotiate with land owners to purchase land using funds provided by the State in the form of grants or loans. While there is a broad consensus that land reform plays an important role in rural development and rural poverty reduction, a great controversy is related to the choice of mechanisms to transfer land from large land owner to the landless and land poor. In addition, there are some caveats in the effectiveness of these land redistribution programs to generate income in the poorest households in practice. There is some evidence that in highly developed land markets, land use tends to concentrate among well established, better educated, and male head households. On the other hand, government's fear of civil agitation and political economy considerations, such as political influence of lobbies and the middle and rich classes, would represent difficult obstacles to introduce land tenure and tenure security reforms in most developing countries.

Land tenure and environmental conditions are also closely related: insecure land tenure is linked to poor land use which in turn leads to environmental degradation and poverty. For example, tenant farmers with short-term leases may not undertake soil protection measures or plant trees if they will not hold the land long enough to receive the benefits of their investments. In order to improve the sustainable use of

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[11] See *Eastwood* and *Lipton* (2000) for a distinction between achieved and ascribed inequality.

natural resources, and hence sustainable pro-poor growth, land tenure strategies should be linked to appropriate land management tools and the provision of extension services, to ensure that the land is put to a use that is suitable for its soil, land form and climatic characteristics.

As mentioned above, the principal asset of the poor is unskilled labour. Education increases the productivity of this asset. Educated workers have a comparative advantage with respect to adjustment and implementation of new technologies, because they usually have a broader set of basic skills, which facilitates the assimilation of new knowledge. Almost all studies on agricultural productivity show that better-educated farmers get also a higher return on their land. In addition, education gives the workers a wider range of self-employment options and allows him or her to choose more profitable alternatives.

The effect of better health and nutrition on productivity has been less well documented than the effect of education. An increasingly number of studies, however, shows that improvements in health may increase output not only through labour productivity but also through the accumulation of capital[12]. Nutrition and health policies lead to positive effects on agricultural productivity, and would generate pro-poor growth if these policies indeed had an impact on the poor. Just as the education of parents has a positive effect on child nutrition, better nutrition improves the child's capacity to learn[13]. Because of the positive effect of better health and nutrition on productivity, investment in it also contributes to pro-poor growth.

Adult health is also a relatively new issue in public health policy in developing countries. Most public health efforts have emphasized child and infant health. However, more than anybody else, the poor depend on health to maintain the productivity of their in most cases only asset, labour. In addition, improvements in sanitation, drinking water, housing and nutrition are pro-poor policies, which if they increase productivity in the labour force, will also be pro-growth policies.

It has been also argued that health affects economic performance through direct and indirect mechanisms (*Bloom* et al., 2004). It has a direct effect on worker's productivity because healthy workers are generally more physically and mentally robust than those afflicted with disease or disability and are less likely to be absent from work because of personal or household illness. Health can also affect economic performance through indirect mechanisms; for example, improved health can increase the return on other forms of investment in human capital, such as education and worker experience. At a macroeconomic level, empirical studies have also demonstrated that population health is a robust predictor of growth in

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[12] See, for instance: *Bloom* et al. (2001); *Deaton* (2001b); and *Preston* (1975).

[13] Studies in many developing countries consistently show that protein energy malnutrition is related to lower cognitive test scores and worse school performance in children and work capacity in adults (Worldbank, 1990).

per capita income and affects foreign direct investment (*Bloom* et al., 2001, 2004; *Deaton*, 2001b).

Policy makers and governments should make sure that the poor have access to basic care, and should continue to expand these basic services with a greater emphasis on access for the poor in order to contribute to pro-poor growth. Human capital is therefore a limiting factor, and without an adequate level of education, health and nutrition of the poor, long run pro-poor strategies and pro-poor growth will fail in its attempt to achieve poverty reduction. Increasing government and private spending in human capital of the poor will enhance productivity, job's opportunities, and personal wealth in the poor households and hence in the economy.

Sectoral policies with a pro-poor perspective should always start by promoting agriculture by liberalizing agricultural exports and import of fertilizers. However, with a higher level of development also the industrial and service sector become relevant for the poor. This is when liberalization of manufactured exports and of services becomes relevant. The public sectors are mostly unable to react to the growing employment needs of poor workers which are laid off in agriculture. This is why the expansion of the domestic private sector becomes necessary with higher standards of living. The informal sector is usually a huge employment machine in most developing countries due to its high flexibility. On the other hand, the formal sector offers not only higher but also more stable employment and income. Therefore the way out of informality is generally pro-poor and it can usually be supported by lower inequality and better institutional governance (*Klump* and *Tenguz,* 2005).

Agricultural liberalization and trade reforms are traditionally expected to promote pro-poor growth, mainly by removing export taxes. There is some evidence that in many African countries, the privatization of marketing boards for crops and the removal of export taxes have increase incentive for farmers to invest and productivity in the crops production[14]. Trade protection has its roots in political economy considerations. Tariffs also reduce economic efficiency, since it undermines incentives to invest, diversify, and exploit new growth opportunities. For instance, the federal and state government in India provided during the 90s significant subsidies for agricultural inputs and outputs that damaged fiscal finances, and disproportionately benefited the larger farmers[15]. It may be arguable that agriculture liberalization and trade reforms must be in a pro-poor growth agenda. However, the impact of such reforms on the income in the poor households is still not clear. In addition, their implementation relies on strong and high quality institutions, which should control that such reforms do not favour the larger and richer farmers, and institutional inefficiencis would certainly benefit lobbies and well established larger farmers more than the poor.

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[14] See *Okidi* et al. (2005) for the case of Uganda.

[15] See *Besley* et al. (2004) for more detail on the Indian economy.

The rural non-farm employment in the developing world mainly consists of employment in traditional industries (e.g. manufacturing), services (tourism), and commerce. The poor are concentrated in traditional industries with low skill and capital requirements and very low labour productivity, and their products are normally intended for home consumption or for the local market. Non-farm employment is particularly important in providing work for landless workers and women from poor households in slack seasons.

During the 90s, non-farm employment both in urban and rural areas has become more important in the developing world[16]. In addition, the non-farm sector emerges as an alternative to generate income and welfare for the poor households, and hence to generate pro-poor growth. For instance, by using 20 household surveys for India's 15 major states and spanning 1960 – 1994, *Ravallion* and *Datt* (1999) remarked three results: first (i) higher (rural and urban) non-farm output and lower inflation were all poverty reducing; secondly (ii) non-farm output was the only explanatory variable in explaining poverty, for what they could reject the null hypothesis that the elasticity was the same across states for a given poverty measure; and thirdly (iii) the non-farm economic growth was less effective in reducing poverty in states with poor initial conditions in terms of rural development (in absolute terms and relative to urban areas) and human resources. In the same line of results, but at this time by studying Latin American economies between the period from 1970 to 1994, *De Janvry* and *Sadoulet* (2000) suggested that growth in the services sector was essential in reducing the growth of both urban and rural poverty.

The characteristics of urban and rural poverty have some significant distinctions, which are important to identify and understand, so that poverty problems can be correctly assessed and appropriate interventions designed. For poor people living in urban environments, the main source of livelihood is the informal sector. The poor sell services and engage in trade or work on a casual basis in construction, manufacturing, and transport. Some are full-time beggars, garbage sifters, prostitutes, or pickpockets, and incomes are low and insecure.

Village clusters, towns, medium-sized cities, and large and mega cities present very different problems and have different institutional capacities. Urban poverty issues are particularly apparent in zones where population growth is high and administrative capacities are inadequate or unprepared to respond to pressing needs. Policy actions to address pro-poor growth must take account of these facts. Differences in income and welfare within the different regions of a country must be an important issue when implementing pro-poor growth strategies. So far, the poor households in the remote poor provinces have mainly been linked to the growth dynamics in the urban centers via migration of household's members and their remittances. In a more general perspective, it would be desirable if these linkages

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[16] For instance, *Datt* and *Ravallion* (1996) found that poverty was reduced by higher agricultural yields, above-trend growth in non-farm output, and lower inflation rates.

could be made also by higher interregional capital mobility, in particular related to the creation of private enterprises outside the urban centers and by a better infrastructure which links the rural suppliers to growing urban markets.

II. Pro-poor policies: Safety Nets
and targeted interventions

Not all the poor will benefit from the policies discussed in previous chapters. Poor people are vulnerable because they are the most exposed to a wide array of risks[17]. Their low income means they are less able to save and accumulate assets. That in turn restricts their ability to deal with a crisis when it strikes. Two broad groups need special attention: those unable to participate in the growth process and those who may be temporarily in danger when events take an unfavourable turn. The first group needs targeted interventions, while the second group is best served by a variety of safety nets.

The adverse effects of these risks will be more damaging to the poor, and lost income may force the poor to sell their land, their tools, send their children to work rather than to school, or eat less. Moreover, the general objective is to improve the living conditions of poor people, especially children, adolescents, senior citizens, women, persons with disabilities and ethnic groups in vulnerable conditions, through equitable access to better opportunities. Safety nets programs have two key functions: (i) redistribute incomes and resources helping the poor to overcome short-term poverty, and (ii) to help households manage risk.

From a pro-poor policy perspective, there are many useful tools for public interventions to improve the ability of households to manage risks, in particular: health insurance, old age assistance and pensions, unemployment insurance and assistance, workfare programs, social funds, microfinance programs and cash transfers (*World Bank,* 2000).

Most low-income countries can offer only limited health insurance, usually providing minimum benefits for all illness rather than full insurance for infrequent but very costly illnesses. Public provision of insurance against catastrophic health risks could thus significantly improve the welfare of poor people where households are unable to insure against these risks themselves.

The risk associated with old age has social as well as economic dimensions, and policies need to address both. To reduce social isolation of many of the elderly, social policies should facilitate access to community groups or associations that cater to the elderly. On the economic side, many elderly are poor because they have been poor all their lives or because of failures in pension systems. Pro-poor

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[17] Risks can be either household (e.g. illness, disability, death and unemployment), community or regionally based (e.g. floods, famine) or nationwide (e.g. global financial risks, shifts in terms of trade).

growth policies that increase income of the poor during their working lives will also make them better off during retirement.

Formal pension systems are limited in most developing countries, covering only 16 percent of the labour force in the developing world (*World Bank,* 2000). The general recommendation for pension reform is to establish a multi-pillar system: combining a publicly managed defined-benefit plan with a privately managed defined-contribution plan, supplemented by voluntary retirement savings. The publicly managed plan, funded from general tax revenues, can address poverty and equity concerns. But successful management of such systems requires considerable administrative capacity, which is not the case in the developing world. In general, coverage is lowest among the poor, the uneducated, the self-employed, and women[18].

Even a well-functioning labour market will not fully eliminate the risk of unemployment or underemployment. Displaced workers will need unemployment benefits to protect them from large income losses and poverty. But unemployment insurance is generally not appropriate for most developing countries because of their low administrative capacity and their large informal sector. The irregular and unpredictable earnings typical in the informal sector and the high compulsory contributions make it hard for workers to participate in a contributory insurance program. A more practical option for assisting the unemployed are therefore the so-called social funds and public workfare programs. Public work programs are a useful countercyclical instrument for reaching poor unemployed workers. Social funds could help to finance small projects identified and implemented by poor communities. Social funds address a wide range of objectives, including infrastructure, community development, social services, and support for decentralization.

Microfinance programs (credit, savings, and insurance) should help poor household to smooth consumption during an adverse shock. Access to credit may help them to avoid distress sales of assets and replace productive assets destroyed in a natural disaster. But microfinance programs do more than help households cope with shocks, they can also provide capital to create or expand microenterprises. Microfinance thus could help households to diversify their sources of income and reduces their vulnerability to income shocks.

Lastly, policy makers can manage equitable cash transfers system, including social assistance payments for the elderly, child allowances, targeted human development programs, and fees for basic services. Cross-country experience suggests that in countries with large informal sectors, where formal unemployment insurance is not feasible, social assistance is an important way of assisting the unemployed and underemployed. Targeted human development programs for poor households with children transfer income in cash or in kind on the basis of such observable criteria as children's age, attendance in school, or participation in a health care program.

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[18] See *Auerbach* et al. (2005) for a detailed analysis of social security coverage and labour markets in Latin American countries.

They thus serve the dual objectives of poverty reduction and human development. When effective, they prevent long term damage to children that occur when households, unable to adequately manage risk, respond to shocks by underfeeding their children or pulling them out of school to work.

Targeted interventions as part of a pro-poor agenda should benefit those groups among the poor who are unable, even in the longer run, to participate in the general growth dividend of a country because they suffer from open or hidden discrimination and / or because their "economic style" is different from that of the majority. Both are often the case with women and ethnic minorities. The Millennium Declaration, signed in September 2000 at the United Nations' Millennium Summit, commits the member countries to promote gender equality and the empowerment of women, as an effective way to combat poverty, hunger, and disease and to stimulate sustainable development[19]. Even as gender disparities in education are reduced, other gender differences tend to persist in labour market opportunities, legal rights, and the ability to participate in public life and decision making.

Pro-female policies, are supposed to be natural elements of a pro-poor growth strategy. Among the links between gender equality and growth, investment in human capital is vital. Investment in human capital, especially girls' and women's education and health, raises productivity. When women work and are well-paid, parents may decide they need fewer boys to support them in old age, and if a mother works for reasonable wages, the opportunity cost of bearing an additional child is relatively high. Educated, healthy women are more able to engage in productive activities, find formal sector employment, earn higher incomes and enjoy greater returns on schooling than are uneducated women who suffer from poor nutrition and health, or are victims of domestic violence. In addition, educated women give greater emphasis to schooling their own children, thereby improving productivity of the next generation. Increased access for women to productive assets and resources, such as land or agricultural inputs, also raises their productivity. When a country educates both its girls and boys, economic productivity tends to raise, maternal and infant mortality usually fall, fertility rates decline and the health and educational prospects of the next generation are improved.

Minority ethnic groups are often discriminated in the developing world. They have no access to public services, live in underdeveloped rural areas, and do not participate in public life. Public funds may be directed to the whole population and not only the big majority[20]. Programs especially designed for minority ethnic groups are crucial to integrate these vulnerable groups in the society. Public action

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[19] The Millennium Development Goals (MDGs) on gender equality include three indicators: literacy rates, the share of women working in non-agricultural jobs, and the proportion of seats women hold in national parliaments.

[20] *Easterly* and *Levine* (1997) studied Africa's ethnic issues and found support for theories that argue that interest group polarization leads to rent-seeking behaviour and reduces the consensus for public goods.

and policies should promote integration of these minorities and implement special programs for them in order to reduce poverty, improve income distribution and generate pro-poor growth. For instance, Keefer and Khemani (2003) point out three pro-poor policy challenges: (i) decentralization of responsibilities for the provision of local public goods and services to the level of locally elected village and municipal governments; (ii) greater autonomy of decision-making at the level of service providers such as schools and clinics; and (iii) greater participation of all kind of citizens through community based organizations such as parent-teacher associations and health committees. These pro-poor policies would be also pro-growth if they facilitate efficiency gains in the provision of public infrastructure and services.

III. Macro policies and institutions

On the macro side there are less specific challenges for a pro-poor growth strategy. Aggregate price stability seems to be one of the cornerstones of a successful pro-growth strategy. The same is true with, and of course highly related to, stable public finances and realistic exchange rates.

Low inflation, sustainable budget deficits, and realistic exchange rates are key factors for a good investment climate, job creation, and poverty reduction. High inflation and volatile real exchange rates are particularly harmful for those with fixed incomes, and local currency and assets. Rich people are more likely to have better access to credit, better access to dollar accounts than poor people, so that, balance of payments crises hurts the poor proportionately more than the rich. Achieving stable macroeconomic policy was the focus of much policy attention during the oil crises of the 1970s and the debt and related financial crises of the 1980s.

Macroeconomic policy should aim for stability, which would reduce the likelihood of such financial, fiscal and balance of payments crises. Some empirical studies found that high inflation hurts economic growth, and tends to worsen income distribution and increase poverty. Macroeconomic instability is negatively associated to the income of the poor. In addition, unstable inflation and volatile relative prices reduce the information content of price signals and finally distorts the efficiency of resource allocation, which may have a negative effect on growth of total factor productivity.

Regarding fiscal policy, large budget and current deficits will eventually lead to a crisis in which the poor will suffer disproportionately (*World Bank,* 2000). Governments should aim for low deficits, which may support macroeconomic stability and avoid disruptions and distortions for financial markets, all of which tend to hurt the poor disproportionately. Keeping the fiscal deficit constant, larger government expenditures imply the need for additional revenues. Thus, through taxation and its adverse effects on the efficiency of resource allocation it would be expected to reduce the rate of growth, which would be harmful to the poor.

On the other hand some government spending may be cut, such as public expenditures on health and education. There are considerable disagreements, however, on the precise optimal mix between tax increases and expenditure cuts, on the extent of fiscal tightening during stabilisation, and on what size of budget is low enough (*Klasen,* 2003). Reducing the burden of government could affect the quality of public services in health or education, which may have negative impact on the poor.

Monetary and exchange rate policy must also be coordinated to ensure low inflation and competitive exchange rates (*Easterly* and *Fischer,* 2000). Governments should avoid an overvalued exchange rate as it destroys efforts to boost exports, and it generates a crisis of balance of payments. An overvalued real exchange rate is typically anti-poor as the rich may have a much higher propensity to import (*Klasen,* 2003).

The following is a summary of pro-poor policy guidelines, which should be included in a poverty reduction strategy:

- Achieve a low fiscal deficit and sustainable public debt, congruent with sustainable economic growth and a prudent monetary policy, ensuring that it is financed, in a manner that avoids inflationary pressures.

- Rationalize public expenditures, giving priority to those affecting directly the poor people, such as education, health, and infrastructures.

- Increase efforts to improve tax administration and maintain tax collecting, which should permit payments for social public expenditures. Special emphasis should be given to enlarging the base for income taxes, reducing the number of exonerations for all taxes, and favouring poor households.

- Assure a competitive exchange-rate system, as a key factor for medium-term sustainability of the balance of payments, and a prudent management of the foreign debt.

Good governance is the most important institutional prerequisite for pro-poor growth, as it is for growth in general. A particular pro-poor perspective comes from policies of decentralizing the power of public institutions. The interest of making the institutions respond much more to the interests of the poor may conflict with the capacities of developing countries to secure good governance even at the sub-national level.

Good governance and institutional development is essential for stimulating economic growth and achieving poverty reduction. Transparent and clear rules provide an appropriate climate to attract private investment. Improving governance and institutions require consolidation of the rule of law, strengthening justice and personal security, greater transparency and efficiency in public expenditures, promotion of democracy, and modernization and decentralization of the public administration. Poor governance, corruption, and political instability damage investment, growth, and poverty reduction. There is a new focus on improving governance by

strengthening the state's democratic accountability, and the role of civil society in monitoring governance and state performance.

As indices of government institution's quality, the literature provides different measures. *Kaufmann* et al. (2003) find a strong positive correlation between their aggregate governance measure and the logarithms of GDP per capita in 2001. Good governance is a pre-requisite to attacking poverty in a developing country and influencing the efficiency of pro-poor policies. Countries with poor institutions are more likely to have high inequality and low-quality institutions, and are often associated with wasteful redistribution toward the rich (*Gradstein,* 2003, *Chong* and *Gradstein,* 2004a, b). Some studies indicate that social polarization negatively affects institutional quality and thereby slows growth (*Keefer* and *Knack,* 2002). In addition, the quality of institutions affects not only economic growth but also the implementation of poverty reduction strategies. It is argued that, while income inequality may cause negative effects on the quality of institutions, the reverse holds as well, so that poor and low-quality institutions result in a higher degree of inequality. The empirical works based on cross-country analyses show that policy biases in favour of the rich, income inequality and poor and low-quality institutions may reinforce each other (*Chong* and *Gradstein,* 2004a, b).

IV. Country experiences

We next summarize the results from the 14 OPPG country case studies[21] with respect to successful policies for pro-poor growth. *Table 2* reveals a high degree of country-specificity. For most Sub-Saharan countries, macro stability and an adequate investment climate, together with both human and physical capital investments appears to be the most successful pro-poor growth policy mix. In these countries, rural development seems to play a crucial role for economic growth and poverty reduction. Alternatively, in Latin American and Caribbean countries, labor market reforms, together with investments in human capital and infrastructure seem to be the most effective pro-poor growth policy package. For East Asia and Pacific countries, good governance emerges as an essential factor to implement pro-poor growth policies and like in other regions, investment in human capital and infrastructure was crucial for pro-poor growth experiences. For the reminding regional areas we do not have enough country experiences to draw policy implications. All together, we can conclude from these country case experiences:

- We find a high degree of country-specificity, what in turn confirms that country case research is an appropriate way to understand pro-poor growth experiences.

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[21] We report only the 13 available Country Case Studies on Vietnam, Bangladesh, Indonesia, India, Tunisia, Ghana, Zambia, Uganda, Burkina Faso, Romania, Bolivia, El Salvador, and Brazil).

Table 2: **Pro-poor growth policy recommendations**

	India	Bolivia	Vietnam	El Salvador	Brazil	Bangladesh	Indonesia	Romania	Tunisia	Burkina Faso	Zambia	Uganda	Ghana
Macro Policy													
Macro stability (8/13)		+	+	+		+				+	+	+	+
Financial System Reform (4/13)	+	+				+				+			
Tax System Reform (5/13)		+				+	+	+		+			
Institutional changes													
Good Governance (4/13)	+		+				+						+
Democratization (3/13)				+			+			+			
Decentralization (4/13)			+				+					+	+
Competition policy (2/13)			+				+						
Sector & Regional policies													
Agriculture Development (6/13)	+	+				+		+			+		+
Non-farm Development (7/13)		+	+	+		+		+		+	+		
Rural Infrastructure (8/13)		+	+	+		+		+		+	+		+
Private Sector Development (6/13)			+			+		+		+	+	+	
Factor Policies													
Population Policy (5/13)					+	+			+	+		+	
Labor Market Reform (4/13)		+			+		+		+				
Human Capital Development (12/13)	+		+	+	+	+	+	+	+	+	+	+	+
Land Reform (3/13)	+					+		+					
General Infrastructure (11/13)		+	+	+	+	+	+	+		+	+	+	+
Pro-poor Policies													
Safety Nets and Tranfers (4/13)		+				+					+	+	
Gender policy (4/13)			+	+					+	+			
Ethnic policy (2/13)		+	+										

Source: OPPG case studies.

- Macro stability together with public investment in both human and physical capital emerges as the most efficient policy instrument to promote simultaneously growth and poverty reduction.

- Pro-poor policies, such as safety nets and transfers, and targeted interventions in favour of women and ethnic minorities are only rarely recognized as successful pro-poor growth policy instruments. This could mean, that they have been inefficiently implemented or that there is a lack of data to prove their effectiveness.

E. How to prioritize pro-poor growth policies?

Given the high degree of country specificity on the one side and on the other side the financial and administrative constraints which national government and international donors face in the implementation of pro-poor growth policy packages, there emerges the problem of prioritizing adequate policy instruments. The problem of prioritizing becomes the more important the more pro-poor growth is considered as a comprehensive strategy which aims at obtaining various goals with a broad variety of possible policy instrument under the particular political and institutional conditions of a given country. We see two approaches which can be helpful for policy makers in dealing with the problem of prioritizing. Both approaches are highly complementary where the first one, the (pro-poor) growth diagnosis approach, offers a framework for identifying the most binding constraints to growth and poverty reduction in a particular country context, while the second one, the (poverty reduction and growth) BMA approach aims at determining empirically the most powerful instruments in overcoming these constraints.

Hausmann et al. (2005) and *Rodrik* (2004) have recently suggested a growth diagnosis approach (GDA). It is based on the idea that one should identify the most binding constraints to economic growth through a decision tree or "diagnosis process", which would help policy makers to match automatically constraints and pro-growth policies to remove them. GDA should help economists, policy advisors and government officials with specific solutions to specific constraints rather than provide a large list of policy recommendations, as the Washington and or the Post-Washington Consensus do. We think that it is natural to extend GDA towards a pro-poor growth diagnosis approach (PPGDA), which represents an attempt to provide specific policy packages to remove the core pro-poor growth constraints in developing countries. Our proposal of PPGDA is based on the identification of five core constraints to pro-poor growth. The first three core constraints, that we call pro-growth constraints, are similar to those proposed by *Rodrik* (2004) and *Hausmann* et. al. (2005): (i) the low return to investment; (ii) the high cost of financing; and (iii) the low appropriability of returns. As we are also concerned with pro-poor growth we add two particular pro-poor constraints, which we find the most binding: (iv) the lack of access for poor people to goods and services; and (v) the high vulnerability of the poor due to instability, insecurity, and discrimination.

Single policy measures can now be attributed to the five single constraints as it is demonstrated in *Table 3*. Quite naturally, some policy measures can be helpful to overcome several pro-poor growth constraints. On the basis of this PPGDA framework politicians and advisers could now prioritize by identifying the most binding constraints to pro-poor growth in a particular country. Not only purely economic considerations, but also non-economic aspects, like institutional, socio-political, and ideological endowments will determine the outcome of this process. PPGDA not only structures the decision making on prioritized policy packages but also makes this decision making much more transparent for all stake-holders.

Table 3

A framework for pro-poor growth diagnostics

PRO-POOR GROWTH DIAGNOSTICS			AREAS OF POSSIBLE PRO-POOR GROWTH POLICY RECOMMENDATION
PRO-GROWTH CONSTRAINTS	PRO-GROWTH CON-STRAINTS	LOW RETURN TO INVESTMENT	Infrastructure Policy R+D Policy Human Capital Policy Rural Development Policy Land Reform Trade Liberalization and Exchange Rate Policy Labor Market Reform Promotion of Small and Medium Enterprises Urbanisation Policy
		HIGH COST OF FINANCING	Financial and Tax Reform Macroeconomic Stabilisation Investment-oriented Credit Provision Policy
		LOW APPROPRIABILITY	Legal Reform and Enforcement of Property Rights Tax Reform Democratization, Decentralization and Anti-Corruption Policy Land Reform Privatization and Competition Policy
	PRO-POOR CON-STRAINTS	LACK OF ACCESS TO GOODS AND SERVICES	Land Reform Public Housing Policy Education, Health, and Nutrition Policy Democratization, Decentralization and Anti-Corruption Policy Cohesion and Infrastructure Policy
		HIGH VULNERABILITY (INSTABILITY, INSECURITY, AND DISCRIMINATION)	Safety Nets and Social Legal Reform and Enforcement of Property Rights Macroeconomic Stabilisation Natural Disaster Prevention Policy Gender Policy Ethnic and Migration Policy Democratization, Decentralization and Anti-Corruption Policy

3*

Empirical studies which tried to evaluate the effectiveness of growth-promoting policies have always suffered from a considerable degree of parameter and model uncertainty. These problems have led some authors (*Brock* and *Durlauf,* 2001; *Brock* et. al., 2003) to proclaim the necessity of policy-relevant empirical analysis on the basis of Bayesian econometric methods. In particular, Bayesian Model Averaging (BMA) has been applied successfully by *Masanjala* and *Papageorgiou* (2004) in order to distinguish African's particular growth determinants related to those in the rest of the world. A first attempt to apply the BMA framework to empirically analyze the sources of poverty reduction and pro-poor growth can be found in *Klump* and *Prüfer* (2005). In this paper, survey data for 61 Vietnamese provinces are used to evaluate the relative effectiveness of 35 policy instrument variables, both with regard to poverty reduction and to growth. Those variables with a high effectiveness in both areas over a cross-section of provinces, such as the reduction in the birth rate, the implementation of the land reform or the promotion of the private sector, can then be regarded as important elements of a comprehensive pro-poor growth policy package in Vietnam.

F. Summary and conclusions

The overview has shown that the theoretical model of pro-poor growth as well as the adequate measurement concepts and the necessary policy recommendations are still highly debated. In the near future this debate will include the following key issues:

- Should pro-poor growth be interpreted more narrowly as "shared growth" or more broadly as "pro-poor development"? The new World Development Report (2006) on "Equity and Development" will presumably stimulate this discussion.

- Should the measurement of pro-poor growth rely on very complex indicators, such as PRRG or PEGR, or on rather simple measures, for instance, the mean of growth rates over all quantiles which would be equivalent to the equal-weighted growth rates proposed by Klasen (2004)?

- Are there other and better approaches to improve the prioritizing of pro-poor growth instruments? We proposed an extension of the DGA and the BMA frameworks, but there may be other promising ways of how to best select a country-specific policy mix for achieving high growth with significant poverty reduction.

After all, the discussion about pro-poor growth has underlined the necessity to find a new balance between an orthodox neoclassical strategy of growth-promotion and more country-specific and more comprehensive approaches to economic development. This is not only in line with the Post-Washington Consensus but also with the latest turn in the new growth theory where the search for "deep" sources of growth has brought back geography, institutions and history on the agenda

(*Weil,* 2005). However, one should recognize that these other factors supplement our standard (neoclassical) knowledge of economic development and do not replace it by a completely new theoretical paradigm. This may explain why some critical observers do not really see a difference between the old and the new era. In particular PRSPs are questioned because they seem to continue the earlier much criticized SAPs. They are said to contain some of the customary traits of the SAPs, starting with the emphasis on growth at the expense of redistribution. And as most PRSPs contain the same components in almost all countries, there must be a preconceived model of development which countries are made to follow, irrespective of their various and differing needs (*Hermele,* 2005).

For a German audience this debate may sound well-known. The German Historical Schools of the 19th and early 20th century had already gained rich insights into the country-specificity of growth at different stages of development. But they also demonstrated the limits of every "holistic" approach. When they abandoned a generally valid and applicable economy theory and replaced it by a space and time dependent theory of economic styles and stages they were unable to react reasonably to new and unforeseen challenges, they lost their influence on economic policy and could not prevent the emergence of major economic and political crises. The same could possibly happen if the concept of pro-poor growth were taken too far so that the individual country diagnosis and therapy became the key element and no more general economic laws were recognized. The fear of such a scenario may have prevented the international donor community, and in particular the multilateral financial institutions, to rely more seriously on true strategies of pro-poor growth.

There may be hope, however, for a scenario somewhere in the middle between the two extremes. As some of the recent case studies have shown, it is difficult, but not impossible to improve the effectiveness of traditional development economics with regard to growth and poverty reduction by putting it in a more comprehensive and country-specific context. Pro-poor growth in this sense means a pro-growth agenda which respects the geographical, historical and institutional context of a country and makes use of this context to make the most efficient use of all available resources and in particular the resources of the poor. This makes it necessary to further develop and discuss the appropriate measurement concepts and most efficient policy recommendations.

References

Adams, J. R. (2004): "Economic Growth, Inequality and Poverty: Estimating the Growth Elasticity of Poverty", World Development, Vol. 32 (12), pp.: 1989 – 2014.

Ahluwalia, M. S. / *Chenery,* H. (1974): "Redistribution with Growth". Oxford: Oxford University Press.

Alesina, A. / *Perotti,* R. (1994): "The political economy of growth: a critical survey of the recent literature", World Bank Economic Review, Vol. 8 (3), pp.: 351 – 371.

Alesina, A. / Rodrik, D. (1994): "Distributive Politics and Economic Growth", Quarterly Journal of Economics, Vol. 109 (2), pp.: 465 – 490.

Aryeetey, E. / McKay, A. (2004): "Operationalizing Pro-poor Growth: A Country Case Study on Ghana". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcasestudies. asp.

Auerbach, P. / Genoni, M. E. / *Pagés,* C. (2005): "Social Security Coverage and the Labor Market in Developing Countries", Paper presented at the Annual Bank Conference on Development Economics (ABCDE) in Amsterdam on 23 – 24th , May 2005.

Ayadi, M. / Boulila, G. / *Lahouel,* M. M. / *Montigny,* P. (2004): "Pro-poor Growth in Tunisia". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcasestudies.asp.

Behrman, J. R. / Birdsall, N. / *Székely,* M. (2000): "Economic Reform and Wage Differentials in Latin America", Working Paper No. 435. Inter-American Development Bank (IADB), Research Department: Washington D.C.

Besley, T / Burgess, R. / *Esteve-Volart,* B. (2004): "Operationalizing Pro-Poor Growth: A Country Case Study on India". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcasestudies.asp.

Bloom, D. / Canning, D. E. / *Sevilla,* J. (2001): "Health, Human Capital, and Economic Growth", WHO's Working Paper No. 8 (WG1). Geneva: Commission on Macroeconomics and Health.

Bloom, D. / Canning, D. E. / *Sevilla,* J. (2004): "The Effect of Health on Growth: A Production Function Approach". World Development, 32 (1), pp.: 1 – 13.

Bonschab, T. / Klump, R. (2004): "Operationalizing Pro-Poor Growth: A Country Case Study on Vietnam". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcasestudies.asp.

Bourguignon, F. (2003): "The Growth Elasticity of Poverty Reduction: Explaining Heterogeneity Across Countries and Time Periods", in: T. Eicher and S. Turnovsky, eds. "Inequality and Growth: Theory and Policy Implications". Cambridge: The MIT Press.

Bourguignon, F. (2004): "The Poverty-Growth-Inequality Triangle". Paper presented at the Indian Council for Research on International Economic Relations, New Delhi.

Brock, W. A. / Durlauf, S. N. (2001): "Growth Empirics and Reality? What have we learned from a decade of Empirical Research on Growth?". World Bank Economic Review, Vol. 15, 229 – 272.

Brock, W. A. / Durlauf, S. N. / *West,* K. D. (2003): "Policy Analysis in uncertain Economic Environments". NBER Working Paper No. 10025, National Bureau or Economic Research (NBER), Cambridge (MA).

Bruno, M. / Ravallion, M. / *Squire,* L. (1996): "Equity and Growth in Developing Countries: Old and new Perspectives on the Policy Issues", Policy Research Working Paper No. 1563, World Bank: Washington D.C.

Byerlee, D. / Jackson, C. / *Timmer,* P. / *Nayak,* R. (2005): "Pro-poor Growth and Agriculture". This paper was prepared in the context of the "Operationalizing Pro-poor Growth" work program. World Bank: Washington D. C.

Chong, A. / Gradstein, M. (2004a): "Inequality and Institutions", Research Department Working Paper No. 506, Inter-American Development Bank (IADB): Washington D.C.

Chong, A. / *Gradstein,* M. (2004b), "Inequality, Institutions, and Informality", Research Department Working Paper No. 516, Inter-American Development Bank (IADB): Washington D.C.

Cord, L. (2005): "Pro-poor growth in the 1990s: Lessons and insights form 14 countries", Operationalizing Pro-Poor Growth Research Program, World Bank: Washington, D.C.

Datt, G. / *Ravallion,* M. (1995): "Growth and Poverty in Rural India", Policy Research Working Paper No. 1405, World Bank: Washington D.C.

Datt, G. / *Ravallion,* M. (1996): "Why Have Some Indian States Done Better Than Others at Reducing Poverty?", Policy Research Working Paper No. 1594. World Bank: Washington D.C.

Datt, G. / *Ravallion,* M. (1998): "Why Have Some Indian States Done Better than Others at Reducing Rural Poverty?", Economica, New Series, Vol. 65 (No. 257), pp.: 17 – 38.

Datt, G. / *Ravallion,* M. (2002): "Is India's Economic Growth Leaving the Poor Behind?", Journal of Economic Perspectives, Vol. 16 (3), pp.: 89 – 108

De Janvry, A. / *Sadoulet,* E. (2000): "Growth, Poverty, and Inequality in Latin America: A casual Analysis, 1970 – 1994", Review of Income and Wealth, Series 46 (No. 3), pp.: 267 – 287.

Deaton, A. (2001a): "Counting the World's Poor: Problems and possible Solutions", The World Bank Research Observer, Vol. 16 (2), pp.: 125 – 147, Oxford University Press: Washington D.C.

Deaton, A. (2001b): "Health, Inequality, and Economic Development", WHO's Working Paper No. 3 (WG1), Commission on Macroeconomics and Health: Geneva

Deininger, K. / *Squire* L. (1998): "New Ways of Looking at Old Issues: Inequality and Growth". Journal of Development Economics, Vol. 57, pp.: 259 – 287.

Devarajan, S. / *Swaroop,* V. / *Zou,* H. (1996): "The Composition of Public Expenditure and Economic Growth", Journal of Monetary Economics, Vol. 37 (2 – 3), pp.: 313 – 344

Dollar, D. / *Kraay,* A. (2002): "Growth is Good for the Poor", Journal of Economic Growth, Vol. 7 (3), pp.: 195 – 225.

Easterly, W. (1999): "Life during Growth". Journal of Economic Growth, Vol. 4 (3), pp.: 239 – 276.

Easterly, W. (2001): "The Middle Class Consensus and Economic Development". Journal of Economic Growth, Vol. 6 (4), pp.: 317 – 335.

Easterly, W. / *Fischer,* S. (2000): "Inflation and the poor". Policy Research Working Paper No. 2335. Washington D.C.: The World Bank.

Easterly, W. / *Levine,* R. (1997): "Africa's Growth Tragedy: Policies and Ethnic Divisions", The Quarterly Journal of Economics, Vol. 112 (4), pp.: 1203 – 1250.

Eastwood, R. / *Lipton,* M. (1999): "The Impact of Human Fertility on poverty", Journal of Development Studies, Vol. 31 (1), pp.: 1 – 30.

Eastwood, R. / *Lipton,* M. (2000), "Pro-poor Growth and Pro-Growth Poverty Reduction: Meaning, Evidence and Policy Implications", Asian Development Review, Vol. 18 (No. 2), pp.: 22 – 58.

Fan, S. / *Hazell,* P. / *Thorat,* S. (1999): "Links between Government Spending, Growth, and Poverty in Rural India", Research Report No. 110. Washington D.C.: IFPRI.

Fan, S. / Hazell, P. / Thorat, S. (2000): "Government Spending, Agricultural Growth, and Poverty in Rural India", American Journal of Agricultural Economics, Vol. 82 (4), pp.: 1038–1051.

Fan, S. / Zhang, L. / Zhang, Z. (2000): "Growth and Poverty in Rural China: The Role of Public Investments", Environment and Production Technology Division Discussion Paper No. 66. Washington D.C.: IFPRI. Available at: http://www.ifpri.org/divs/eptd/dp/papers/eptdp66.pdf.

Fan, S. / Zhang, L. / Zhang, Z. (2004): "Reforms, Investment, and Poverty in Rural China", Economic Development and Cultural Change, Vol. 52 (2), pp.: 395–421.

F.A.O. (2002): "Land Tenure and Rural Development". Land Tenure Studies No. 3. Rome: F.A.O.. Available at: ftp://ftp.fao.org/docrep/fao/005/y4307E/y4307E00.pdf.

Foster, J. / Greer, J. / Thorbecke, E. (1984): "A class of decomposable poverty measures". Econometrica Vol. 52 (3), pp.: 761–766.

Gheorghiu, R. / Paczynski, W. / Radziwill, A. / Sowa, A. / Stanculescu, M. / Topinska, I. / Turlea, G. / Walewski, M. (2004): "Operationalising Pro-poor Growth: A Case study on Romania". Available at: http://www.dfid.gov.uk/news/files/propoorgrowthcasestudies.asp.

Gradstein, M. (2003): "Governance and Economic Growth", Policy Research Working Paper No. 3098. Washington D.C.: The World Bank.

Grimm, M. / Gunther, I. (2004): "Operationalizing Pro-poor Growth: A Case Study on Burkina Faso". Available at: http://www.dfid.gov.uk/news/files/propoorgrowthcasestudies.asp.

Hausmann, R. / Rodrik, D. / Velasco, A. (2005): "Growth Diagnostics". Available at: http://ksghome.harvard.edu/~drodrik/barcelonafinalmarch2005.pdf.

Hermele, K. (2005): "The Poverty Reduction Strategies: A Review of the Literature", Working Paper, Forum Syd, Stockholm.

Hoff, K. / Stiglitz, J. E. (1990): "Introduction: Imperfect Information and Rural Credit Market: Puzzles and Policy Perspectives", The World Bank Economic Review, 4 (No. 3), pp.: 235–251.

Kakwani, N. / Khandker, S. / Son, H. H. (2004): "Pro-Poor Growth: Concepts and Measurement with country Case Studies", Working Paper No. 1. Brasilia: UNDP International Poverty Centre (IPC). Available at: http://www.undp.org/povertycentre/newsletters/WorkingPaper1.pdf.

Kakwani, N. / Pernia, E. (2000): "What is Pro-poor Growth?", Asian Development Review, 18 (1), pp.: 1–16.

Kaufmann, D. / Kraay, A. / Mastruzzi, M. (2003): "Governance Matters III: Governance Indicators for 1996–2002", World Bank's Working Paper No. 3106. The World Bank: Washington D.C

Keefer, P. / Khemani, S. (2003): "Democracy, Public Expenditures, and the Poor", Policy Research Working Paper No. 3164. Washington D.C.: The World Bank

Keefer, P. / Knack, S. (2002): "Social Polarization, Political Institutions, and Country Creditworthiness", Policy Research Working Paper No. 2920. The World Bank: Washington D.C.

Klasen, S. (2003): "In Search of the Holy Grail: How to Achieve Pro-poor Growth?", Ibero-America Institute for Economic Research (IAI) Discussion Paper NB0 96. Washington: WUSTL. Available at: http: // econwpa.wustl.edu / eps / mac / papers / 0401 / 0401005.pdf.

Klasen, S. (2004), "In Search of the Holy Grail: How to Achieve Pro-poor Growth?", in Krakowski (ed.), Attacking Poverty: What Makes Growth Pro-poor?, Baden-Baden: Nomos Verlagsgesellschaft.

Klasen, S. / *Grosse,* M. / *Thiele,* R. / *Lay,* J. / *Spatz,* J. / *Wiebelt,* M. (2004): "Operationalizing Pro-poor Growth: A Case Study on Bolivia". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcasestudies.

Klump, R. / *Menkhoff,* L. (1995): "Die Wirtschaftswunder in Ostasien – Eine Suche nach Erklärungen", IFO-Studien, Vol. 41, pp.: 271 – 287.

Klump, R. / *Prüfer,* P. (2005): "How to prioritise policies for poverty reduction: Applying Bayesian Model Averaging (BMA) to Vietnam", Working Paper, University of Frankfurt.

Klump, R. / *Tenguz,* A. (2005): "Strategies of the state towards the informal economy", Paper presented at the WIDER 2005 Conference.

Lopez, H. (2004): "Pro-Growth, Pro-Poor: Is there a Trade-off?", Policy Research Working Paper No. 3378, Washington D.C.: The World Bank.

Lundberg, M. / *Squire,* L. (2003): "The Simultaneous Evolution of Growth and Inequality", The Economic Journal, 113 (April), pp.: 326 – 344.

Marques, J. (2004): "Operationalizing Pro-poor Growth: A Case Study on El Salvador". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcasestudies.asp.

Masanjala, W. H. / *Papageorgiou,* C. (2004): "The Solow Model with CES Technology: nonlinearities and parameter heterogeneity", Journal of Applied Econometrics, Vol. 19 (2), pp.: 171 – 201.

McCulloch, N. / *Baulch,* B. (1999): "Assessing the Poverty Bias of Growth Methodology and an Application to Andhra Pradesh and Uttar Pradesh", Working Paper No. 98. Brighton: University of Sussex.

Menezes-Filho, N. / *Vasconcellos,* L. (2004): "Operationalizing Pro-poor Growth: A Case study on Brazil". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcase-studies.asp.

Miralles, C. A. (2005): "Pro-poor Growth and Pro-poor Policies", Diploma Thesis, University of Frankfurt.

O.E.C.D. (2001): "Rising to the Global Challenge: Partnership for Reducing World Poverty", statement by the Development Assistance Committee (DAC) High Level Meeting, April 25 – 26th, Paris.

Okidi, J. A. / *Ssewanyana,* S. / *Bategeka,* L. / *Muhumuza,* F. (2005): "Operationalizing Pro-poor Growth: A Case Study on Uganda". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcasestudies.asp.

Persson, T. / *Tabellini,* G. (1994): "Is Inequality Harmful for Growth?", American Economic Review, Vol. 84 (3), pp.: 600 – 621.

Preston, S. H. (1975): "The Changing Relation between Mortality and Level of Economic Development", Population Studies, Vol. 29 (No. 2), pp.: 231 – 248.

Ravallion, M. (1995): "Growth and Poverty: Evidence for the Developing World", Economics Letters, Vol. 48 (3 – 4), pp.: 411 – 417.

Ravallion, M. (1996): "Issues in Measuring and Modelling Poverty", The Economic Journal, Vol. 106 (No. 438), pp.: 1328 – 1343.

Ravallion, M. (1997): "Can high-inequality developing countries escape absolute poverty?", Economics Letters, Vol. 56 (1), pp.: 51 – 57.

Ravallion, M. (1998): "Poverty Lines in Theory and Practice", Living Standards Measurement Study Working Paper No. 133. Washington D.C.: The World Bank.

Ravallion, M. (2001): "Growth, Inequality and Poverty: Looking Beyond Averages", World Development, Vol. 29 (No. 11), pp.: 1803 – 1815.

Ravallion, M. (2002): "Inequality Convergence", Policy Research Working Paper No. 2645. Washington D.C.: The World Bank.

Ravallion, M. (2004): "Pro-poor Growth: A Primer", Policy Research Working Paper No. 3242. Washington D.C.: The World Bank.

Ravallion, M. / *Chen,* S. (2003): "Measuring pro-poor growth", Economics Letters, 78 (1), pp.: 93 – 99.

Ravallion, M. / *Datt,* G. (1995): "Growth and Poverty in Rural India", Policy Research Working Paper No. 1405. Washington D.C.: The World Bank.

Ravallion, M. / *Datt,* G. (1996): "How Important to India's Poor is the Sectoral Composition of Economic Growth?", World Bank Economic Review, Vol. 10 (1), pp.: 1 – 25.

Ravallion, M. / *Datt,* G. (1999): "When Is Growth Pro-poor? Evidence from the Diverse Experiences of India's States", Policy Research Working Paper No. 2263. Washington D.C.: The World Bank.

Ravallion, M. / *Datt,* G. (2002). "Why has Economic Growth been more Pro-poor in Some States of India than Others?", Journal of Development Economics, 68, pp.: 381 – 400.

Reddy, S. G. / *Pogge,* T. W. (2003): "How not to count the poor". Institute of Social Analysis", Technical Paper. New York City: Columbia University. Available at: www.socialanalysis.org.

Rodrik, D. (2002): "After Neoliberalism, What?", Paper presented at the Alternatives to Neoliberalism Conference, in Washington D.C., May 23, 2002. Available at: http: // www.newrules.org / docs / afterneolib / rodrik.pdf.

Rodrik, D. (2004): "Rethinking Growth Strategies", WIDER Annual Lecture 8, UNU-WIDER: Stockholm.

Sen, A. (1976). "Poverty: An Ordinal Approach to Measurement". Econometrica. Vol. 44 (2), pp.: 219 – 231.

Sen, A. (1992): "Inequality Reexamined", Harvard University Press, Cambridge: Massachusetts.

Sen, B. (2004): "Operationalizing Pro-Poor Growth: A Country Case Study on Bangladesh". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcasestudies.asp.

Son, H. H. / *Kakwani,* N. (2004), "Economic Growth and Poverty Reduction: Initial Conditions Matter", Working Paper No. 2. Brasilia D. F.: UNDP International Poverty Centre (IPC).

Srinivasan, T. N. (2001a): "Comment on Counting the World's Poor by Angus Deaton". World Bank Research Observer. Vol. 16 (2), pp.: 157–168.

Srinivasan, T. N. (2001b): "Growth and Poverty Alleviation: Lessons from Development Experience", Working Paper Series, No. 17. Tokyo: Asian Development Bank Institute.

Stiglitz, J. E. (1998): "More Instruments and Broader Goals: Moving toward the Post-Washington Consensus", World Institute for Development Economics Research (WIDER) Annual Lecture. Helsinki: United Nations University Press.

Thurlow, J. / *Wobst,* P. (2004): "Operationalizing Pro-poor Growth: A Country Case Study on Zambia". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcasestudies. asp.

Timmer, C. P. (2004): "Operationalizing Pro-Poor Growth: A Country Case Study on Indonesia". Available at: http: // www.dfid.gov.uk / news / files / propoorgrowthcasestudies.asp.

U.N. (2000), "United Nations Millennium Declaration". New York: United Nations.

U.N. (2001): "Road map towards the implementation of the United Nations Millennium Declaration". New York: United Nations. Available at: www.un.org / millenniumgoals /.

U.N.D.P. (1997): "Human Development Report 1997: Human Development to Eradicate Poverty". New York: Oxford University Press.

U.N.D.P. (2003): "Human Development Report 2003: Millennium Development Goals: A compact among nations to end human poverty". New York: Oxford University Press.

Watts, H. (1968): "An Economic Definition of Poverty", in D.P. Moynihan (ed.) On Understanding Poverty. Basic Books, New York

Weil, D. N. (2005): "Economic Growth", New York: Pearson.

White, H. / *Anderson,* A. (2001): "Growth vs. Redistribution: Does the Pattern of Growth Matter?, Development Policy review, Vol. 19 (3), pp.: 167–289.

Williamson, J. (1990): "What Washington Means by Policy Reform", Chapter 2 in J. Williamson (ed.), "Latin American Adjustment: How Much Has Happened?". Washington D.C.: Institute of International Economics.

World Bank (1990): "WDR: Poverty". New York: Oxford University Press.

World Bank (1993): "The East Asian Miracle: Economic Growth and Public Policy". New York: Oxford University Press.

World Bank (2000). "WDR: Attacking Poverty". New York: Oxford University Press.

World Bank (2002). "A Sourcebook for Poverty Reduction Strategies". New York: Oxford University Press.

World Bank (2004): "WDR: Making Services Work for Poor People". New York: Oxford University Press.

World Bank (2005): "WDR: A Better Investment Climate for Everyone". New York: Oxford University Press.

World Bank (2006): "WDR: Equity and Development", upcoming in September 2005.

Zagha, R. (2005): "Economic growth in the 1990s: Learning form a decade of reform", Washington, D.C.: The World Bank.

Zheng, B. (1993): "An Axiomatic Characterization of the Watts Poverty Measure", Economics Letters, Vol. 42 (1), pp.: 81–86.

Appendix: Assumptions for the simulation of pro-poor growth scenarios
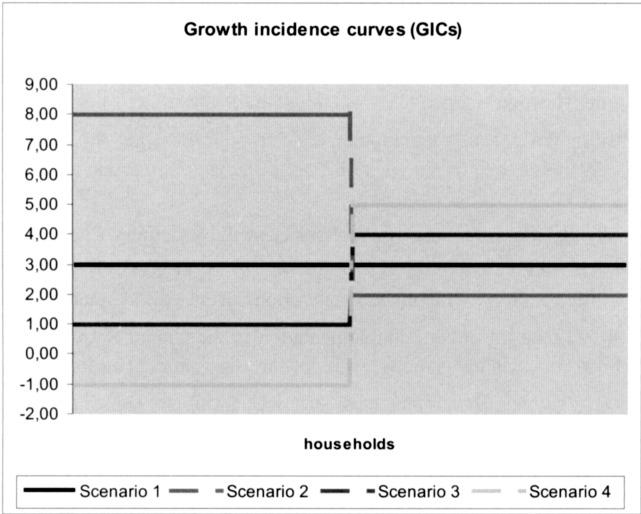
Scenario 1: mean income growth rate of the poor equal to the mean income growth rate of the non-poor

Scenario 2: mean income growth rate of the poor higher than mean income growth rate of the non-poor (real pro-poor growth)

Scenario 3: mean income growth rate of the poor lower than mean income growth rate of the non-poor (trickle down growth)

Scenario 4: negative mean income growth rate of the poor combined with a positive mean income growth rate of the non-poor (immiserizing growth)

House- holds	Initial income (Economy A)	Initial income (Economy B)	Scenario 1 %	Scenario 2 %	Scenario 3 %	Scenario 4 %
1	0,50	0,75	3,00	8,00	1,00	−1,00
2	0,50	0,75	3,00	8,00	1,00	−1,00
3	0,50	0,75	3,00	8,00	1,00	−1,00
4	0,50	0,75	3,00	8,00	1,00	−1,00
5	0,50	0,75	3,00	8,00	1,00	−1,00
6	0,50	0,75	3,00	8,00	1,00	−1,00
7	0,50	0,75	3,00	8,00	1,00	−1,00
8	0,50	0,75	3,00	8,00	1,00	−1,00
9	0,50	0,75	3,00	8,00	1,00	−1,00
10	0,50	0,75	3,00	8,00	1,00	−1,00
11	0,50	0,75	3,00	8,00	1,00	−1,00

House-holds	Initial income (Economy A)	Initial income (Economy B)	Scenario 1 %	Scenario 2 %	Scenario 3 %	Scenario 4 %
12	0,50	0,75	3,00	8,00	1,00	−1,00
13	0,50	0,75	3,00	8,00	1,00	−1,00
14	0,50	0,75	3,00	8,00	1,00	-1,00
15	0,50	0,75	3,00	8,00	1,00	−1,00
16	0,50	0,75	3,00	8,00	1,00	−1,00
17	0,50	0,75	3,00	8,00	1,00	−1,00
18	0,50	0,75	3,00	8,00	1,00	−1,00
19	0,50	0,755	3,00	8,00	1,00	−1,00
20	0,50	0,75	3,00	8,00	1,00	−1,00
21	0,50	0,75	3,00	8,00	1,00	−1,00
22	0,50	0,75	3,00	8,00	1,00	−1,00
23	0,50	0,75	3,00	8,00	1,00	−1,00
24	0,50	0,75	3,00	8,00	1,00	−1,00
25	0,50	0,75	3,00	8,00	1,00	−1,00
26	0,50	0,75	3,00	8,00	1,00	−1,00
27	0,50	0,75	3,00	8,00	1,00	−1,00
28	0,50	0,75	3,00	8,00	1,00	−1,00
29	0,50	0,75	3,00	8,00	1,00	−1,00
30	0,50	0,75	3,00	8,00	1,00	−1,00
31	0,50	0,75	3,00	8,00	1,00	−1,00
32	0,50	0,75	3,00	8,00	1,00	−1,00
33	0,50	0,75	3,00	8,00	1,00	−1,00
34	0,50	0,75	3,00	8,00	1,00	−1,00
35	0,50	0,75	3,00	8,00	1,00	−1,00
36	0,50	0,75	3,00	8,00	1,00	−1,00
37	0,50	0,75	3,00	8,00	1,00	−1,00
38	0,50	0,75	3,00	8,00	1,00	−1,00
39	0,50	0,75	3,00	8,00	1,00	−1,00
40	0,50	0,75	3,00	8,00	1,00	−1,00
41	0,50	0,75	3,00	8,00	1,00	−1,00
42	0,50	0,75	3,00	8,00	1,00	−1,00
43	0,50	0,75	3,00	8,00	1,00	−1,00
44	0,50	0,75	3,00	8,00	1,00	−1,00

Continued Appendix

House-holds	Initial income (Economy A)	Initial income (Economy B)	Scenario 1 %	Scenario 2 %	Scenario 3 %	Scenario 4 %
45	0,50	0,75	3,00	8,00	1,00	−1,00
46	0,50	0,75	3,00	8,00	1,00	−1,00
47	0,50	0,75	3,00	8,00	1,00	−1,00
48	0,50	0,75	3,00	8,00	1,00	−1,00
49	0,50	0,75	3,00	8,00	1,00	−1,00
50	0,50	0,75	3,00	8,00	1,00	−1,00
51	0,50	0,75	3,00	8,00	1,00	−1,00
52	0,50	0,75	3,00	8,00	1,00	−1,00
53	0,50	0,75	3,00	8,00	1,00	−1,00
54	0,50	0,75	3,00	8,00	1,00	−1,00
55	0,50	0,75	3,00	8,00	1,00	−1,00
56	0,50	0,75	3,00	8,00	1,00	−1,00
57	0,50	0,75	3,00	8,00	1,00	−1,00
58	0,50	0,75	3,00	8,00	1,00	−1,00
59	0,50	0,75	3,00	8,00	1,00	−1,00
60	0,50	0,75	3,00	8,00	1,00	−1,00
61	0,50	0,75	3,00	8,00	1,00	−1,00
62	0,50	0,75	3,00	8,00	1,00	−1,00
63	0,50	0,75	3,00	8,00	1,00	−1,00
64	0,50	0,75	3,00	8,00	1,00	−1,00
65	0,50	0,75	3,00	8,00	1,00	−1,00
66	0,50	0,75	3,00	8,00	1,00	−1,00
67	0,50	0,75	3,00	8,00	1,00	−1,00
68	0,50	0,75	3,00	8,00	1,00	−1,00
69	0,50	0,75	3,00	8,00	1,00	−1,00
70	0,50	0,75	3,00	8,00	1,00	−1,00
71	0,50	0,75	3,00	8,00	1,00	−1,00
72	0,50	0,75	3,00	8,00	1,00	−1,00
73	0,50	0,75	3,00	8,00	1,00	−1,00
74	0,50	0,75	3,00	8,00	1,00	−1,00
75	0,50	0,75	3,00	8,00	1,00	−1,00
76	0,50	0,75	3,00	8,00	1,00	−1,00

House-holds	Initial income (Economy A)	Initial income (Economy B)	Scenario 1 %	Scenario 2 %	Scenario 3 %	Scenario 4 %
77	0,50	0,75	3,00	8,00	1,00	−1,00
78	0,50	0,75	3,00	8,00	1,00	−1,00
79	0,50	0,75	3,00	8,00	1,00	−1,00
80	0,50	0,75	3,00	8,00	1,00	−1,00
81	0,50	0,75	3,00	8,00	1,00	−1,00
82	0,50	0,75	3,00	8,00	1,00	−1,00
83	0,50	0,75	3,00	8,00	1,00	−1,00
84	0,50	0,75	3,00	8,00	1,00	−1,00
85	0,50	0,75	3,00	8,00	1,00	−1,00
86	0,50	0,75	3,00	8,00	1,00	−1,00
87	0,50	0,75	3,00	8,00	1,00	−1,00
88	0,50	0,75	3,00	8,00	1,00	−1,00
89	0,50	0,75	3,00	8,00	1,00	−1,00
90	0,50	0,75	3,00	8,00	1,00	−1,00
91	0,50	0,75	3,00	8,00	1,00	−1,00
92	0,50	0,75	3,00	8,00	1,00	−1,00
93	0,50	0,75	3,00	8,00	1,00	−1,00
94	0,50	0,75	3,00	8,00	1,00	−1,00
95	0,50	0,75	3,00	8,00	1,00	−1,00
96	0,50	0,75	3,00	8,00	1,00	−1,00
97	0,50	0,75	3,00	8,00	1,00	−1,00
98	0,50	0,75	3,00	8,00	1,00	−1,00
99	0,50	0,75	3,00	8,00	1,00	−1,00
100	0,50	0,75	3,00	8,00	1,00	−1,00
101	5,00	7,50	3,00	2,00	4,00	5,00
102	5,00	7,50	3,00	2,00	4,00	5,00
103	5,00	7,50	3,00	2,00	4,00	5,00
104	5,00	7,50	3,00	2,00	4,00	5,00
105	5,00	7,50	3,00	2,00	4,00	5,00
106	5,00	7,50	3,00	2,00	4,00	5,00
107	5,00	7,50	3,00	2,00	4,00	5,00
108	5,00	7,50	3,00	2,00	4,00	5,00
109	5,00	7,50	3,00	2,00	4,00	5,00

Continued Appendix

House-holds	Initial income (Economy A)	Initial income (Economy B)	Scenario 1 %	Scenario 2 %	Scenario 3 %	Scenario 4 %
110	5,00	7,50	3,00	2,00	4,00	5,00
111	5,00	7,50	3,00	2,00	4,00	5,00
112	5,00	7,50	3,00	2,00	4,00	5,00
113	5,00	7,50	3,00	2,00	4,00	5,00
114	5,00	7,50	3,00	2,00	4,00	5,00
115	5,00	7,50	3,00	2,00	4,00	5,00
116	5,00	7,50	3,00	2,00	4,00	5,00
117	5,00	7,50	3,00	2,00	4,00	5,00
118	5,00	7,50	3,00	2,00	4,00	5,00
119	5,00	7,50	3,00	2,00	4,00	5,00
120	5,00	7,50	3,00	2,00	4,00	5,00
121	5,00	7,50	3,00	2,00	4,00	5,00
122	5,00	7,50	3,00	2,00	4,00	5,00
123	5,00	7,50	3,00	2,00	4,00	5,00
124	5,00	7,50	3,00	2,00	4,00	5,00
125	5,00	7,50	3,00	2,00	4,00	5,00
126	5,00	7,50	3,00	2,00	4,00	5,00
127	5,00	7,50	3,00	2,00	4,00	5,00
128	5,00	7,50	3,00	2,00	4,00	5,00
129	5,00	7,50	3,00	2,00	4,00	5,00
130	5,00	7,50	3,00	2,00	4,00	5,00
131	5,00	7,50	3,00	2,00	4,00	5,00
132	5,00	7,50	3,00	2,00	4,00	5,00
133	5,00	7,50	3,00	2,00	4,00	5,00
134	5,00	7,50	3,00	2,00	4,00	5,00
135	5,00	7,50	3,00	2,00	4,00	5,00
136	5,00	7,50	3,00	2,00	4,00	5,00
137	5,00	7,50	3,00	2,00	4,00	5,00
138	5,00	7,50	3,00	2,00	4,00	5,00
139	5,00	7,50	3,00	2,00	4,00	5,00
140	5,00	7,50	3,00	2,00	4,00	5,00
141	5,00	7,50	3,00	2,00	4,00	5,00

House-holds	Initial income (Economy A)	Initial income (Economy B)	Scenario 1 %	Scenario 2 %	Scenario 3 %	Scenario 4 %
142	5,00	7,50	3,00	2,00	4,00	5,00
143	5,00	7,50	3,00	2,00	4,00	5,00
144	5,00	7,50	3,00	2,00	4,00	5,00
145	5,00	7,50	3,00	2,00	4,00	5,00
146	5,00	7,50	3,00	2,00	4,00	5,00
147	5,00	7,50	3,00	2,00	4,00	5,00
148	5,00	7,50	3,00	2,00	4,00	5,00
149	5,00	7,50	3,00	2,00	4,00	5,00
150	5,00	7,50	3,00	2,00	4,00	5,00
151	5,00	7,50	3,00	2,00	4,00	5,00
152	5,00	7,50	3,00	2,00	4,00	5,00
153	5,00	7,50	3,00	2,00	4,00	5,00
154	5,00	7,50	3,00	2,00	4,00	5,00
155	5,00	7,50	3,00	2,00	4,00	5,00
156	5,00	7,50	3,00	2,00	4,00	5,00
157	10,00	15,00	3,00	2,00	4,00	5,00
158	10,00	15,00	3,00	2,00	4,00	5,00
159	10,00	15,00	3,00	2,00	4,00	5,00
160	10,00	15,00	3,00	2,00	4,00	5,00
161	10,00	15,00	3,00	2,00	4,00	5,00
162	10,00	15,00	3,00	2,00	4,00	5,00
163	10,00	15,00	3,00	2,00	4,00	5,00
164	10,00	15,00	3,00	2,00	4,00	5,00
165	10,00	15,00	3,00	2,00	4,00	5,00
166	10,00	15,00	3,00	2,00	4,00	5,00
167	10,00	15,00	3,00	2,00	4,00	5,00
168	10,00	15,00	3,00	2,00	4,00	5,00
169	10,00	15,00	3,00	2,00	4,00	5,00
170	10,00	15,00	3,00	2,00	4,00	5,00
171	30,00	45,00	3,00	2,00	4,00	5,00
172	30,00	45,00	3,00	2,00	4,00	5,00
173	30,00	45,00	3,00	2,00	4,00	5,00
174	30,00	45,00	3,00	2,00	4,00	5,00

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House-holds	Initial income (Economy A)	Initial income (Economy B)	Scenario 1 %	Scenario 2 %	Scenario 3 %	Scenario 4 %
175	30,00	45,00	3,00	2,00	4,00	5,00
176	30,00	45,00	3,00	2,00	4,00	5,00
177	30,00	45,00	3,00	2,00	4,00	5,00
178	30,00	45,00	3,00	2,00	4,00	5,00
179	30,00	45,00	3,00	2,00	4,00	5,00
180	30,00	45,00	3,00	2,00	4,00	5,00
181	30,00	45,00	3,00	2,00	4,00	5,00
182	30,00	45,00	3,00	2,00	4,00	5,00
183	30,00	45,00	3,00	2,00	4,00	5,00
184	30,00	45,00	3,00	2,00	4,00	5,00
185	30,00	45,00	3,00	2,00	4,00	5,00
186	30,00	45,00	3,00	2,00	4,00	5,00
187	30,00	45,00	3,00	2,00	4,00	5,00
188	30,00	45,00	3,00	2,00	4,00	5,00
189	30,00	45,00	3,00	2,00	4,00	5,00
190	30,00	45,00	3,00	2,00	4,00	5,00
191	30,00	45,00	3,00	2,00	4,00	5,00
192	30,00	45,00	3,00	2,00	4,00	5,00
193	30,00	45,00	3,00	2,00	4,00	5,00
194	30,00	45,00	3,00	2,00	4,00	5,00
195	30,00	45,00	3,00	2,00	4,00	5,00
196	30,00	45,00	3,00	2,00	4,00	5,00
197	30,00	45,00	3,00	2,00	4,00	5,00
198	30,00	45,00	3,00	2,00	4,00	5,00
199	30,00	45,00	3,00	2,00	4,00	5,00
200	30,00	45,00	3,00	2,00	4,00	5,00

Integrating Issues of Income Mobility
in the Analysis of Pro-poor Growth

By *Michael Grimm*, Göttingen*

Abstract

Measurements of pro-poor growth all have in common that they are based on the anonymity axiom, i.e. they cannot inform about income mobility. It is shown for Indonesia and Peru that such a perspective may provide a very incomplete picture regarding the common objective of most studies to investigate the pro-poorness of growth or to test whether specific policy reforms where beneficial to the initially poor or not. However, often data constraints, i.e. the lack of panel data, do not allow to analyze income paths of individuals and households. Micro-simulation techniques are discussed which can help to circumvent this problem. Some illustrative examples are shown for Côte d'Ivoire.

A. Introduction

With the formulation of the *Millennium Development* Goals and the launch of the *HIPC-PRSP* initiative[1] the issue of pro-poor growth came to the top of the research and policy agenda in development economics. There is not yet a full consensus of what exactly pro-poor growth is, but it should be growth which is particularly beneficial for the poor. Whereas some compare the identification of such growth processes to the search of the 'Holy Grail' (*Klasen* 2004), others think the term 'pro-poor growth' makes no sense at all and argue that only policies but not growth per se can be pro-poor (*Agénor* 2005). Economists have developed a set of instruments to measure to what extent a given growth process increased the in-

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[1] 'HIPC' stands for *Heavily Indebted Poor Country* and 'PRSP' stands for *Poverty Reduction Strategy Paper*.

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comes of the poor, in absolute terms and in relative terms, i.e. in relation to the growth of the mean income.[2] However, all suggested measures, irrespective which definition they use, rely on what is called in welfare economics the 'anonymity axiom' (sometimes also called 'symmetry'), i.e. they do not account for income mobility. More precisely, usual assessments of pro-poor growth look at distributional changes over time and ignore how specific groups or households moved. In other words, two distributions are treated as equally good if, after income is redistributed among households, the overall distribution is the same. The ways of how the observed distributions were obtained are deemed irrelevant. However, such a perspective may provide a very incomplete picture.

For the analyst and the policy maker it is important to know whether specific policy reforms were beneficial to the initially poor or not. More generally, to evaluate the effectiveness of reforms one would like to know which groups benefited or lost and how much. One would also like to know, if individuals under the poverty line before and after the reform are roughly the same and thus poverty is a rather chronic state, or, in contrast, if mobility is high and poverty is a rather transient phenomenon. If, for instance, the poor and the rich exchange their positions, we would state no change when looking at marginal distributions only. However, looking at the group-specific trajectories, this growth pattern could be judged as being pro-poor in the sense that the initially poor escaped the state of poverty. If the initially poor would even end up a little bit richer than the initially rich and the initially rich a little bit poorer than the initially poor, marginal distributions would indicate that growth was 'anti-poor' and inequality increased, but from the mobility perspective this growth pattern indicates the existence of economic opportunities. However, obviously a clear-cut answer whether such a growth process can be called pro-poor or not cannot be given and depends on value judgements, i.e. how one compares chronic poverty to transient poverty. *Ravallion* (2004) illustrated this issue by referring to the debate between 'anti-globalizers' and 'pro-globalizers'. Whereas the former seem to focus more on the losers amongst the poor and those vulnerable to poverty and therefore on mobility, the latter seem to focus more on aggregate poverty explaining why both groups may sometimes conclude so differently on the social consequences of openness and trade.

This paper contributes to the literature on pro-poor growth by illustrating the bias inherent in most concepts we normally use and by making some suggestions how that bias can be removed. Hence, Section 2 presents some of the usually employed measurements and shows how they can be reformulated such that they account for income mobility. They are then illustrated with data from Indonesia and Peru. Given that the consideration of income mobility requires not only information on the marginal distributions of income under alternative policies, but also on the joint distributions of income across these policy states, Section 3 will offer a

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[2] See, for instance *McCulloch* and *Baulch* (2000), *Kakwani, Khandker* and *Son* (2003), *Kakwani* and *Pernia* (2000), *Ravallion* and *Chen* (2003) and *Klasen* (2004).

discussion and provide some examples of how such joint distributions can be obtained when panel data is not available. Section 4 concludes.

B. Mobility and the measurement of pro-poor growth

To document the bias of usual pro-poor growth measurements and to show how they can be modified to consider explicitly mobility, I select the 'growth incidence curve' and the 'rate of pro-poor growth' as measurements. Both were suggested by *Ravallion* and *Chen* (2003), they are widely used in the empirical literature and even more important, they are relatively intuitive and therefore convenient for illustrative purposes. First I analyze these measures for the case where the anonymity axiom is postulated. Afterwards, I study their properties when the anonymity axiom is removed, i.e. when issues of mobility are explicitly integrated in the analysis. In addition, I suggest a new decomposition technique of poverty changes able to establish the link between 'cross-section poverty' and mobility. All concepts are then empirically illustrated using panel data from Indonesia and Peru.[3]

I. The measurement of pro-poor growth

The growth incidence curve looks at changes in income at each percentile of the income distribution. More precisely, when comparing two income distributions observed in $t - 1$ and t, the growth rate in income of the pth percentile, $g_t(p)$ can be written as:

$$(1) \qquad g_t(p) = \frac{y_t(p)}{y_{t-1}(p)} - 1 \ .$$

Letting p vary from p_1 to $p_{\max}$, $g_t(p)$ traces out what *Ravallion* and *Chen* (2003) called the 'growth incidence curve' GIC). Denoting γ_t the growth rate in mean income, it is evident from Equation (1) that if inequality does not change then $g_t(p) = \gamma_t$ for all p. Conversely, $g_t(p) > \gamma_t$ if and only if the ratio of the income at p, $y(p)$, and the mean income increases between $t - 1$ and t. If $g_t(p)$ is a decreasing (increasing) function for all p then inequality falls (rises) over time for all inequality measures satisfying the Pigou-Dalton transfer principle. If the GIC lies above zero everywhere $(g_t(p) > 0$ for all $p)$ then there is first-order dominance of the distribution at date t over that of $t - 1$. If the GIC switches sign then one cannot in general infer whether higher-order dominance holds by looking at the GIC alone (*Ravallion* and *Chen* 2003).

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[3] Section 2 draws heavily on *Grimm* (2005a).

Using the concept of the GIC, *Ravallion* and *Chen* (2003) define the rate of pro-poor growth *(RPPG)* as the area under the GIC up to the initial headcount index, H_{t-1}, which gives the proportion of all individuals having an income below or equal to the poverty line:[4]

$$(2) \qquad RPPG = \frac{1}{H_{t-1}P} \sum_{p=1}^{pH_{t-1}} g_t(p) \,,$$

where P stands for the total number of percentiles. It is important to note that the *RPPG* is derived from the mean of the growth rates at all percentiles up to the headcount index, which is not the same as the growth rate of mean income of the poor. *RPPG* collapses to the growth rate in the overall mean (γ_t) if *all* incomes grow at the same rate. In this case inequality remains constant.

II. Integrating mobility in measurements of pro-poor growth

In the previous section, the hypothesis was (implicitly) made that we observe one income distribution in $t-1$, $(F(y_{i,t-1}))$ and one in t, $(F(y_{j,t}))$, where i and j do not refer necessarily to the same individuals or where at least no information is available to follow individuals over time. Now, I assume explicitly that this information is available and that it is possible to infer the joint income distribution $F(y_{i,t-1}, y_{i,t})$ for a fixed population, i.e. individuals cannot only be ordered by their income level y, but also according to some other personal circumstances revealing their identity or membership to group Ω_h, where h is a criteria classifying individuals into up to $i = 1, \ldots, N$ groups. For instance, suppose we can order individuals, observed in $t-1$ and t, according to the group membership $\Omega_{p(y_{t-1})}$ defined by the income percentile $p(y_{t-1})$ they belonged to in $t-1$. This information allows to order individuals in ascending order according to their initial income percentile $p(y_{t-1})$ and to compute the percentile specific mean incomes and growth rates in income where each percentile comprises the same individuals in $t-1$ and t:

$$(3) \qquad g_t\big(p(y_{t-1})\big) = \frac{y_t\big(p(y_{t-1})\big)}{y_{t-1}\big(p(y_{t-1})\big)} - 1 \,.$$

As before, letting p vary from p_1 to $p_{\max}$, $g_t\big(p(y_{t-1})\big)$ traces out a GIC. To distinguish this GIC from the one defined by *Ravallion* and *Chen* (2003), I denote it in what follows 'IGIC', for 'Individual Growth Incidence Curve'. As for the GIC, the IGIC is a horizontal line if $g_t\big(p(y_{t-1})\big) = \gamma_t$ for all $p(y_{t-1})$, i.e. the individuals in each percentile see their incomes grow with the average growth rate. If $g_t\big(p(y_{t-1})\big) > 0$ $\big($or $g_t\big(p(y_{t-1})\big) < 0\big)$ for all $p(y_{t-1})$, then each group is richer (or poorer) in t

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[4] Throughout the analysis I assume that there is no ambiguity about the poverty line. It is defined in absolute terms (currency units) and remains constant in real terms over time.

than in $t-1$. Conversely, $g_t\big(p(y_{t-1})\big) > \gamma_t$ if and only if the ratio of the income at $p(y_{t-1})$ and the mean income increases between $t-1$ and t. However using the concept of the *IGIC* it is not true anymore that if $g_t\big(p(y_{t-1})\big)$ is a decreasing (increasing) function for all $p(y_{t-1})$ then inequality falls (rises) over time for all inequality measures satisfying the Pigou-Dalton transfer principle. This is because individuals in t are not anymore ordered in ascending order of their income, i.e. going along the percentiles $p(y_{t-1})$ is not going along richer and richer individuals in t. It might be that the initially rich end up poorer as the initially poor and the initially poor end up richer as the initially rich. In this case the IGIC would have a negative slope and the GIC a positive slope, i.e. inequality would increase. The difference is that the GIC compares two distributions percentile by percentile, whereas the IGIC reflects the transition between the distributions observed in $t-1$ and t, i.e. income growth *and* income mobility.

To compute the *RPPG* for the ICIC, *IRPPG* in what follows, we may integrate the area under the IGIC up to the initial headcount index, H_{t-1}. That means we integrate the growth of income for all those individuals who had an income below or equal to the poverty line in $t-1$. Integrating over the IGIC, implies to integrate over the same individuals in $t-1$ and t, independent whether they have still an income below the poverty line or not in t. It follows that the *IRPPG* can be written as:

$$(4) \qquad IRPPG = \frac{1}{H_{t-1}P} \sum_{pt-1=1}^{p_{Ht-1}} g_t(p_{t-1}) \ .$$

Obviously, we may have individuals who had an income above the poverty line in $t-1$, but who have one below the poverty line in t. These individuals would not enter the *IRPPG*. Hence, computing *IRPPG* for the IGIC implies to focus on those initially poor.

III. Decomposition of poverty changes into income growth, up-ward and down-ward mobility

To uncover the mobility process which separates the growth incidence curve under anonymity from that without anonymity, it might be quite instructive to decompose changes in poverty in various mobility components. To illustrate this, I use the FGT class of poverty indices (*Foster, Greer* and *Thorbecke* 1984). Let $y = (y_1, y_2, \ldots y_n)$ be a vector of incomes in increasing order, $q = q(y, z)$ be the number of poor individuals (having an income no greater than z), and n be the total number of individuals, the FGT poverty measure can be written as:

$$(5) \qquad P_\alpha = \frac{1}{n} \sum_{i=1}^{q} \left(\frac{z - y_i}{z}\right)^\alpha$$

The parameter $\alpha(\alpha \geq 0)$ can be chosen by the user $\alpha = 0$ yields the headcount index, i.e. the proportion of poor individuals, and $\alpha = 1$ the poverty gap ratio, i.e. the average distance of the poor to the poverty line multiplied by P_0, where for the non-poor this distance is set to zero. These indices can be decomposed into components summarizing up-ward mobility of the initially poor, income growth among the 'chronic' poor and down-ward mobility of the initially non-poor. Hence, defining the following set of $0/1$ indicator variables: $\xi_i = 1$ if the individual i was poor in $t-1$ and t *(stayer)*; $\pi_i = 1$ if the individual i was poor in $t-1$ and non-poor in t *(mover)*; $\psi_i = 0$ if the individual i was non-poor in $t-1$ and poor in t *(joiner)*; the change in poverty between $t-1$; and t can be written as:

(6) $\qquad P_{\alpha,t} - P_{\alpha,t-1}$

$$= \frac{1}{n}\left[\sum_{i=1}^{n}\left(\left(\frac{z-y_{it}}{z}\right)^{\alpha}\max(\xi_i,\psi_i) - \left(\frac{z-y_{it-1}}{z}\right)^{\alpha}\max(\xi_i,\pi_i)\right)\right].$$

From this we can derive the following decomposition:

(7) $\qquad P_{\alpha,t} - P_{\alpha,t-1}$

$$= \frac{1}{n}\left[\sum_{i=1}^{n}\left(\left(\frac{z-y_{it-1}}{z}\right)^{\alpha}\xi_i - \left(\frac{z-y_{it-1}}{z}\right)^{\alpha}\max(\xi_i,\pi_i)\right)\right]$$

$$+ \frac{1}{n}\left[\sum_{i=1}^{n}\left(\left(\frac{z-y_{it}}{z}\right)^{\alpha} - \left(\frac{z-y_{it-1}}{z}\right)^{\alpha}\right)\xi_i\right]$$

$$+ \frac{1}{n}\sum_{i=1}^{n}\left(\frac{z-y_{it}}{z}\right)^{\alpha}\psi_i ,$$

where the first component gives the change in poverty, which is due to the up-ward mobility of those individuals who where poor in $t-1$ and non-poor in t *(movers)* while for those remaining under the poverty line *(stayers)* income is kept at the initial level $t-0$. The second component gives the change in poverty, which is due to changes in income among the *stayers* (or chronic poor). The third component gives the change in poverty, which is due to the down-ward mobility and income contraction of individuals who where initially non-poor *(joiners)*. If the headcount index (FGT0), i.e. $\alpha = 0$, is retained as poverty indicator, the second component is of course zero.

IV. An assessment of pro-poor growth for Indonesia and Peru with and without integrating mobility

1. Data

To illustrate empirically the various concepts suggested above, I use longitudinal data for Indonesia and Peru. Both countries are very interesting for this purpose, because they were recently affected by profound economic shocks which might have caused a lot of mobility on the labor market and across income groups.

For Indonesia, I use all three existing waves of the Indonesian Family Life Survey conducted by RAND, UCLA and the University of Indonesia's Demographic Institute in 1993 (IFLS1), 1997 (IFLS2) and 2000 (IFLS3). The IFLS is representative of 83 % of the Indonesian population living in 13 of the nation's current 26 provinces. The IFLS is judged as having a very high quality, among other things, because individuals who moved are tracked to their new location and, where possible, interviewed there. Hence, this procedure ensured that the re-contact rate in the IFLS3 was 95.3 % of IFLS1 households.[5] Using the three waves, I built two panels, one from 1993 to 1997 (6,723 households; 31,324 individuals) and one from 1997 to 2000 (7,187 households; 32,314 individuals).[6] I use real household expenditure per capita as income measure. Expenditure is expressed in 1993 prices and adjusted by regional price deflators to the Jakarta price level.

For Peru I use the first (ENAHO1, 1997) and third wave (ENAHO3, 1999) of the Peruvian Encuesta Nacional de Hogares conducted by the Instituto Nacional de Estadística e Informática. The ENAHO is representative for the three rural and four urban areas of Peru. The 'panel-households' are only a sub-sample of all households interviewed. In total 3,027 households (14,948 individuals) have been followed over the first three waves. *De Vreyer, Mesplé-Somps* and *Herrera* (2002) have shown that there seems to be no significant attrition bias. Attrition could be a problem if the fourth wave (2000) were used, because of a substantial drop out of many panel households. I use again real household expenditure per capita as the income measure. Expenditure is expressed in 1997 prices and adjusted by regional price deflators to the Lima price level.

2. Results

In the mid-nineties real GDP per capita increased by almost 5 percent per year in Indonesia. Hence, *Table 1* shows, as one can expect, that between 1993 and 1997 household incomes increased and poverty could be significantly reduced.

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[5] For details see *Strauss, Beegle, Sikoki et al.* (2004).

[6] The number of households is higher in the second period, because it includes so called 'split-off' households, i.e. individuals covered by the IFLS1, but who left their initial household and formed their own new household.

Table 1

Growth, poverty[a] and inequality

	Initial	Final
Indonesia, 1993 – 1997, national[b]		
Growth in mean p.y.	0,079	
FGT0 (25 % pline.)	0,250	0,100
FGT1 (25 % pline.)	0,072	0,023
FGT0 (50 % pline.)	0,500	0,297
FGT1 (50 % pline.)	0,185	0,086
Gini-Coeff.	0,400	0,376
Indonesia, 1997 – 2000, national		
Growth in mean p.y.	0,019	
FGT0 (25 % pline.)	0,250	0,228
FGT1 (25 % pline.)	0,069	0,058
FGT0 (50 % pline.)	0,500	0,473
FGT1 (50 % pline.)	0,173	0,158
Gini-Coeff.	0,363	0,367
Indonesia, 1997 – 2000, urban only		
Growth in mean p.y.	0,011	
FGT0 (25 % pline.)	0,250	0,252
FGT1 (25 % pline.)	0,067	0,070
FGT0 (50 % pline.)	0,500	0,502
FGT1 (50 % pline.)	0,177	0,179
Gini-Coeff.	0,354	0,372
Peru, 1997 – 1999, national		
Growth in mean p.y.	−0,008	
FGT0 (25 % pline.)	0,250	0,247
FGT1 (25 % pline.)	0,071	0,069
FGT0 (50 % pline.)	0,500	0,514
FGT1 (50 % pline.)	0,191	0,194
Gini-Coeff.	0,367	0,366
Peru, 1997 – 1999, rural only		
Growth in mean p.y.	−0,009	
FGT0 (25 % pline.)	0,250	0,256
FGT1 (25 % pline.)	0,054	0,056
FGT0 (50 % pline.)	0,500	0,507
FGT1 (50 % pline.)	0,161	0,167
Gini-Coeff.	0,325	0,327

Notes: [a] Two poverty lines are used: the first considers the first 25 percent (25 % pline.) and the other considers the first 50 percent (50 % pline.) at the bottom of the income distribution in each base year as poor. [b] Income growth and thus poverty reduction could be slightly over-estimated due to comparability problems between IFLS1 and IFLS2.

Source: IFLS1, IFLS2, IFLS3, ENAHO1, ENAHO3; computations by the author.

This very favorable dynamic was abruptly stopped by the economic crisis which started to be felt in the South-East Asia region in April 1997. However the major impact did not hit Indonesia until December 1997 / January 1998, just after IFLS2 was conducted. Then, in 1998, GDP per capita declined almost by 12 percent. The sustained crisis period continued in Indonesia more than a year. Yet in 2000, when IFLS3 was conducted, the population had – benefiting from the pre-crisis positive dynamic – returned to roughly its pre-crisis living standard, and as *Table 1* shows, with some people even a little better off. All these developments suggest that income mobility should have been high in the nineties.

A look at the usual (cross-section) GICs (the graphs on the left hand side of *Figures 1* and *2*), which postulate anonymity, show that growth was in both sub-periods positive over the whole income distribution and thus according to the absolute definition 'pro-poor'. During the period 1993 to 1997 the GIC indicates that growth rates up to the 80th percentile of the income distribution were even higher than the average growth rate and thus growth was also 'pro-poor' according to the relative definition. In consequence inequality decreased (see *Table 1*). This was, except in the first ten percentiles, not the case during the period 1997 to 2000. This can also easily be seen by the fact that during the first period the mean of percentile growth rates was above the growth rate in mean, whereas it was below the growth rate in mean during the second period. *Table 2* shows the rates of pro-poor growth, *RPPG*, for both periods and alternative poverty lines. The rates computed under the anonymity axiom (1st and 3rd column) consistently suggest that between 1993 and 1997 growth was highly pro-poor for both poverty lines used and between 1997 and 2000 only 'moderately' pro-poor if the 25 percent poverty line is retained and even negative (or 'anti-poor') if the 50 percent poverty line is retained.

Table 2

Rates of pro-poor growth with and without postulating anonymity

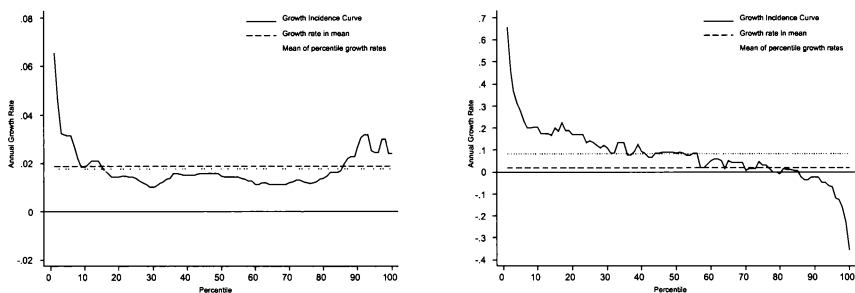|	25 % pline.		50 % pline.	
	anonymity *(RPPG)*	no anonymity *(IRPPG)*	anonymity *(RPPG)*	no anonymity *(IRPPG)*
Indo., 1993 – 1997, national	0,103	0,268	0,096	0,220
Indo., 1997 – 2000, national	0,023	0,225	0,018	0,163
Indo., 1997 – 2000, urban	–0,007	0,167	–0,003	0,126
Peru, 1997 – 1999, national	0,007	0,200	–0,002	0,131
Peru, 1997 – 1999, rural	–0,002	0,224	–0,006	0,138

Notes: The rates of pro-poor growth are computed for two alternative poverty lines: the first considers the first 25 percent (25 % pline.) and the other considers the first 50 percent (50 % pline.) at the bottom of the income distribution in each base year as poor.
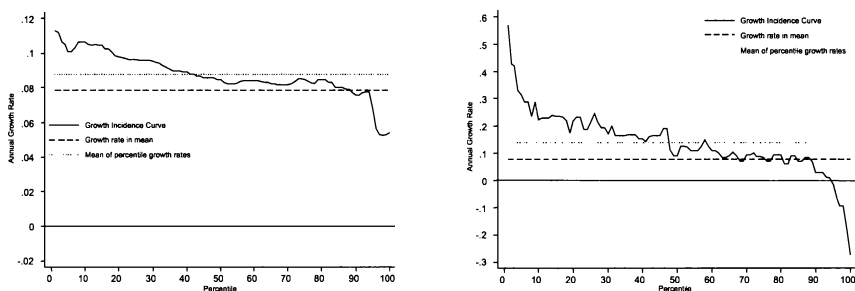
Source: IFLS1, IFLS2, IFLS3, ENAHO1, ENAHO3; computations by the author.

Figure 1: Growth incidence curves: Indonesia, 1993 – 1997, national
LHS: anonymity (GIC), RHS: no anonymity (IGIC)

Figure 2: Growth incidence curves: Indonesia, 1997 – 2000, national
LHS: anonymity (GIC), RHS: no anonymity (IGIC)

However, these growth incidence curves and rates of pro-poor growth completely hide the mobility of households across the income distribution. They offer only a comparison of marginal distributions and are compatible with various movements of poor and non-poor individuals over time. For instance, one might want to know whether those individuals having been poor after the crisis were the same individuals than those having been poor before the crisis. Put differently, did post-crisis policies and reforms only help a few poor to escape poverty, or, instead, were these measures very favorable for the poor and helped many of them to substantially improve their living standard, but did in the same time hurt the richer households and pushed some of them below the poverty line? The usual pro-poor growth assessment does not allow to distinguish between both phenomena, but from a political point of view, this distinction might be crucial.

To answer these questions, I now turn to the IGICs, i.e. to the growth incidence curves, where growth rates for percentiles containing the same households in both years are considered. Looking first at the curve for the period 1993 to 1997 (*Fig-*

ure 1, RHS), one can state that the pattern of the IGIC is even 'more' pro-poor than that of the GIC, indicating strong (unconditional) convergence or what is sometimes called 'regression to the mean'. A look at the other IGICS (*Figures 2 – 5*), shows that this 'regression to the mean' can be observed more or less for all spells considered. Measurement error might of course be a problem here and be responsible for the observed convergence. This issue will be discussed below.

However, one can notice that with respect to the period 1993 to 1997 the GIC hides substantial mobility of households over the income distribution and the fact that particularly the initially poor benefited from income growth. This can also be seen when computing the mean of percentile growth rates up to the 50 percent poverty line *(IRPPG),* which is 22.0 percent instead of the obtained 9.6 percent, when simply the mean of the growth rates at all percentiles up to the median is computed (*Table 2*). However, in this case both curves show at least qualitatively the same thing: pro-poor growth in the absolute as well as in the relative sense.

Making the comparison of the GIC and IGIC for the period 1997 – 2000, one can state that whereas the GIC is *U*-shaped, suggesting that for the very poor and the very rich growth was higher than growth in mean, the IGIC has a clear negative slope (again suggesting regression to the mean) and, in contrast to the GIC, growth in mean is significantly below the mean of percentile growth rates. Therefore in this case, whether we postulate or remove the anonymity axiom clearly matters for our conclusion on how the 'poor' benefited from growth. This shows also up when computing rates of pro-poor growth (see *Table 2*). The corresponding rates of pro-poor growth are almost zero for the GIC, but again very high when computed for the IGIC.

Both curves are even more contrasting if they are drawn solely for the urban sample. Whereas postulating anonymity leads to a GIC (*Figure 3,* LHS) which is clearly anti-poor in the relative sense and only weakly pro-poor in the absolute sense (from the 30th to the 45th percentile), the IGIC (*Figure 3,* RHS) is clearly pro poor, i.e. growth rates are positive up to the 70th percentile and higher than the growth rate in mean up to the 65th percentile. That means, if we remove the anonymity axiom and consider individual trajectories through time, we get exactly the opposite GIC compared to the case where we do the usual cross-section comparison. Likewise the rates of pro-poor growth computed for both poverty lines are negative for the GIC, but significantly positive for the IGIC (*Table 2*).

Now I turn to the Peruvian case. In the nineties Peru had to face substantial institutional reforms and several macro-economic shocks. Among other things the country was adversely affected by the economic crisis in South-East Asia and EL Niño. From 1997 on macro-economic growth slowed down and became even negative in 1998 and 1999. *Table 1* shows that real household income per capita, poverty and inequality remained more or less constant during that period. However, the comparison of the GIC with the IGIC shows again that this 'cross-sectional' stability hides interesting dynamics.
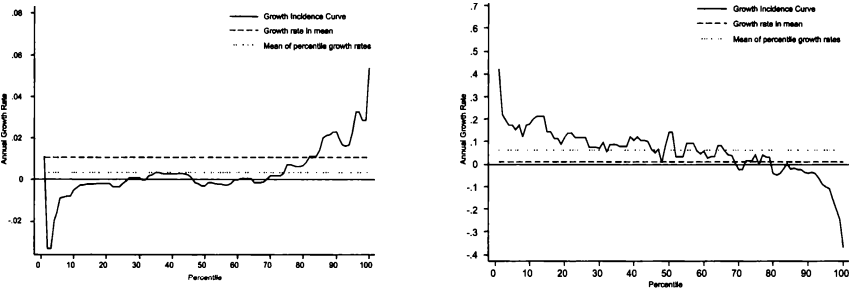
Figure 3: Growth incidence curves: Indonesia, 1997–2000, urban
LHS: anonymity (GIC), RHS: no anonymity (IGIC)

Whereas the GIC (*Figure 4,* LHS) shows positive growth only for the poorest five percentiles and between the 15th and the 25th percentile and negative growth for all others, the IGIC (*Figure 4,* RHS) indicates positive growth rates up to the 75th percentile. As for Indonesia, the slope of the IGIC is clearly negative, indicating higher growth rates for the poor and thus again convergence. Likewise, whereas the mean of percentile growth rates lies below the growth rate in mean for the GIC, it lies not only above the growth rate in mean for the IGIC, but is also positive (about 5 percent). This contrast is even more pronounced if rural areas are considered alone (see *Figure 5*). On the national level as well as for rural areas, the *RPPG*s are close to zero or even negative, whereas the *IRPPG*s are clearly positive (*Table 2*).
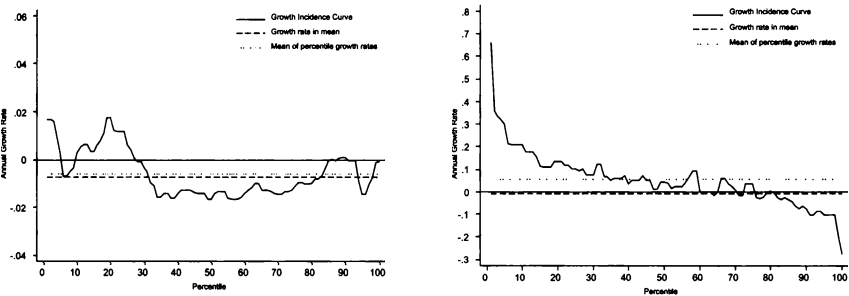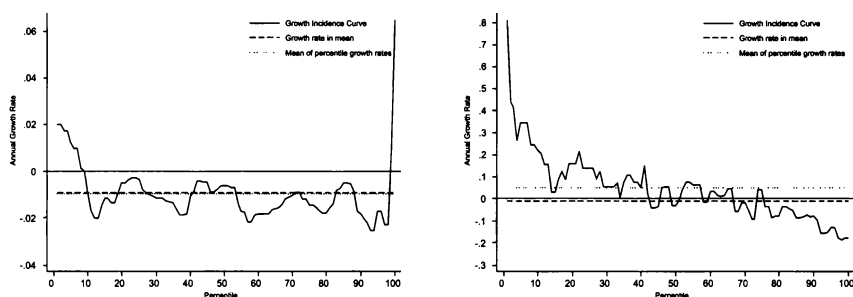
Figure 4: Growth incidence curves: Peru, 1997–1999, national
LHS: anonymity (GIC), RHS: no anonymity (IGIC)

The decomposition of changes in poverty measures can give further interesting insights in how exactly the presented GIC and IGICS arose. These decompositions are done using Equation (7), the 50 percent poverty line (the income at the 50th

percentile in the initial year) and two alternative poverty measures (FGT0 and FGT1) (*Table 3*).

Figure 5: Growth incidence curves: Peru, 1997–1999, rural
LHS: anonymity (GIC), RHS: no anonymity (IGIC)

Table 3

**Decomposition of changes in poverty in mobility and
pro-poor growth components**

	FGT0 (50 % pline.)			Decomposition		
	Initial	Final	Change	Out-mob.	Pro-poor growth	In-mob.
Indo., 1993–1997, national	0,500	0,297	−0,202	−0,270	0	0,067
Indo., 1997–2000, national	0,500	0,473	−0,028	−0,158	0	0,131
Indo., 1997–2000, urban	0,500	0,502	0,003	−0,138	0	0,140
Peru, 1997–1999, national	0,500	0,514	0,014	−0,106	0	0,120
Peru, 1997–1999, rural	0,500	0,507	0,008	−0,131	0	0,138
	FGT0 (50 % pline.)			Decomposition		
	Initial	Final	Change	Out-mob.	Pro-poor growth	In-mob.
Indo., 1993–1997, national	0,185	0,086	−0,099	−0,087	−0,029	0,016
Indo., 1997–2000, national	0,173	0,158	−0,016	−0,045	−0,059	0,036
Indo., 1997–2000, urban	0,177	0,178	0,001	−0,036	0,001	0,037
Peru, 1997–1999, national	0,191	0,194	0,003	−0,026	−0,001	0,031
Peru, 1997–1999, rural	0,161	0,167	0,005	−0,036	0,004	0,038

Notes: The used poverty line (50 % line) refers to the poverty line which considers the first 50 percent at the bottom of the income distribution in each base year as poor.

Source: IFLS1, IFLS2, IFLS3, ENAHO1, ENAHO3; computations by the author.

Looking at the decomposition of the poverty gap (FGT1) for Indonesia between 1993 and 1997, one can state that 'movers' reduced the average distance to the poverty line in relation to the poverty line by almost 9 points, income growth of those staying in poverty reduced it by further 3 points and, in contrast, 'joiners' increased it by only 1.6 points. In consequence, the GIC in *Figure 1* (LHS) is the result of significant upward mobility and clearly higher growth rates among the poor which reduced also the average gap to the poverty line of those who stayed under the poverty line. This was only slightly compensated by downward mobility of initially non-poor individuals. However, for all other spells one can state that the changes in poverty where mainly driven by up-ward and down-ward mobility, which in particular in urban Indonesia (1997–2000) and in Peru more or less off-set each other, leading in some cases to GICS and IGICS with slopes of the opposite sign. Hence, whereas the GIC suggests in these cases, that the poor did benefit under-proportionally from growth, the decomposition shows that a significant share of the initially poor escaped from poverty, but that this effect was however not reinforced through income growth among 'stayers' and even off-set to a large extent by individuals falling under the poverty line. Remarkably, income growth of the chronic poor was – with the exception of Indonesia in 1993 to 1997 – in average almost zero across all these spells. This suggests that despite an intense upward mobility there seem to be groups of chronic poor, or 'stayers', which do not participate in economic growth. The identification of these chronically poor households is important, because to pull them out of poverty different policies are needed than for the transient poor (e.g. investment in human capital and assets to increase their productivity vs. compensation of temporary risks by social safety nets). This issue is widely recognized in the literature (see e.g. *Hulme* and *Shepherd* 2003), but usual pro-poor growth measures are unable to uncover it.

3. Robustness to measurement error

The used income measure 'household expenditure per capita' is not directly observed, but is – as usual – based on declarations made by the interviewed households. Hence, it is obvious that this welfare measure is subject to errors, voluntary or involuntary. Apparent outliers have been withdrawn from the sample using the Mahalanobis distance measure (see *Grimm* 2005a). However, probably the remaining declarations are still, more or less, affected by measurement error. When drawing the usual GIC, the problem of measurement error is less a problem given that we only compare marginal income distributions. However, the problem can be more serious, when drawing the IGIC, which is based on a joint income distribution, even if the problem is reduced due to the fact that growth rates are – as for the GIC – computed over percentiles and not over individuals directly. In this subsection the robustness of the – in more or less all cases stated – negative slope of the IGICs to the existence of measurement error is considered. To do this, I follow the approach suggested by *Fields, Cichello, Freije* et al. (2003).

Fields et al. (2003) measure convergence by a regression coefficient β_1 which relates households' income in the initial period Y_{it-1} and their subsequent income change $Y_{it} - Y_{it-1}$:

$$(8) \qquad\qquad Y_{it} - Y_{it-1} = \beta_0 + \beta_1 Y_{it-1} + u_i \ .$$

If $\beta_1 < 0$ incomes converge to the mean.[7]

If incomes are measured with error the 'true' coefficient β_1 cannot be estimated and we estimate only β_1^*. Hence, β_1^* can be smaller than 0 even if β_1 is not, whenever measurement in income is negatively correlated with initial income (i.e. measurement error is the higher the lower the initial income) and measurement error is auto-correlated over time. In fact, so-called 'validation studies' which can draw on true incomes and declared incomes, show that both conditions are usually fulfilled (see *Bound, Brown* and *Mathiowetz* 2001). Hence, taking the usual lower and upper bounds for the correlation coefficient between measurement error and true income and for the serial correlation coefficient found in these validation studies, one can compute a threshold value for the ratio between the variance of measurement error and the variance of true income required to overturn the estimated negative convergence coefficient β_1^*. If this threshold is below the usual value found in the validation studies then the observed convergence might be entirely due to measurement error.

Applying this procedure, I found that the observed convergence to the mean and the resulting negatively sloped IGICS for Indonesia can be considered as highly robust against measurement error. However, for the case of Peru, it cannot be excluded with certainty that measurement error is responsible for the observed convergence.[8]

C. How to account for mobility
when longitudinal data is unavailable?

The analysis above shows that a judgment about the extent of the pro-poorness of growth based on the usual cross-section growth incidence curve can give a biased impression on how the initially poor benefited or not from growth. However, in most cases, especially for developing countries, we do not have panel data at hand and, in consequence, it seems that we are forced to postulate anonymity when comparing income distributions over time. A solution to this problem can be to rely on micro-simulation methods.

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[7] However, it should be noted that 'mean-reversion' $(\beta_1 < 0)$ is not sufficient but only necessary to prove convergence, under some circumstances the rate of convergence is even independent of the degree of mean-reversion. Put differently, mean-reversion and convergence are, as shown by *Lichtenberg* (1994), not completely equivalent.

[8] For a detailed analysis, see *Grimm* (2005a).

I. Mobility analysis using micro-simulation methods

The term micro-simulation spans a number of different approaches used in so-cial sciences. Their common denominator is to focus primarily on the economic behavior of a representative sample of agents (households or firms) and investigate the impact of public policy and shocks at the micro level. The field originated from a paper by *Orcutt* (1957) who was concerned that macro-economic models had little to say about the impact of government policy on the income distribution of agents in the economy. In developed countries, micro-simulation techniques are now extensively used to evaluate the impact of such policies as pension systems, social security and fiscal reforms. Micro-simulation became recently also very popular in development economics due to the PRSP Initiative and the resulting need to evaluate income distributional consequences of macro-economic shocks and policy reforms (see *Cogneau, Grimm* and *Robilliard* 2003). Given this objec-tive the modeling of labor supply and income generation at the household level is central. Once both aspects are modeled, the parameters of the model can be used to generate for alternative policies or shocks a counterfactual showing how each household in the sample would fare depending on the reform being undertaken. Since households respond to policy changes by changing their own actions, this counterfactual should rely on some representation of household behavior. Under some conditions and assumptions, which are discussed below, such a counterfac-tual income distribution can represent the mobility of households and not only an alternative cross-sectional distribution.

A general household income generation model can be written as follows:

$$(9) \qquad\qquad y_i = Y(x_i, \varepsilon_i; \beta; \sigma; \lambda)/P(c_i; p) \ ,$$

where real household income per capita, y_i, of household i is assumed to depend on six sets of arguments: its observable socio-demographic characteristics, or those of its members (x_i), unobservable characteristics (ε_i), a vector of remuneration rates of the observed (β) and unobserved earnings determinants (σ), and a set of parameters defining the participation and occupational choice behavior of its mem-bers (λ). P stands for a household specific price deflator being a function of the household's budget shares c_i and a vector of commodity prices p.

Such a model can be estimated in two different forms; either as a reduced form model or as a structural model (see *Cogneau, Grimm* and *Robiliard* 2003). When the reduced form is chosen, one would estimate two separate equations, one for labor supply and one for earnings (possibly separately for the various types of household members) with in each time the exogenous assumed socio-economic characteristics x_i as arguments. When the structural form is chosen, one would estimate both behaviors simultaneously allowing earnings, besides socio-economic characteristics, to influence labor supply behavior directly.[9]

$P(c_i; p)$ has not to be estimated since it is directly defined over observed household budget shares.

Once the parameters β, σ and λ are estimated the model can be used for simulation. For instance one could simulate a counterfactual income for alternative values of the remuneration rates on the labor market: $y_i' = Y(x_i; \varepsilon_i; \beta'; \sigma; \gamma)/P(c_i; p)$. The change in remuneration rates can be observed between two points in time or can be purely hypothetical in accord with some planned policy. One could also think of policies which change the endowments of people, e.g. education, and hence simulate incomes under an alternative distribution of the characteristics x_i.

Using the counterfactual incomes one can compute the usual welfare indicators W as mean income, inequality measures and poverty indices and compare them to those obtained for the observed incomes, for example: $W_t'(y_i')$ vs. $W_t(y_i)$. The difference can be attributed to the simulated policy. Besides a comparison of cross-sectional distributions like $F_t'(y_t')$ vs. $F_t(y_t)$ one can also consider the mobility of households by considering the joint distribution $F_{t,t}'(y_t, y_t')$, i.e. trajectories of households from the income before the policy was implemented to the income after.

However, to ensure that the mobility analysis gives reliable results, the behavior of households has to be modeled carefully. In an ideal case, one would need panel data – which we assumed we do not have – to model properly the reaction households to changes in remuneration rates, for instance. Otherwise we have to assume that the behavior of households differs from one situation to another as the behavior between two different households each of them in one of the two situations. Retrospective information contained in cross-section household surveys can often be used to model satisfactory the behavior of households. If the modeling of behavior is inappropriate, the simulated joint distribution of income often contains excessive mobility, i.e. the model lacks memory and will not produce good estimates of individual or household earning paths (see *Klevmarken* 1997).

It should also be emphasized that the unobservable characteristics ε_i play an important role in the simulation procedure. They determine the unobserved heterogeneity in earnings and labor supply behavior. Thus they will be responsible for some of the heterogeneity in responses to a policy or economic shock. Hence agents who are otherwise identical might react differently to a change in the environment, despite the fact that these changes are the same for all of them. Therefore these idiosyncratic terms ensure that the simulation results preserve the natural observed variance in the data.

So far it was assumed that we are interested in mobility processes over a relatively short period of time, thus a framework was considered where only labor supply and earnings change, but where the population structure with respect to

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[9] An alternative to estimation is to calibrate the model, i.e. assuming a specific structure so as to make it consistent with what is observed in the survey and meant to correspond to the status quo.

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age, education, household size, region of residence and so on remains constant. If long term mobility and policies which develop their desired effects only after several years are considered, like for instance education policies, it is however more appropriate to work with a dynamic micro-simulation model. In a dynamic micro-simulation model the population structure has to be 'aged' over time that means basic socio-demographic processes as fertility, mortality, migration, household formation and schooling have to be modeled and simulated. Dynamic models are much more complex than static models and need much more time and data for construction and implementation (see *Cogneau, Grimm* and *Robilliard* 2003).

II. Two illustrative examples

To illustrate what kind of mobility analysis can be performed using micro-simulation techniques I present in what follows two short examples. Both are taken from studies on Côte d'Ivoire. The first uses a static micro-simulation model and analyses the short and medium-term changes in income distribution during macroeconomic adjustment (*Grimm* 2004). The second one uses a dynamic model and investigates the long-term consequences of education policies on income distribution (*Grimm* 2005b).

The static model is very similar to the model outlined above. It comprises labor supply and earnings equations for individuals. Household income is then simulated by aggregating all individual incomes of all household members within the household. The model was estimated using cross-section Ivorian household income survey data of 1992. *Figure 6,* shows the distributional impact of changes in the returns to individual endowments, as education, experience and gender, on the labor market in Abidjan, the economic capital of Côte d'Ivoire. More precisely the simulation is done by applying to the sample of individuals observed in 1992 characterized by their socio-demographic characteristics and those of their households the returns to individual endowments on the labor market observed in 1998, i.e. after the main measures of the structural adjustment program have been undertaken. The simulation assumes that each individual remained in the activity occupied in 1992. Thus uniquely the change in factor returns is simulated. Put differently, the observed distribution of household income per capita in 1992 is compared to a hypothetical income distribution which we would have seen with a constant population structure and without any employment changes, but with the observed changes in factor returns. *Figure 6* shows the relative change in household income per capita for each percentile (smoothed and the point estimates), where the percentiles contain the same households in t and t^* conditional on their income in 1992. It is therefore the same type of representation as the IGIC presented in Section 2, i.e. without postulating anonymity and showing thus mobility. One can state that changes in factor returns had a positive impact for all households having been situated in 1992 below the 70th percentile. Above the 70th percentile incomes more

or less decreased. Moreover, relative income growth resulting from changes in the factor returns was the higher the lower the initial income, i.e. the impact was clearly pro-poor according to the absolute as well to the relative definition. For details and various other simulations around the same question, the interested reader can refer to *Grimm* (2004).
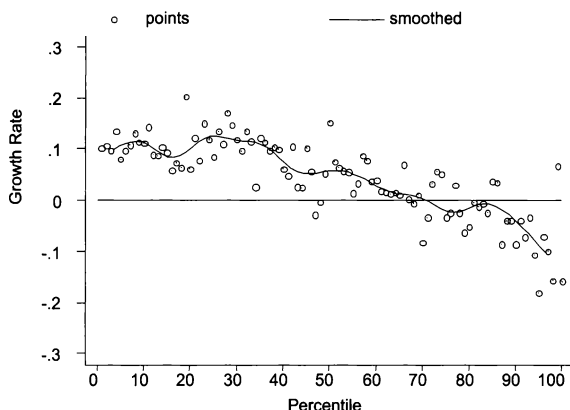
Notes: The dots correspond to the simulated impact at each percentile. The line represents the smoothed impact across percentiles.
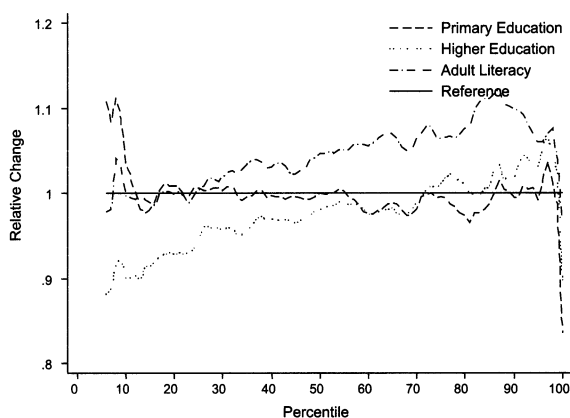
Source: Simulations by the author (see Grimm 2004).

Figure 6: The distributional effect of changes in the returns on the labor market in Abidjan (Côte d'Ivoire), 1992 – 1998

The second example draws on a dynamic micro-simulation model, where besides labor supply and earnings, socio-demographic events as fertility, mortality, migration, household formation and schooling are simulated. Thus the population structure is projected over time and in each year household income per capita is simulated. The model was estimated using several cross-section surveys on household income and demographics as well as population census data. The paper from which this example is drawn, investigates the distributional impact of various education policies. In this case the dynamic approach is important to take into account the time it takes to accumulate human capital and the occurring interactions with other economic and demographic variables during this period.

Figure 7, shows the distributional impact of three education policies. The experiments are in line with the education programs debated or already in force in Côte d'Ivoire. The simulations start in 1998 and end in 2015 (the year where the *Millennium Development Goals* should have been met). 'Reference' is the reference case or baseline, and consists in maintaining the enrolment ratios at all schooling levels at those which Côte d'Ivoire would experience if the observed conditions in 1998 persisted. 'Primary Education' refers to a simulation where 90

percent instead of 50 percent of all children entry and finish primary school. 'Higher Education' simulates in addition higher progression into higher education, i.e. into secondary and tertiary education. In all scenarios the selection of those children who start and continue in school is based on econometrically estimated equations, such that those children progress who are empirically the most likely to do so. The simulation 'Adult Literacy' completes the former simulation by an adult literacy program. From 1998 on, in each period 10 percent of illiterate adult men and 20 percent of illiterate adult women are randomly selected. The literacy program is supposed to last three years. It is assumed that participants are able to work full-time when following the program.

Source: Simulations by the author (see *Grimm* 2005b).

Figure 7: The distributional effect of education policies
in Côte d'Ivoire, 2015

Figure 7, represents again a kind of growth incidence curve, which does not postulate anonymity, i.e. it shows movements of households according to their initial position. However there is one particularity here, 'growth' means here the change in household income per capita in 2015 relative to household income per capita under the reference case in 2015. That is why the 'Reference' is a straight line at one. The 'primary education' program modifies only slightly incomes and is more or less distributional neutral. That is among other things due to the fact that returns to primary education are relatively low. The 'higher education' program is clearly 'anti-poor' under this time horizon. It decreases household income per capita below the 75th percentile and increases household income per capita above. The relative change is the higher the higher the initial income, therefore inequality increases. This can be explained by the fact that in poorer households enrollment substitutes work and thus has high opportunity costs. This is only slightly compensated when these children enter later the labor force. In contrast, in richer house-

holds, opportunity costs are lower. Moreover, the children in these households are more likely to be among the pupils which progress in school (recall that pupils are selected according to their empirical probability to progress into higher education). Therefore for richer families the benefits of such policies are likely to be higher, especially if these policies have not a universal coverage or are not especially dedicated to the poor and combined with some conditional cash transfers. However, as the last simulation shows a combination with literacy programs for adults can turn such policies into policies which are favorable for the poor even in this rather short time horizon up to 2015. However, the benefit is simulated to be still higher among the rich and therefore inequality is increasing. It is important to note that all simulations assume that returns to education remain constant, as the supply of education increases this is of course only one possible scenario. Simulations which relax this assumption and investigate various other developments of returns are discussed in *Grimm* (2005b).

D. Conclusion

It was analytically shown and empirically illustrated that usual measurements of pro-poor growth are unable to inform about the true dynamics of the income distribution. If mobility was integrated in the analysis, it came out, for both countries that growth for the initially poor was generally stronger than the usual pro-poor growth measurements suggested. Put differently, almost each spell considered indicated substantial up-ward mobility and convergence to the mean. In the same time the decomposition of poverty changes has shown that generally a part of the population seems however to be stuck in poverty and to benefit not at all from economic growth. Hence, the explicit consideration of mobility may in some cases substantially modify our conclusions regarding the poverty impact of growth. Obviously, the usual perspective of looking at aggregate changes in poverty is of course important, given for instance that the *Millennium Development Goal One*, which requires to halve poverty before 2015, clearly focuses on aggregate poverty, but that perspective should be complemented by some mobility analysis. Of course, then value judgments are necessary on how one weighs transient relative to chronic poverty. This issue is especially important, if we talk about the distributional effects of specific macroeconomic shocks or policy reforms.

Generally, we want to know who were the winners and losers and especially to what extent benefited the initially poor. Undertaking this kind of analysis requires longitudinal data. Unfortunately, in most cases, especially for developing countries, such data is not available and it seems that then we are forced to postulate anonymity when comparing income distributions over time. As shown, a solution to this problem can be to rely on micro-simulation methods or, more generally, on some kind of counterfactual analysis. Two illustrative examples have shown that these techniques can be very useful when analyzing the distributional effects on specific households or household groups. Moreover, if we are interested in the dis-

tributional impact of *specific* policy reforms or economic shocks it can also solve the usual problem inherent in 'before-after-comparisons' by isolating what distributional change is due to that specific policy or shock and what is due to other changes. Thus, these methodologies eventually allow under some conditions to go also beyond to what can be done with a usual panel data analysis. Finally, if the objective is to undertake some kind of ex-ante analysis of the likely distributional effects of policy options open today, we have in any case to rely on these techniques.

References

Agénor, P.-R. (2005): The macroeconomics of poverty reduction. The Manchester School, 73 (4): 369 – 434.

Bound, J. / *Brown,* C. / *Mathiowetz,* N. (2001): Measurement error in survey data. In: J. J. Heckman and E. Learner (eds.), Handbook of Econometrics, Vol. 5 (pp. 3705 – 3843), Amsterdam: Elsevier Science.

Cogneau, D. / *Grimm,* M. / *Robilliard,* A.-S. (2003): Evaluating poverty reduction policies – The contribution of micro-simulation techniques. In: J.-P. Cling, M. Razafindrakato and F. Roubaud (eds.), New International Poverty Reduction Strategies (pp. 340 – 370), London: Routledge Books.

De Vreyer, P. / *Mesplé-Somps,* S. / *Herrera,* J. (2002): Consumption growth and spatial poverty traps: an analysis of the effects of social services and community infrastructures on living standards in rural Peru. DIAL Working Paper DT / 2002 / 17, DIAL, Paris.

Fields, G. S. / *Cichello,* P. L. / *Freije,* S. / *Menéndez,* M. / *Newhouse,* D. (2003): For Richer or for Poorer? Evidence from Indonesia, South-Africa, Spain, and Venezuela. Journal of Economic Inequality, 1: 67 – 99.

Foster, J. / *Greer,* J. / *Thorbecke,* E. (1984): A Class of Decomposable Poverty Measures. Econometrica, 52: 761 – 776.

Grimm. M. (2004): A decomposition of inequality and poverty changes in the context of macroeconomic adjustment: A microsimulation study for Côte d'Ivoire. In: A. F. Shorrocks and R. van der Hoeven (eds.), Growth, Inequality and Poverty. Prospects for Pro-Poor Economic Development (pp. 197 – 221), Oxford: Oxford University Press.

Grimm. M. (2005a): Removing the anonymity axiom in assessing pro-poor growth. IAI Discussion Paper No. 113, Ibero-America Institute of Economic Research, University of Göttingen.

Grimm, M. (2005b): Educational policies and poverty reduction in Côte d'Ivoire. Journal of Policy Modeling, 27: 231 – 247.

Hulme, D. / *Shepard,* A. (2003): Conceptualizing Chronic Poverty. World Development, 31(3): 403 – 424.

Kakwani, N. / *Khandker,* S. / *Son,* H. H. (2003: Poverty Equivalent Growth Rate: With Applications to Korea and Thailand. Mimeo, Economic Commission for Africa.

Kakwani, N. / *Pernia,* E. (2000): What is Pro-Poor Growth? Asian Development Review, 18: 1 – 16.

Klasen, S. (2004): In Search of the Holy Grail. How to Achieve Pro Poor Growth. In: N. Stern and B. Tungodden (eds.), Towards Pro Poor Policies. Proceedings of the Annual Bank Conference on Development Economics (ABCDE) Europe Conference, Washington D.C.: World Bank.

Klevmarken, N. A. (1997): Behavioural modelling in micro-simulation models. A survey. Working Paper No. 31, Department of Economics, Uppsala University.

Lichtenberg, F. R. (1994): Testing the Convergence Hypothesis. Review of Economics and Statistics, 76 (3): 576 – 579.

McCulloch, N. / *Baulch,* B. (2000): Tracking pro-poor growth. ID21 Insights No. 31, University of Sussex, Institute of Development Studies.

Ravallion, M. (2004): Competing Concepts of Inequality in the Globalization Debate. World Bank Policy Research Working Paper No. 3243, World Bank, Washington D.C.

Ravallion, M. / *Chen,* S. (2003): Measuring Pro-Poor Growth. Economics Letters, 78: 93 – 99.

Orcutt (1957): A new type of socio-economic system. Review of Economics and Statistics, 58: 773 – 797.

Strauss, J. / *Beegle,* K. / *Sikoki,* B. / *Dwiyanto,* A. / *Herwati,* Y. / *Witoelar,* F. (2004): The Third Wave of the Indonesia Family Life Survey (IFLS3): Overview and Field Report. WR-144 / 1-NIA / NCHID, RAND Corporation.

Estimating Pro-poor Indices from Time Series Data: Concepts and an Application to Rural India

By *Stefan Klonner,* Cornell University*

Abstract

The pro-poor index introduced by Kakwani and Pernia (*Asian Development Review,* 18 (2000): 1 – 16) is a unit-free, cardinal measure which compares observed poverty reduction to poverty reduction with growth that benefits all individuals of an economy proportionally. I derive an econometric procedure for estimating the pro-poor index from time series data. The method has minimal data requirements and allows statistical inference about the nature (pro-rich vs. pro-poor) of the growth process. The procedure is applied to data from rural India. I find that growth between 1950 and 1992 has been significantly pro-poor. The results suggest that the use of traditional poverty regressions may be misleading for comparing the effectiveness of poverty reduction across samples.

A. Introduction

Recently the relationship between economic growth and poverty reduction has attracted much attention by both policy makers and researchers as poverty eradication is at the heart of the millennium goals (*United Nations,* 2005). In this connection, the concept of "pro-poor growth" (PPG) has become increasingly popular. In broad terms, PPG is concerned with the extent to which economic growth benefits the poor.

Regarding the measurement of PPG, a widely used approach is to estimate the poverty elasticity, i.e. the percentage change of a specific poverty measure in response to a relative change in per capita GDP. Recent examples along these lines are *Dollar* and *Kraay* (2004) with a set of cross-country data and *Ravallion* and *Datt* (2002) with a panel of fifteen Indian states. In this methodology, growth in a given country or state is deemed more pro-poor the higher the poverty elasticity. It has been recognized at least since *Kakwani* (1990), however, that the poverty elasticity alone is a misleading measure of the extent to which economic growth benefits the poor. He develops a framework in which growth is deemed pro-poor only if it benefits the poor more than other individuals in the economy. Kakwani illus-

trates that, when all incomes of a distribution grow at the same rate (i.e. economic growth is distribution-neutral), the poverty elasticity crucially depends on the shape of the distribution below the poverty line. As a consequence, two economies with identical level of initial poverty and distribution-neutral growth whose distributions are shaped differently, will in general exhibit different poverty elasticities. In such a scenario, it is obviously little desirable to give the government which achieved the higher poverty elasticity more credit for poverty eradication.

To facilitate comparisons of the extent to which growth is pro-poor while taking into account differences in initial distributions, *Kakwani* and *Pernia* (2000) introduce a cardinal concept. Their pro-poor index (PPI) is essentially the observed poverty elasticity relative to the (counterfactual) poverty elasticity had growth been distribution-neutral (or DNPE for short). In this framework, growth is pro-poor when actual poverty decreases by more than under (hypothetical) distribution-neutral growth. Moreover, in a very recent paper, *Kakwani, Khandker* and *Son* (2004) show how to use the pro-poor index to calculate a hypothetical growth rate, which would achieve the same as the observed extent of poverty reduction had growth been distribution-neutral. The authors advocate that this "poverty equivalent growth rate" is what should be used to compare poverty eradication records of countries.

When it comes to the empirics of PPG, two broad categories of approaches can be distinguished. First, what I will call traditional poverty regressions, where the dependent variable is some poverty measure and per capita GDP as well as other factors affecting poverty serve as explanatory variables. With data from India, this approach has a long tradition starting with *Ahluwalia* (1978). Recent examples along these lines include *Ravallion* and *Datt* (2002), who seek to identify pro-poor policies, as well as *Burgess* and *Pande* (2005), who address the role of banks for rural poverty reduction. While the earlier papers within this category only seek to determine whether growth benefitted the poor at all, the more recent ones attempt to compare poverty reduction records across states. The strength of this approach is that it allows to isolate secular growth factors from transitory shocks and that it has fairly moderate data requirements. Typically only time series of poverty measures and average per capita income are required. The obvious shortcoming of this approach, however, is first that it makes no statement on whether growth benefitted the poor disproportionately or not. And second that comparisons across states do not take into account differences in initial distributions, which, as explained above, may account for different poverty elasticities even if growth is distribution-neutral.

The other broad category of empirical approaches to PPG, which I will call the Kakwani approach, uses household micro data to compute pro-poor indices and compare single years to arrive at judgements about PPG. Examples are *Kakwani* (1990), *Kakwani* and *Pernia* (2000), *Kakwani* et al. (2004), and *Ravallion* and *Chen* (2003). It can be criticized that this empirical approach confounds effects of long term growth, which is the interesting one, and transitory aggregate shocks. After all, transitory aggregate shocks may affect the poor differently than secular

growth factors (see *Bell* and *Klonner,* 2005, for an example). Moreover, for most low income countries, household micro data is difficult to obtain and, if at all, usually only available after 1990. This flaws any attempt to employ this approach for a longer time horizon, which is needed if transitory and secular forces are to be disentangled.

The present paper builds a bridge between the two empirical approaches to PPG by combining the strengths of each one. In the spirit of the traditional approach, I propose a regression technique that allows to disentangle transitory and permanent components of the growth process. Using a result of *Kakwani* (1990), the traditional poverty regression is modified to yield estimates of the pro-poor index instead of the poverty elasticity. Compared to the traditional approach, this procedure has the advantage of identifying the character of the long-run relationship between economic growth and poverty while controlling for the shape of the distribution. Compared to the Kakwani approach, the procedure presented here has two advantages. First, it does not require micro data, which is often not available. Second, it allows statements about the nature of PPG in terms of statistical significance. In particular, a null hypothesis of distribution-neutral growth is straightforwardly tested and may be rejected in favor of either pro-poor or pro-rich growth.

This method is applied to data on rural India, for which long records of poverty and national accounts data, but no micro data, are available. I find that, between 1951 and 1992, the growth process in India's agricultural sector was pro-poor. Moreover, transitory shocks to aggregate income affected the poor less than proportionally.

The rest of this paper is organized as follows. Section 2 reviews the basic result of *Kakwani* (1990) and derives a regression specification for the estimation of the pro-poor index. Section 3 contains a description of the data. Section 4 presents estimation results. The final section summarizes the findings and concludes.

B. Methodology

I. Distribution-neutral elasticity and the pro-poor index

We start with a review of *Kakwani's* (1990) result on the DNPE. Denote individual income by x and the cumulative distribution function (cdf) of income by $F(x; \mu)$ with support $[0, \infty)$, where μ is a scale parameter. The cdf then satisfies

$$F(x; \mu) = F(x/\mu; 1) \ .$$

Distribution-neutral growth can be formalized through an increase in the scale parameter.

We denote a poverty line by p. The class of FGT poverty measures (see *Foster, Greer* and *Thorbecke,* 1984) is defined as

$$P_\alpha = \int\limits_0^p \frac{(p-x)^\alpha}{p} dF(x;\mu), \alpha \geq 0 \ .$$

The most prominent examples are the headcount ratio (HCR) when α equals 0, the poverty gap ratio (PGR) when α equals 1, and the squared poverty gap ratio (SPGR) when α equals 2. The bigger α, the more weight is given to incomes of the very poor among the poor.

Distribution-neutral growth acts like a proportional increase in μ. Kakwani (1990) establishes the following identity for the DNPE, η_α say:

(1) $$\eta_\alpha = \frac{d\log P_\alpha}{d\log\mu} = -\alpha\left(\frac{P_{\alpha-1}}{P_\alpha} - 1\right) \quad \text{for} \quad \alpha \geq 1 \ ,$$

which is always negative because $P_{\alpha-1} > P_\alpha$ for all $\alpha \geq 1$.

A pro-poor index is introduced by *Kakwani* and *Pernia* (2000). For the P_α poverty measure, I will denote it by

$$\phi_\alpha = \frac{\delta_\alpha}{\eta_\alpha} \quad \text{for} \quad \alpha \geq 1 \ ,$$

where δ_α denotes the observed elasticity of the P_α measure with respect to average income. The interpretation of φ_α is straightforward. When the observed poverty elasticity is negative and exceeds the DNPE in absolute terms, growth benfits the poor disproportionately. This is a clear case of pro-poor growth. When δ_α is negative but smaller than the DNPE in absolute terms, the poor do benefit from growth, albeit to a lesser extent than with distribution-neutral growth at the same rate. *Kakwani* et al. (2004) have labeled this case "trickle down growth". It may also be called "pro-rich growth". Finally, a positive observed poverty elasticity means that the absolute position of the poor deteriorates as average income increases. *Bhagwati* (1988) has labeled this undesirable case "immiserizing growth".

II. A regression framework for the measurement of PPG

Using (1), indexing time (in years) by t and moving from infinitesimal to discrete units, we may write

$$\log P_{\alpha,t} \approx \log P_{\alpha,t-1} + \eta_{\alpha,t-1}(\log y_t - \log y_{t-1}) \ ,$$

where the approximation is exact if all higher order derivatives of P_α with respect to μ equal zero. Differentiating with respect to $\log y_t$ gives

$$\frac{d\log P_{\alpha,t}}{d\log y_t} \simeq \eta_{\alpha,t-1} \ .$$

The traditional poverty regression is specified as

(2)
$$\log P_{\alpha,t} = a_0 + \delta_\alpha \log y_t + \varepsilon_t \ ,$$

where δ_α estimates the (observed) poverty elasticity. Now consider the following specification,

(3)
$$\log P_{\alpha,t} = a_0 + a_1(\eta_{\alpha,t-1} \log y_t) + \varepsilon_t \ .$$

I shall assume that a_1 is indeed a constant, that is a_1 is invariant in t. Writing a_1 as $\dfrac{\delta_a}{\eta_a}$, the coefficient a_1 in (3) will thus estimate $\dfrac{\delta_a}{\eta_a} = \phi_\alpha$ which is *Kakwani* and *Pernia's* (2000) pro-poor index.

The obvious advantage of specification 3 is that it has low data requirements. Only time series of two members of the FGT class of poverty measures as well as per capita income are required. To illustrate, many data sets have data on the headcount ratio (P_0), the poverty gap ratio (P_1), and the squared poverty gap ratio (P_2). With such data, (3) allows estimation of pro-poor indices based on either the poverty gap ratio (for which η is calculated from P_0 and P_1) or the squared poverty gap ratio (for which η is calculated from P_1 and P_2). As in traditional poverty regressions, a pro-poor index based on the squared poverty gap ratio, P_2, gives more weight to the very poor than a pro-poor index based on P_1.

To identify the long-run relationship between economic growth and poverty, one wants to abstract from transitory economic shocks. In the present context, such shocks can work in two ways. First, per capita GDP may be subject to transitory fluctuations, which may be induced by transitory economic conditions, such as rainfall conditions. Second, holding per capita GDP constant, poverty itself may be driven by further transitory factors. To give an example, inflationary shocks (i.e. price hikes) typically disadvantage the poor temporarily (see *Datt* and *Ravallion,* 1998, for evidence from rural India).

Identification of the long-run relationship between economic growth and poverty warrants an empirical strategy that takes into account both of these short-term effects. One way to do so is to estimate the simultaneous system

(4)
$$\log(y_t) = b_0 + b_1 t + \varepsilon_{yt}$$
$$\log(P_{\alpha,t}) = a_0 + a_1 \eta_{\alpha,t-1} b_1 t + \varepsilon_{Pt} \ ,$$

where y_t denotes per capita GDP. The first of these two equations singles out the long-term component in the time series of y. The second equation essentially regresses the poverty measure on that long-term component of per capita GDP. Moreover, simultaneous estimation of both equations allows valid statistical inference on the pro-poor index, which would be flawed by a two-step procedure regres-

sing $\log(P)$ on predicted values of $\log(y)$. In particular, the null hypothesis of distribution-neutral growth is a test of the statistical hypothesis $a_1 = 1$. If this null can be rejected in favor of the alternative $a_1 > 1$, growth is significantly pro-poor. If it is to be rejected in favor of $a_1 < 1$, on the other hand, growth is significantly pro-rich.

The present framework can also be extended to the recently introduced concept of the poverty-equivalent growth rate, or PEGR for short (*Kakwani* et al., 2004). In particular, multiplication of the estimated pro-poor index with the long run growth rate of per capita GDP gives the long-term poverty-equivalent growth rate. Toward this, regression system (4) can be reparametrized as follows. Defining $\psi = a_1 b_1$ and $b_2 = 1/a_1$, we can write

$$\log(y_t) = b_0 + b_2 \psi t + \varepsilon_{yt}$$
$$\log(P_{\alpha,t}) = a_0 + \psi \eta_{\alpha,t-1} t + \varepsilon_{Pt} \ .$$

Here ψ estimates the poverty-equivalent growth rate. Again statistical inference about the PEGR can be conducted through statistical hypotheses relating to ψ.

C. Data

For India, as for many other countries, no long-reaching record of household income surveys is available. Instead, the Indian National Sample Survey (NSS) publishes data on nominal per capita household consumption. These are reported in grouped form, where, for each group, the fraction of households in that group and the mean nominal expenditure are reported. Since the concern here is with movements in the distribution of real expenditures, the ideal would be a suitable price index for each expenditure group. The only available index for the entire period, however, is the consumer price index for agricultural laborers (CPIAL), whose living standards are not much inferior to those of marginal farmers and service workers. It can be argued, therefore, that the CPIAL is a satisfactory deflator for the purpose of producing a series of real mean per capita household consumption. To get from the grouped nominal expenditure data to measures of poverty in real terms, first the nominal expenditure data are deflated by the CPIAL. Second, using the poverty line recommended by the *Planning Commission's Expert Group* (1993), *Özeler* et al. (1996) have estimated FGT poverty indices from the grouped data through parametric interpolations.

I will use data only until the 47th NSS round (July to December of 1991) since more recent data is flawed by several changes in the consumption survey methodology (see Deaton and Kozel, forthcoming, for a discussion) applied by India's National Sample Survey Organization.

Rural households derive their incomes overwhelmingly from agriculture or activities that depend, directly or indirectly, on the level of agricultural production.

Therefore, the relevant measure of aggregate economic performance is real agricultural value added per head of the rural population, y_t. Income y_t is defined to be the level of nominal value added per head deflated by the CPIAL.

The time series of y_t, the CPIAL, P_0, P_1 and P_2, as well as the mean of the distribution of real consumption and the Gini index are set out in *Table 1*. A closer look at the table immediately reveals two problems of these data. First, a consumption survey was not carried out in every agricultural year (which lasts from July to June). In particular, between 1974/74 and 1986/87, only two consumption surveys were undertaken.[1] Second, the beginning and end dates of survey rounds, which are set out in the second column were changed several times. Toward this, Özeler et al. (1996) have interpolated agricultural GDP, which is reported by calender year in India's national accounts, according to the NSS survey periods. In the sequel I will use the midpoint of each round, expressed in decimal terms, as the time when the survey was conducted.

Figure 1 plots the natural logarithm of per capita real GDP in agriculture over the midpoint of each survey round, both actual and fitted, where the fitted line allows for one change in slope in 1979. Real per capita value added appears to possess a slight upward trend until 1973–74 with substantial year-to-year fluctuations. A decade later, its level was scarcely higher, but noticeable growth set in thereafter. This is in accordance with the observation that agricultural productivity accelerated in a sustained fashion as the green revolution of the 1970s became effective (see, for example, *Joshi* and *Little,* 1994).

Figure 2 depicts per capita real GDP in agriculture and the mean of the distribution of yearly consumption expenditures. The latter is obtained from column 9 of *Table 1* multiplied by twelve. The two graphs move closely together. Given the findings of *Townsend* (1994) and many others on village insurance and consumption smoothing, it is striking that the trajectory of mean consumption is not smoother than that of agricultural output. What is important, however, is that the ratio of the two quantities remains roughly constant, with output exceeding mean consumption by about 20%. This relationship changed markedly later in the 1990s, which has led to vivid discussions (see *Deaton* and *Kozel,* forthcoming, for a summary).

Figure 3 depicts headcount, poverty gap and squared poverty gap ratios. These series show an upward, rather than a downward, trend before surveys were interrupted in 1974. Ten years later, all three measures had fallen between ten and twenty percent and this level was sustained until the early 1990's.

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[1] Note that only those 33 rounds in which a consumption survey was undertaken are included in *Table 1*.

Table 1: The data

(1) NSS Round	(2) Survey Period	(3) Midpoint	(4) Real Value Added per Capita in Agriculture*	(5) CPIAL, Base Year 1973/74	(6) Head-Count Ratio	(7) Poverty-Gap Ratio	(8) Squared Poverty Gap Ratio	(9) Mean of Real Consumption Distribution**	(10) Gini Index
3	Aug 51–Nov 51	1951.75	798.75	35.32	47.37	16.05	7.53	61.24	33.72
4	Apr 52–Sep 52	1952.50	805.76	31.38	43.87	14.64	6.71	64.82	34.37
5	Dec 52–Mar 53	1953.08	823.17	31.04	48.21	16.29	7.56	60.18	33.53
6	May 53–Sep 53	1953.54	843.93	33.91	54.13	19.03	9.12	55.18	33.27
7	Oct 53–Mar 54	1954.00	854.91	31.55	61.29	21.95	10.26	51.54	33.75
8	Jul 54–Mar 55	1954.88	856.44	28.48	64.24	25.04	12.50	49.54	35.54
9	May 55–Nov 55	1955.63	837.88	26.32	51.83	18.44	8.80	57.74	34.13
10	Dec 55–May 56	1956.17	847.14	27.91	48.34	15.65	6.71	63.10	34.80
11	Aug 56–Feb 57	1956.88	856.47	31.85	58.86	19.45	8.50	53.28	32.21
12	Mar 57–Aug 57	1957.42	827.05	33.64	62.11	21.69	10.01	51.46	33.58
13	Sep 57–May 58	1958.04	828.57	33.40	55.16	19.01	8.78	55.66	33.74
14	Jul 58–Jun 59	1959.00	868.25	34.61	53.26	17.74	7.88	58.16	34.29
15	Jul 59–Jun 60	1960.00	859.83	34.14	50.89	15.29	6.13	58.96	31.65
16	Jul 60–Aug 61	1961.08	885.91	33.95	45.40	13.60	5.53	63.24	32.48
17	Sep 61–Jul 62	1962.13	862.29	35.32	47.20	13.60	5.31	61.53	31.61

18	Feb 63 – Jan 64	1963.58	844.29	38.58	48.53	13.88	5.49	57.98	28.94
19	Jul 64 – Jun 65	1965.00	873.18	47.98	53.66	16.08	6.60	55.11	29.71
20	Jul 65 – Jun 66	1966.00	779.13	53.74	57.60	17.97	7.60	52.85	30.13
21	Jul 66 – Jun 67	1967.00	782.76	64.67	64.30	22.01	10.01	47.78	29.69
22	Jul 67 – Jun 68	1968.00	850.26	70.17	63.67	21.80	9.85	47.60	29.08
23	Jul 68 – Jun 69	1969.00	845.64	63.35	59.00	18.96	8.17	52.55	30.97
24	Jul 69 – Jun 70	1970.00	884.29	66.02	57.61	18.24	7.73	52.56	29.82
25	Jul 70 – Jun 71	1971.00	906.27	65.69	54.84	16.55	6.80	53.75	28.76
27	Oct 72 – Sep 73	1973.25	840.76	80.90	55.36	17.35	7.33	54.60	30.67
28	Oct 73 – Jun 74	1974.13	850.87	100.00	55.72	17.18	7.13	53.01	28.54
32	Jul 77 – Jun 78	1978.00	924.95	112.99	50.60	15.03	6.06	58.25	30.92
38	Jan 83 – Dec 83	1983.50	947.21	183.35	45.31	12.65	4.84	61.46	30.10
42	Jul 86 – Jun 87	1987.00	898.05	211.15	38.81	10.01	3.70	66.99	30.22
43	Jul 87 – Jun 88	1988.00	921.63	236.74	39.60	9.70	3.40	66.78	30.14
44	Jul 88 – Jun 89	1989.00	1021.34	263.04	39.06	9.50	3.29	66.57	29.51
45	Jul 89 – Jun 90	1990.00	1028.07	274.48	34.30	7.80	2.58	69.03	28.23
46	Jul 90 – Jun 91	1991.00	1041.63	302.87	36.43	8.64	2.93	66.73	27.72
47	Jul 91 – Dec 91	1991.75	1016.08	351.25	37.42	8.29	2.68	68.50	29.91

* at constant 1973/74 prices.
** monthly expenditures at constant 1973/74 prices.
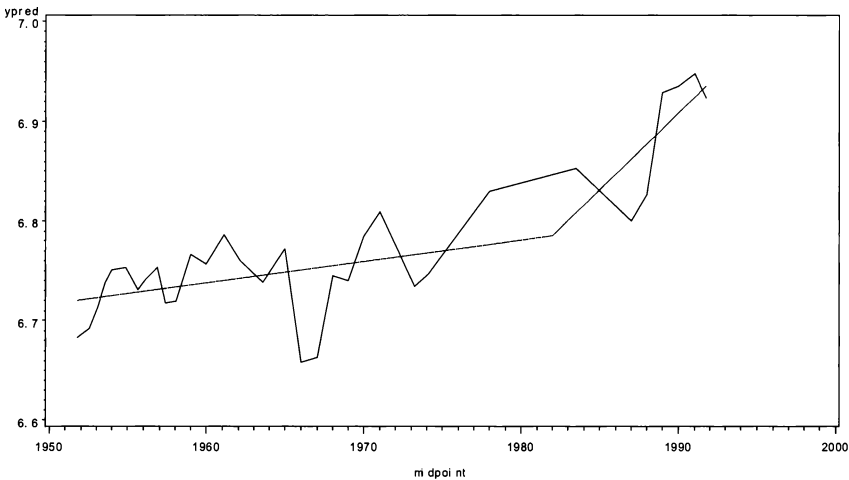
Source: Özeler et al. (1996).

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Figure 1: Real GDP per capita in agriculture (in logarithms), actual and fitted
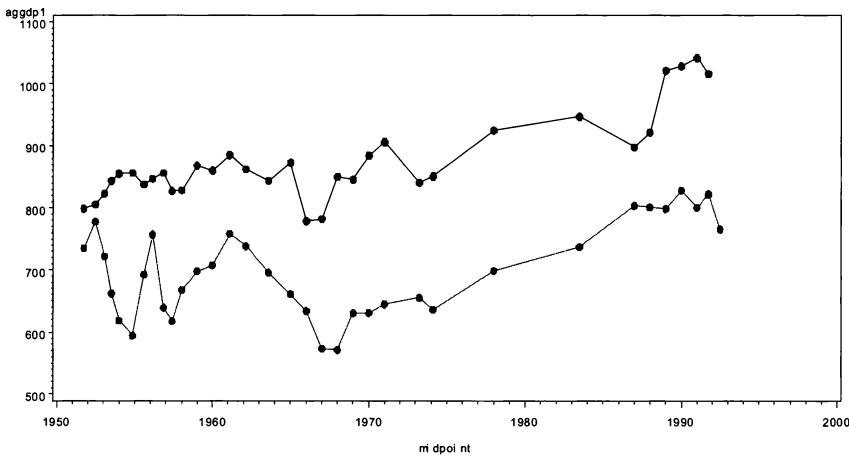

Figure 2: Real GDP per capita in agriculture (top) and mean per capita yearly
expenditure at constant 1973 / 74 prices by rural households (bottom)

Finally, *Figure 4* depicts (absolute values of) counterfactual distribution-neutral growthrates η_1 and η_2 which are computed according to equation 1. Notice that the former is essentially proportional to the fraction $\frac{\text{headcount ratio}}{\text{poverty gap ratio}}$ and the latter to $\frac{\text{poverty gap ratio}}{\text{squared poverty gap ratio}}$. As the poverty measures themselves, these quantities move closely together. In contrast to the time series of the poverty measures, however, there is an apparent upward trend in both series over the sampling period as a whole. This means that, among the poor, the very poor gained disproportionately

over the sample period because, in both cases, the measure which is more sensitive
to the very poor decreased by more. What this also means is that the shape of the
distribution of consumption expenditures changed in a way that a distribution-neu-
tral one percent increase in y led to a decrease in P_1 of around 2.5 percent in 1960
in contrast to a decrease of 4 percent in 1990. Put differently, a per capita growth
rate of one percent associated with a one percent decrease in P_1 in 1960 should not
be deemed less pro-poor than the same growth rate accompanied by a 1.6 percent
reduction in poverty twenty years later. These numbers hint at the importance of
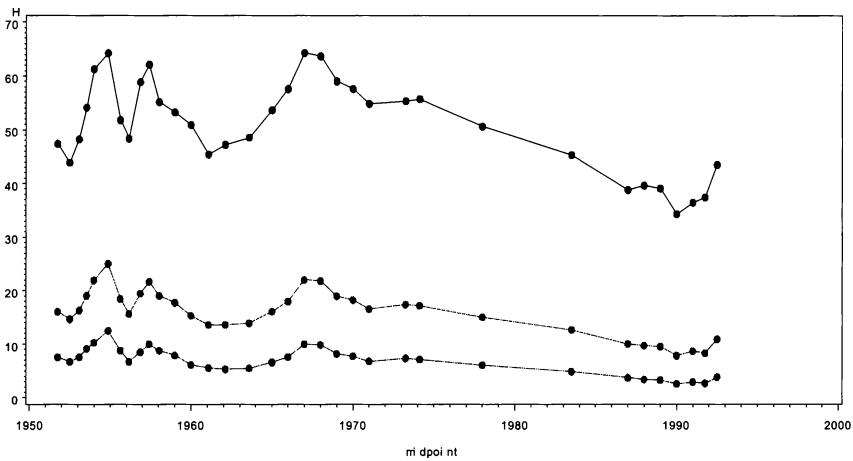taking into account η for judgements about PPG.

Figure 3: Headcount ratio (top), poverty gap ratio (middle),
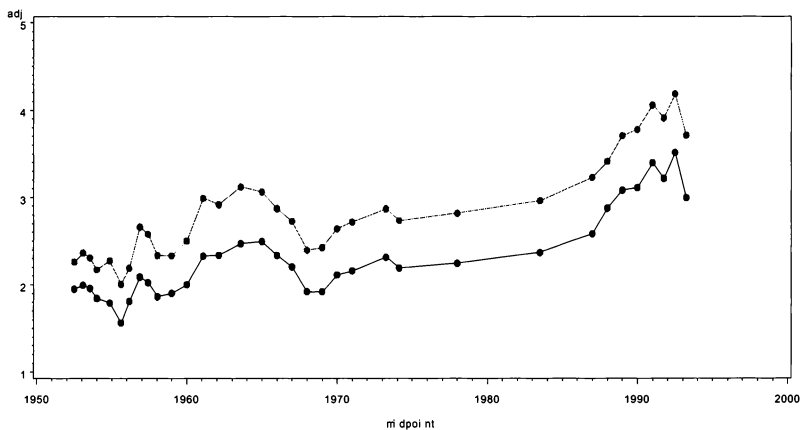squared poverty gap ratio (bottom)

Figure 4: Distrubution-neutral growth elasticities, η_1 (top) and η_2 (bottom),
absolute values*

* $\eta_1 = -(\text{HCR}/\text{PGR-1})$, $\eta_2 = -2(\text{PGR}/\text{SPGR-1})$.

D. Estimation and results

We now proceed to the estimation of a modified version of equation system 4. As the data used for this exercise are time series, it is warranted to first investigate the data's dynamic properties before specifying an empirical model of output and poverty. Therefore, the next subsection is devoted to an analysis of the dynamic properties of the time series used here. With insights obtained there, a joint model of output and poverty in the spirit of (4) will be is set up and estimated subsequently.

The dynamic properties of the series

This subsection aims to identify the dynamic process generating the time series which will be used in the subsequent empirical analysis of income and poverty. In doing so, I take into account the possibility of a structural break in the series as the discussion in the previous section has suggested that the nature of the growth process changed as the green revolution of the 1970s got under way. Unfortunately several features inherent in the data set out in *Table 1* make testing between stochastic and deterministic trends particularly awkward. First, there are substantial gaps for years in which no consumption survey was conducted. Second the observations are not evenly spaced, i.e. the time between midpoints of adjacent rounds is not constant, especially for the early years. Third, the observations can hardly be considered identically distributed as different rounds cover different time periods (see the second column of *Table 1*). Lastly, with 33 observations, the series are short. To improve on each of these shortcomings, in this section I will employ yearly data of value added in agriculture, which is available without interruptions from 1950 to 1995. These data are arguably generated by the same economic process as the income data in *Table 1,* which covers NSS rounds. On the other hand, the yearly data has no gaps, they are evenly spaced and cover the period of exactly one year, and there are 46 observations available.[2] As such data are not available for any of the poverty series, this section will be confined to an analysis of the series of y. In regard of the fact that agricultural productivity increased in a sustained fashion toward the end of the 1970s and that a sustained one time jump in the series of agricultural output can hardly be justified economically, I will only consider a single break in the trend of this series.

In the presence of a structural break affecting the time trend (or drift when there is a unit root) whose date is unknown a priori, *Vogelsang* and *Perron* (1998) suggest the following, so-called additive outlier procedure. Denoting $1(t > T_b)$ $(t - T_b)$ by DT_t, where T_b is the time of the structural break and $1()$ the indicator function, first estimate

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[2] For considerations of space, these additional data are not set out in a table. They are available from the author on request. The source is Özeler et al. (1996).

(5) $$y_t = \mu + \beta t + \gamma DT_t + u_t$$

by OLS for all possible break dates T_b and select the value of T_b which maximizes the T-statistic of γ. With the annual data of y in logarithms, this is achieved for $T_b = 1979$. For that value of T_b, the results of the regression are set out in *Table 2*. In this specification the additional trend term is highly significant with the T-statistic of γ equal to 4.61.

Table 2

OLS regression of annual agricultural real GDP per capita

	Est.	Std	T
Constant	4.0601	1.6983	2.39
Trend	0.0014	0.0009	1.57
Additional Trend after Break Date	0.0108	0.0024	4.61

The second step consists of estimating

$$u_t = \alpha u_{t-1} + \sum_{i=1}^{k} c_i \Delta u_{t-i} + \nu_t$$

by OLS for alternative values of k, where u_t is the residual obtained from the previous equation. It is recommended that the number of lags included is chosen such that the coefficient of the last lag included is significant at the 10 percent level. For the present data, the specification with $k = 0$ gives a p-value of c_1 of 0.34, which implies a choice of $k = 0$. The results of that specification are set out in Table 3. The test statistic is the T-statistic for the test of the hypothesis that α equals one, i.e. $t_{\hat{\alpha}} = (0.046 - 1)/.15 = -6.36$, and the decision rule is to reject the unit root hypothesis when $t_{\hat{\alpha}}$ is small (i.e. large in absolute value). Given that the break is estimated to occur at a sample fraction of $(1979 - 1950)/46 = 0.63$, at a level of 1% the asymptotic critical value of $t_{\hat{\alpha}}$ is -4.50 (see *Perron* and *Vogelsang, 1993, Table 1*). I thus confidently reject the unit root hypothesis and will hence treat the series used here as trend stationary, where a break in the trend function is taken into account.

Table 3

OLS regression of y-residuals

	Est.	Std.	T
Lagged y Residuals	0.046	0.150	0.30

Estimation of pro-poor indices

In this section I estimate a variant of equation system 4. Guided by the results of the previous subsection, the y equation of (4) will be augmented to accommodate the change in slope of that series. When the break date is unknown, *Perron* (2005) suggests choosing the break date such that the residual sum of squares is minimized. For equation 5, this leads to choosing T_b equal to 1979, which coincides with the choice of T_b maximizing the T-statistic of γ. Perron shows that, with this procedure, the asymptotic distribution of other estimated coefficients has the same standard properties as when the break date is known.

I thus model the growth process of y in this section with a unique change in slope occurring in 1979. To be precise, the estimating equation for y is specified as

$$(6) \qquad \log(y_t) = b_0 + (1 - after_t)\, b_1 t + after_t \left[b_2 t - 1979(b_2 - b_1) \right] + \varepsilon_{yt}$$

where $after_t$ is equal to one if $t > 1979$ and zero otherwise. Notice that t is chosen to be the midpoint of the NSS survey year.

The specification of the poverty equation is

$$(7) \quad \log(P_{\alpha,t}) = a_0 + \eta_{\alpha,t-1}\left\{ (1 - after_t)\, a_1 b_1 t + after_t a_1 \left[b_2 t - 1979(b_2 - b_1) \right] + a_2 \hat{\varepsilon}_{yt} \right\} + \varepsilon_{Pt}$$

where

$$\hat{\varepsilon}_{yt} = \log(y_t) - \left\{ b_0 + (1 - after_t)\, b_1 t + after_t \left[b_2 t - 1979(b_2 - b_1) \right] \right\}$$

is the residual of the y equation. Note that, in addition to the fitted trend terms of the y equation, the poverty equation is augmented by the term $a_2 \eta_{\alpha,t-1} \hat{\varepsilon}_{yt}$, which accounts for the impact of transitory shocks to aggregate income on poverty. In this connection, the interpretation of a_2 is somewhat different from a_1's. In particular, a value of a_2 larger than unity means that the poor suffer more than the non-poor in years of negative shocks to aggregate income. In this light, we may deem transitory shocks to work in a pro-poor fashion, if a_2 is smaller than unity. Transitory shocks leave the poor unaffected if $a_2 = 0$.

To put the results of the approach developed here into perspective, I will also estimate a traditional poverty regression,

$$(8) \qquad \log(P_{\alpha,t}) = a_0 + a_1 \left\{ (1 - after_t)\, b_1 t + after_t \left[b_2 t - 1979(b_2 - b_1) \right] \right\} + a_2 \hat{\varepsilon}_{yt} + \varepsilon_{Pt}$$

For $\alpha = 1$, the SUR results of systems (6), (8) on the one, and (6), (7) on the other hand are set out in columns 1 and 2 of *Table 4*, respectively. Corresponding results for the squared poverty gap index, $\alpha = 2$, are set out in *Table 5*. Turning to *Table 4* first, per capita income growth is estimated at 1.45 % and 1.31 % per year after 1979, respectively, as opposed to a disappointing 0.1 % for the period before

Table 4

SUR results for the poverty gap index, $\alpha = 1$, without (1) and with (2) correction for distribution-neutral growth, constant relationship between output and poverty

			(1)			(2)		
Dependent Variable and Coefficient			Est.	Std.	T	Est.	Std.	T
y	b_0	constant	6.7277	0.0110	611.3	6.7241	0.0122	552.62
	b_1	trend before 1979	0.0013	0.0007	1.83	0.0018	0.0009	2.16
	b_2	trend after 1979	0.0145	0.0022	6.64	0.0131	0.0023	5.70
P_2	a_0	constant	2.9192	0.0441	66.16	2.9184	0.0416	70.17
	a_1	fitted y trend function	–4.1218	0.5593	–7.37	1.3140	0.1786	7.36
	a_2	y residual	–0.5894	0.7093	–0.83	0.2357	0.3116	0.76

Table 5

SUR results for the squared poverty gap index, $\alpha = 2$, without (1) and with (2) correction for distribution-neutral growth, constant relationship between output and poverty

			(1)			(2)		
Dependent Variable and Coefficient			Est.	Std.	T	Est.	Std.	T
y	b_0	constant	6.7239	0.0108	625.17	6.7205	0.0124	539.83
	b_1	trend before 1979	0.0017	0.0007	2.41	0.0022	0.0009	2.56
	b_2	trend after 1979	0.0137	0.0021	6.57	0.0124	0.0023	5.34
P_2	a_0	constant	2.1348	0.0576	37.08	2.1267	0.0548	38.82
	a_1	fitted y trend function	–5.6826	0.7135	–7.96	1.4992	0.1959	7.65
	a_2	y residual	–0.9948	0.8999	–1.11	0.2911	0.3143	0.93

1979.[3] Both of these coefficients are significantly bigger than zero and also significantly different from each other. When poverty is concerned, the traditional approach (column 1 of *Table 4*) gives a poverty elasticity of 4.1. The adjusted approach, on the other hand, gives a pro-poor index of 1.3. This coefficient is, moreover, significantly different from zero and, at a level of 10 percent, bigger than unity, which suggests that, taken as a whole, the growth process in rural India was significantly pro-poor. Fluctuations in y affect the poor far less than long-term factors. The coefficient a_2 is estimated to be small and is not distinguishable from

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[3] These numbers are roughly in accordance with the findings obtained from the more comprehensive annual y series. There the annual growth rate is estimated at 1.2 and 0.1 % after and before 1979, respectively (see *Table 2*).

zero at conventional significance levels. The order of magnitude of this coefficient in column 2, 0.24, suggests that the non-poor carry most of the burden of a bad shock (but of course also enjoy most of the additional surplus of a good shock).

Turning to *Table 5,* where results for the squared poverty gap ratio, $\alpha = 2$, are set out, we see qualitatively identical results compared to the poverty gap ratio. Here the pro-poor index is estimated at 1.5 which is different from unity at the one percent level. Notice that the more favorable picture, which arises with the squared poverty gap index as dependent variable, is in accordance with the qualitative finding from *Figure 4,* according to which the situation of the very poor among the poor improved disproportionately between 1951 and 1992.

Given the dramatic regime shift in y's time series, it may be worthwhile to allow for such a shift in the relationship between income and poverty as well. In this connection it has been found that more recent accelerated growth in Indian agriculture tended to slow down the secular decrease in economic inequality previously observed in India's rural sector (*Bell* and *Klonner,* 2005). A specification of the poverty equation in the adjusted poverty regression which allows for a single trend break in the relationship between output and poverty in 1979 is

(9)

$$\log(P_{\alpha,t}) = a_0 + \eta_{\alpha,t-1}\left\{a_{11}(1 - \mathit{after}_t)\, b_1 t + a_{12}\, \mathit{after}_t\left[b_2 t - 1979(b_2 - b_1)\right] + a_2\hat{\varepsilon}_{yt}\right\} + \varepsilon_{Pt}$$

while the poverty equation of a traditional poverty regression is given by

(10) $$\log(P_{\alpha,t}) = a_0 + a_{11}(1 - \mathit{after}_t)\, b_1 t + a_{12}\, \mathit{after}_t\left[b_2 t - 1979(b_2 - b_1)\right] + a_2\hat{\varepsilon}_{yt} + \varepsilon_{Pt}\,.$$

In both cases the equation modelling the income process remains unchanged.

SUR results for systems (6), (10) and (6), (9) are set out in *Tables 6* and *7* for the poverty gap and squared poverty gap ratio, respectively. Turning to *Table 6* first, the most interesting finding here is that, at 0.80, the point estimate of the pro-poor index is smaller than one for the period before 1979 while it exceeds unity by 0.28 after that date, which suggests that the growth process has been more pro-poor in more recent years than before. Allowing for a structural break in the relationship between y and P, however, comes at the cost of less precise estimates, which prevents this finding from being statistically significant. In fact, the coefficient a_{11} in column two, which measures the pro-poor index for the period before 1979 is not even significantly different from zero. Another lesson from this exercise is that comparing poverty elasticities across sub-samples to make statements about how effective growth is in reducing poverty may be misleading. In this connection, the poverty elasticity for the period before 1979 is estimated at 1.18 and at more than three times that (3.87) later on. In contrast, the adjusted procedure yields an increase in the pro-poor index of only (in comparison) about 50 %, which is due to the fact that the distribution around the poverty line evolved in such a way that, in later years, neutral growth implied a larger poverty elasticity.

Table 6

**SUR results for the poverty gap index, $\alpha = 1$, without (1)
and with (2) correction for distribution-neutral growth, break in relationship
between output and poverty**

			(1)			(2)		
Dependent Variable and Coefficient			Est.	Std.	T	Est.	Std.	T
y	b_0	constant	6.7214	0.0120	560.36	6.7215	0.0140	481.27
	b_1	trend before 1979	0.0019	0.0009	2.20	0.0021	0.0010	2.05
	b_1	trend after 1979	0.0131	0.0024	5.48	0.0126	0.0027	4.72
P_1	a_0	constant	2.8898	0.0514	56.19	2.9030	0.0522	55.65
	a_{11}	fitted y trend before 1979	−1.1863	2.0658	−0.57	0.8015	0.9064	0.88
	a_{12}	fitted y trend after 1979	−3.8680	0.5603	−6.90	1.2797	0.1940	6.59
	a_2	y residual	−0.6840	0.7203	−0.95	0.2345	0.3091	0.76

Table 7

**SUR results for the squared poverty gap index, $\alpha = 2$, without (1)
and with (2) correction for distribution-neutral growth, break in relationship
between output and poverty**

			(1)			(2)		
Dependent Variable and Coefficient			Est.	Std.	T	Est.	Std.	T
y	b_0	constant	6.7212	0.0119	564.52	6.7200	0.0146	460.35
	b_1	trend before 1979	0.0020	0.0009	2.26	0.0022	0.0011	2.11
	b_2	trend after 1979	0.0131	0.0024	5.51	0.0123	0.0028	4.43
P_2	a_0	constant	2.1187	0.0658	32.18	2.1307	0.0662	32.20
	a_{11}	fitted y trend before 1979	−3.9809	2.8370	−1.40	1.5360	0.9928	1.55
	a_{12}	fitted y trend after 1979	−5.5463	0.7433	−7.46	1.5022	0.2185	6.88
	a_2	y residual	−1.0272	0.9155	−1.12	0.2919	0.3151	0.93

With the squared poverty gap index a similar picture arises. The most interesting finding here is that the traditional poverty regression and the adjusted procedure give different rankings of how advantageous growth was for the poor before versus after 1979.

The estimated poverty elasticity increased from 3.98 to 5.54 while the pro-poor index slightly decreased from 1.54 to 1.50. As for the poverty gap index, however, this finding fails to be statistically significant at common levels.

It should finally be noted that for all four specifications set out in *Tables 6* and *7*, the coefficient restriction $a_{11} = a_{12}$ fails to be rejected at the ten percent level. In this light the present data do not appear to support a trend break in the relationship between output and poverty. As the contribution of this paper is methodological in the first place, however, the qualitative findings just spelled out still deserve attention.

To conclude this section, the estimates of a_1, and b_1 and b_2 of system (6), (7) can be used to derive poverty-equivalent growth rates, which are computed as $a_1 b_1$ for the period before 1979 and $a_1 b_1$ afterwards. This gives 0.24 % ($\alpha = 1$) and 0.33 % ($\alpha = 2$) per year for the period before 1979 compared to 1.72 % and 1.86 % afterwards. To put this number into perspective, *Kakwani* et al. (2004) report an average PEGR of about 8 % for South Korea between 1990 and 1996, which is driven by much faster aggregate growth of roughly 7 % per year. For Thailand, these authors report an average PEGR of around 6 % per year between 1988 and 1996, which is again driven by rapid aggregate growth of about 7.5 % per year. What this comparison makes clear is that, even though rural India has the highest PPI in this international comparison, South Korea's and Thailand's aggregate growth, which was five times as fast as rural India's, led to substantially greater poverty reduction. Qualitatively, this underpins the findings of *Dollar* and *Kraay's* (2004) cross-country study.

E. Conclusion

Kakwani and *Pernia* (2000) have introduced the concept of the pro-poor index, which is useful for statements on the effectiveness of poverty reduction relative to aggregate economic growth. In this paper I have introduced a method for estimating pro-poor indices from time series data. In contrast to traditional growth regressions, in which poverty elasticities cannot tell whether and to what extent growth is pro-poor rather than pro-rich, the approach developed here delivers clear judgements about the nature of the growth process as far as the poor are concerned. My method also has advantages over existing applications of the PPI. When pro-poor growth is of concern, one is interested primarily in the relationship between long-term growth and long-term poverty trends. In contrast to existing PPI calculations based on year-to-year comparisons, my method allows to separate transitory from long-run determinants of poverty. Moreover, it allows to conduct statistical inference about the nature of the growth process, i.e. whether growth is pro-poor or not.

The method is applied to data from rural India, where substantial aggregate growth reduced poverty by about a third between 1951 and 1992. I conclude that growth was significantly pro-poor over the period as a whole. Moreover, when the relationship between output and poverty is modelled with a structural break in 1979, the procedure developed in this paper suggests that the estimated difference

in poverty reduction relative to the growth rate is overstated by a traditional poverty regression.

The method presented here allows comparisons of the nature of growth processes both over time and across space. It thus contributes to a growing literature on how to measure and operationalize the concept of pro-poor growth. It is hoped that, for future research, it provides a useful tool for identifying determinants of pro-poor growth as well as evaluating the poverty-reduction record of policy makers in low income countries.

References

Ahluwalia, M. S. (1978): "Rural Poverty and Agricultural Performance in India", Journal of Development Studies 14, 298 – 323.

Bell, C. / *Klonner,* S. (2005): "Output, Prices and the Distribution of Consumption in Rural India", Agricultural Economics 33, 29 – 40.

Bhagwati, J. N. (1988): "Poverty and Public Policy", World Development Report 16, 539 – 654.

Burgess, R. / *Pande,* R. (2005): "Do Rural Banks Matter? Evidence from the Indian Social Banking Experiment", American Economic Review 95, 780 – 197.

Datt, G. / *Ravallion,* M. (1998): "Farm Productivity and Rural Poverty in India", Journal of Development Studies 34, 62 – 85.

Deaton, A. / *Kozel,* V. (forthcoming): "Data and Dogma: The Great Indian Poverty Debate", World Bank Research Observer.

Dollar, D. / *Kraay,* A. (2004): "Growth is Good for the Poor" in Growth, Inequality, and Poverty: Prospects for Pro-poor Economic Development, A. Shorrocks and R. van der Hoeven, eds. Oxford: Oxford University Press, p. 29 – 61.

Foster, J. / *Greer,* J. / *Thorbecke,* E. (1984): "A Class of Decomposable Poverty Mea-sures", Econometrica 52, 761 – 766.

Joshi, V. / *Little,* I. M. D. (1994): India: Macroeconomics and Political Economy 1964 – 1991, Oxford: Clarendon Press.

Kakwani, N. (1990): "Poverty and Economic Growth with Application to Côte d'Ivoire", Living Standards Measurement Study Working Paper No. 63, The World Bank.

Kakwani, N. / *Khandker,* S. / *Son,* H. H. (2004): "Pro-poor Growth: Concepts and Mea-sure-ment with Country Case Studies". UNDP International Poverty Centre Working Paper No. 1.

Kakwani, N. / *Pernia,* E. M. (2000): "What is Pro-poor Growth?", Asian Development Review 18, 1 – 16.

Özeler, B. / *Datt,* G. / *Ravallion,* M. (1996): "A Database on Poverty and Growth in India". Poverty and Human Resources Division, Policy Research Department, The World Bank.

Perron, P. (2005): "Dealing with Structural Breaks", Manuscript, Boston University.

Perron, P. / *Vogelsang,* T. (1989): "The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis: Erratum", Econometrica 61, 248 – 249.

Planning Commission (1993): Report of the Expert Group on Estimation of Proportion and Number of Poor, Government of India, New Delhi.

Ravallion, M. / *Chen,* H. (2003): "Measuring Pro-poor Growth", Economics Letters 78, 93 – 99.

Ravallion, M. / *Datt,* G. (2002): "Why has Economic Growth been more Pro-poor in some States of India than Others?", Journal of Development Economics 68, 381 – 400.

Townsend, R. (1994): "Risk and Insurance in Village India", Econometrica 62, 539 – 591.

Vogelsang, T. J. / *Perron,* P. (1998): "Additional Tests for a Unit Root Allowing for a Break in the Trend Function at an Unknown Time", International Economic Review 39, 1073 – 1100.

United Nations (2005): The Millennium Development Goals Report, UN Department of Public Information.

Policy Options for Achieving
Pro-poor Growth in Bolivia

By *Jann Lay, Rainer Thiele,* and *Manfred Wiebelt*, Kiel*

Abstract

Employing a recursive-dynamic Computable General Equilibrium (CGE) model, this paper evaluates the opportunities for achieving pro-poor growth in rural and urban Bolivia. It turns out that due to several factors prospects are much less favorable for rural households. First, the rural economy will inevitably have to cope with recurrent disruptions caused by external shocks. Second, difficult natural conditions in combination with very low initial capital endowments will limit the impact of efforts to increase the asset base of poor farmers. Third, the modern, dynamic segment of the agricultural sector is too small to absorb a sizeable part of the poor rural workforce. Finally, the development of the gas sector will largely bypass the rural economy, and will even raise rural poverty via the economy-wide repercussions it entails. Direct transfers constitute the only realistic option to raise incomes of the rural poor in the short to medium run, but it has to be kept in mind that the financing of transfers that are large enough to accomplish a significant poverty reduction is only sustainable as long as the gas boom endures.

By contrast, several options can be pursued to raise urban growth and to alleviate urban poverty. Despite limited linkages to the rest of the economy, the development of the gas sector will benefit urban areas. The same is true for the two big remaining structural reforms, a deregulation of the urban labor market and an income tax reform.

A. Introduction

The empirical finding that, on average, economic growth in developing countries benefits the poor (*Dollar* and *Kraay* 2002), but that its impact on poverty varies strongly across countries and over time (*Ravallion* 2001), has given rise to the concept of pro-poor growth. This concept has shaped recent innovations in development policy such as the Poverty Reduction Strategy Papers (PRSPs) required to qualify for debt relief under the HIPC initiative and for concessional lending by the IMF and the World Bank. It has also sparked an extensive academic literature,

which includes a large comparative country analysis aimed at operationalizing pro-poor growth (*Agence Française de Développement* et al. 2005).

This paper deals with the country case study for Bolivia. Bolivia is arguably one of the few countries for which it is beyond doubt that the era of structural adjustment under the auspices of the IMF and the World Bank has brought substantial benefits. Starting from a hyperinflation in 1985, the country quickly regained macroeconomic stability and then entered a new growth path (*Thiele* 2003). It has never come anywhere close to East Asian growth rates, however, and growth has been volatile due to recurrent external shocks such as the El Niño weather phenomenon. Furthermore, the rise in average incomes experienced since 1990 has only to a limited extent been translated into poverty reduction. This is particularly true for rural areas, where the poverty incidence still remains at around 80 percent (*Klasen* et al. 2004).[1] In its PRSP, which was completed in May 2001 (*República de Bolivia* 2001), the Bolivian government presents very optimistic projections for medium-run economic growth, which are largely based on the prospects of rising gas revenues. Furthermore, it is acknowledged that faster growth will require additional structural reforms – in particular a more flexible urban labor market and a more efficient tax system – which enable the country to boost private investment, and that only measures specifically tailored to poverty groups, such as investments in rural infrastructure, can make growth more pro-poor than in the past. Finally, the government denies that higher devaluation rates within the crawling peg system might have a positive growth effect.

Against this background, the policy options Bolivia might pursue so as to achieve pro-poor growth will be evaluated using GEM-PIA, a dynamic Computable General Equilibrium (CGE) model for poverty analysis.[2] The remainder of the paper is structured as follows. Chapter 2 motivates the choice of the modeling framework and describes some of its key features. In Chapter 3, it will be examined how reforms in different areas, ranging from exchange rate policies to poverty-focused interventions, might affect the trajectory of the Bolivian economy and the evolution of poverty compared to a business-as-usual scenario. The paper closes with some policy conclusions in Chapter 4.

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[1] Throughout the paper, changes in poverty refer to absolute income poverty, measured by the headcount ratio, the poverty gap and the poverty severity index.

[2] The acronym GEM-PIA stands for **G**eneral **E**quilibrium **M**odel for **P**overty **I**mpact Analysis.

B. Modeling framework

I. Structural vs. reduced-form models

To be useful for policy analysis, economic models should be policy relevant, transparent, timely, and validated for the domain of application of the model (*Devarajan* and *Robinson* 2005). The first two criteria argue strongly for using structural (CGE) models instead of reduced-form models since the latter typically do not explicitly incorporate the transmission channels linking policy variables to economic outcomes. Even if they do, the reduced-form structure of such models makes it difficult to identify the underlying structural relations, and hence difficult to trace out the links between policy variables and outcomes. This holds especially true for distributional and poverty analysis.

Policy relevance requires models to link policy variables and economic outcomes that are of interest in the policy debate. With regard to the pro-poor-growth debate, summary measures such as estimates of the growth elasticities of poverty are an imperfect substitute for a CGE analysis, as the policy debate focuses on identifying the winners and losers from proposed policy changes and on assessing the trade offs between distributional and macroeconomic impacts. For distributional analysis, tracing out the impact of external shocks and policy reforms on changes in the structure of production, trade, employment, and relative prices is at least as important as generating summary distributional and poverty measures.

The transparency criterion argues for the use of small and narrowly focused stylized models that emphasize a particular transmission channel or policy, since it is relatively easy to interpret the results and describe the causal chains involved. Policy relevance, however, requires more sectoral and institutional detail, which calls for the use of applied models that are larger and more complex.

Timeliness is very important for ongoing debates and requires up-to-date models and data. Historical analysis may also be useful but requires that, first, the historical structural model is still relevant and that, second, the domain of applicability of the past policy changes is similar enough to draw valid lessons for current policy.

The issue of validation of a policy model also argues for a structural model. The domain of applicability of a reduced-form econometric model must be contained within the historical range of the data used to estimate the model. The domain of applicability of a structural model depends on the applicability of the structural relations and on the stability of its parameters in the period of analysis. Thus, there is a trade-off between using a structural model, which requires estimation of a large number of structural parameters, and a reduced-form model with far fewer parameters.

Overall, we would argue that it is better to have a good structural model capturing the relevant behavior of economic actors and their links across markets, even if

the parameters are imperfectly estimated, because the domain of applicability of such models makes them more useful for policy analysis.

II. Desired model structure

To be useful for distributional analysis in a shock-prone, highly dollarized, highly indebted poor country such as Bolivia, a structural model should incorporate the most important institutional and structural characteristics of the country and be able to identify the winners and losers from proposed policy refoms. An appropriate modeling framework should therefore

- include different representative households, distinguished by their (initial) income levels (rich and poor), regional affiliation (urban and rural), and factor endowments (capital owners and workers) in order to assess the distributional issues;

- link the distributional results for representative households to household survey information in order to take into account the full functional and spatial characteristics of households in the determination of distributional and poverty results;

- consist of a sectoral production and consumption structure to facilitate an appropriate modeling of structural adjustment processes;

- differentiate between formal and informal activities to distinguish between formal and informal employment, and to take account of alternative sources of labor market segmentation, differences in wage formation, and inter-sectoral wage rigidities;

- consist of an open-economy model incorporating the "rest of the world" as an integral component that permits the consideration of worldwide capital and goods flows and consequently their influence on the domestic economy;

- include the financial system to take account of the facts that (1) poor households have access to only a limited range of financial assets, (2) commercial banks play a predominant role in the financial intermediation process, (3) additional lending to the government may have a crowding-out effect on lending to the private sector, and (4) revaluations of highly dollarized deposit and loan accounts change the distribution of wealth;

- consist of a dynamic framework to differentiate between the impact of short-term stabilization policies and medium to long-term structural adjustment policies;

- be formulated in such a way that it can be used for numerical analysis based on existing datasets.

All these features are included in GEM-PIA. The structure of GEM-PIA is driven by concerns about the links between poverty, income and wealth inequality,

and growth (the so-called poverty-growth-inequality triangle; *Bourguignon* 2004), the types of external shocks affecting growth and poverty, and the policy instruments and institutional regulations being considered to face the external shocks and to achieve pro-poor growth (*Figure 1*). A comprehensive non-technical and mathematical treatment of the model is given in *Wiebelt* (2004). Hence, in what follows only key features of the Bolivian model will be presented.
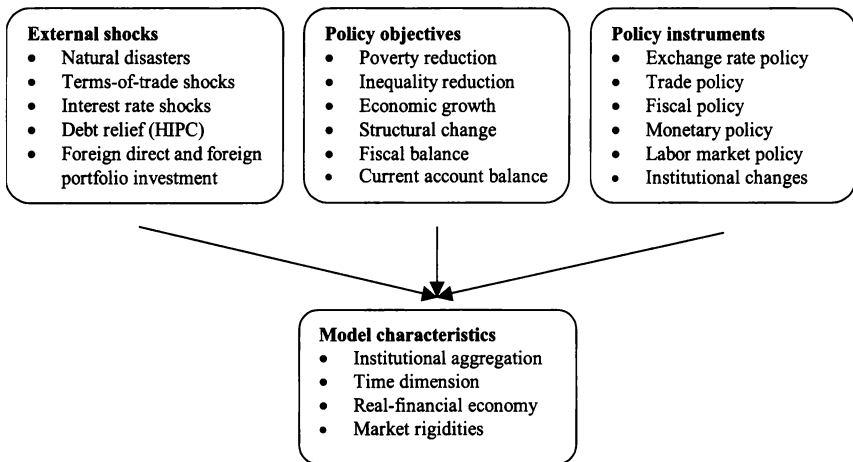
External shocks	Policy objectives	Policy instruments
• Natural disasters	• Poverty reduction	• Exchange rate policy
• Terms-of-trade shocks	• Inequality reduction	• Trade policy
• Interest rate shocks	• Economic growth	• Fiscal policy
• Debt relief (HIPC)	• Structural change	• Monetary policy
• Foreign direct and foreign portfolio investment	• Fiscal balance	• Labor market policy
	• Current account balance	• Institutional changes

Model characteristics
- Institutional aggregation
- Time dimension
- Real-financial economy
- Market rigidities

Figure 1: Factors affecting the structure of the model

III. Key features of the Bolivia model

First, the model identifies six types of representative households (see *Table 1*), distinguished by factor endowments, regional affiliation and income levels. Smallholders and urban informals mainly supply self-employed labor, agricultural and non-agricultural workers exclusively unskilled labor, employees exclusively skilled labor, and employers exclusively capital. With respect to regional affiliation, employer households are peculiar because they live in both rural and urban areas. Four of the households (smallholders, agricultural workers, non-agricultural workers and urban informals) have to be considered as groups with a high incidence of poverty.

A *second* key feature of the model is the explicit treatment of traditional agriculture and (urban) informal services as informal production sectors, where most of Bolivia's poor earn their living. Traditional agriculture mainly comprises small-scale food production with a low degree of market integration, whereas modern agriculture is export-oriented and consists of larger holdings. In the same vein, informal services comprise small businesses such as petty trade, whereas more sophisticated services such as financial intermediation but also public administration

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are allotted to the formal sector. Workers in the informal sectors for the most part rely on their own labor inputs and use only small amounts of capital. This implies that, over one year, supply is almost constant for a given number of workers and given factor productivities; and if demand slackens, adjustment will mainly run through a fall in prices and incomes of those employed in these sectors. By contrast, formal sectors tend to produce with modern, capital intensive techniques and, like the government, hire skilled and unskilled workers, which provides them with greater adjustment flexibility on the supply side.

Table 1

Classification of GEM-PIA for Bolivia

Activities / Goods & Services	Production Factors	Economic Agents
Informal Sectors – Traditional agriculture – Informal services *Formal Sectors* – Modern agriculture – Oil&gas – Mining – Consumer goods – Intermediate goods – Capital goods – Utilities – Construction – Formal services – Public services	*Labor* – Skilled labor – Agricultural unskilled labor – Non-agricultural unskilled labor – Smallholder labor – Urban informal labor *Physical Capital* – Corporate (formal) capital – Employers' capital – Urban informals' capital – Smallholders' capital – Public (infrastructure) capital	*Households* – Smallholders – Agricultural workers – Non-agricultural workers – Employees – Urban informals – Employers *Enterprises* – State enterprises – Private enterprises *Financial institutions* – Commercial banks – Central Bank *Government* *Rest of the world*

Third, supply-side adjustment and income earnings possibilities are hampered by a high degree of factor market segmentation. As regards labor markets, beside the self-employed labor of smallholders and urban informals, two types of unskilled labor (agricultural and non-agricultural) as well as skilled labor are distinguished. Labor markets are linked via rural-rural and rural-urban migration. While the former involves smallholders becoming hired workers in modern agriculture, the latter involves the absorption of smallholders by the urban informal sector. Along the lines of the Harris-Todaro model (*Harris* and *Todaro* 1970), the decision to migrate depends on wage differentials. For all labor markets, full employment is assumed with wage adjustments clearing the respective markets. With regard to capital markets, a distinctive feature of the model is that it separates public infrastructure capital, which is provided costlessly to the different sectors and assumed to have a crowding-in effect on sectoral production. Thus, by determining its

investment focus, the government can influence the income generation possibilities in different sectors and regions (*Agenor* et al. 2003).

Fourth, the working of the model's financial sector is based on Tobin's port-folio-theoretic framework (*Rosensweig* and *Taylor* 1990), where the interaction of stocks and flows plays a decisive role. Starting from the beginning-of-period stocks of assets and liabilities, financial markets match the savings and investment decisions of all economic agents over the period, comprising the accumulation of both physical and financial assets and liabilities. A further characteristic of the financial sector is that specific economic agents may be constrained in their access to credit, which is clearly the case for Bolivia's informal producers, who obtain very few loans from commercial banks (*Jemio* 2001). This is modeled by deter-mining bank credit to the respective agent residually after all other agents' credit demand is satisfied.

Fifth, the identification of stocks in the model makes it possible to account for the revaluation of assets and liabilities, which is of great importance in the highly dollarized Bolivian economy where the value of most domestic assets is at least partially indexed to movements in the exchange rate (*Schweickert* et al. 2005). To-gether with the accumulation occurring over the period, these revaluations deter-mine the end-of-period stocks of assets, liabilities and net wealth for each econom-ic agent.

Sixth, an important feature of the model is its recursive-dynamic nature, which means that the model is solved for a sequence of static equilibria connected through capital accumulation and labor growth. A general advantage of the dy-namic specification is the possibility to generate a medium to long run growth path. Moreover, structural change over time can be analyzed. Finally, dynamic ef-fects running through the financial sector can be captured.

Seventh, the model is calibrated to a Social Accounting Matrix for 1997 (*Thiele* and *Piazolo* 2003), i.e. a year when Bolivia still benefited from improvements in its terms-of-trade, strong inflows of foreign direct investment, and stable macro-economic conditions. The calibrated model was updated so as to generate a fairly smooth growth path reflecting average growth in the 1990s.

Finally, the distributional results of the CGE model are linked to information of the 1999 MECOVI household survey on individual or household factor, remit-tance, and public transfer income to obtain detailed results on the poverty and dis-tributional impact of the simulated policies. The link between CGE and the survey is simply sequential: each individual factor or household income component in the household survey is scaled up or down according to the CGE results.

C. Simulation results

I. Business as usual

A scenario that describes how the Bolivian economy might evolve in the absence of policy changes serves as a benchmark against which all alternative developments will be evaluated. Given Bolivia's susceptibility to external shocks, such a scenario can only be deemed realistic if it accounts for the most significant shocks facing the country. These arguably are the El Niño phenomenon that recurrently hits the agricultural sector, and the steep fall in foreign capital inflows that occurred as a result of the Brazilian crisis (*Klasen* et al. 2004).

Our model results suggest that in the absence of shocks the economy might exhibit smooth economic growth of about 4.7 percent on average over a ten-year period (*Table 2*). Factoring in the two external shocks leads to less optimistic growth projections. El Niño entails substantial short-run costs in terms of agricultural output losses. An El Niño shock of average size may lower GDP growth by about one percentage point in the year when it occurs. Since this is only partly compensated by higher growth in subsequent periods, and since El Niño tends to occur every three years, the losses add up to about 0.3 percentage points lower average growth rates. If foreign capital inflows fall by almost a third, as has been the case in Bolivia in the year 2000, the growth rate of real GDP is driven down by about 1.5 percentage points in the short run. In contrast to El Niño, the impact turns out to be persistent.[3] Even after ten years, growth has not fully recovered. Average growth over the whole simulation period is about 0.3 percentage points lower than without the shock. Overall, then, an average growth rate of 4 percent appears to constitute a realistic baseline scenario for Bolivia's medium-run macroeconomic prospects.

As concerns the distribution of income, the baseline scenario suggests that in the absence of shocks the rise in urban inequality observed over the 1990s (Klasen et al. 2004) would continue, and that the rural-urban gap in income levels would widen. Since both urban and rural inequality is very high, aggregate growth translates into poverty reduction only to a limited extent, which holds in particular for rural areas. In the course of the simulated 10-year period, the national headcount would merely decline from 63.6 percent to 55.3 percent. This moderate reduction would result from a decrease in the urban headcount from 49.7 percent to 38.9 percent, and a decrease in the rural headcount from 86.9 percent to 82.8 percent.

Taking into account the external shocks further worsens this distributional outcome. The direct distributional consequence of El Niño is that smallholders and agricultural workers suffer income losses. The same is true for employers, who

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[3] Since a dramatic fall in foreign capital inflows can be expected to lead to temporary open unemployment on a significant scale, the true short-run losses probably exceed those reported here.

obtain a significant share of their capital income from investments undertaken in modern agriculture. In urban areas, the only major effect of El Niño on household incomes runs via a real devaluation, which makes the providers of non-traded informal services worse off. By contrast, the overall income position of non-agricultural workers and employees is hardly affected as their gains in tradable sectors tend to offset their losses in nontradable sectors. The decline of urban informal income results in a quite considerable increase in the urban poverty incidence. Inequality rises somewhat within urban areas, and quite considerably in rural areas, which is mainly due to the fact that the losses of the employers in modern agriculture are less pronounced than those for rural workers and smallholders.

Table 2

The impact of policy reforms on growth and poverty

	Average Growth (%)	National[a] Headcount	Urban[a] Headcount	Rural[a] Headcount
Baseline Scenario	4.1	57.3	41.1	84.6
No Shocks	4.7	55.3	38.9	82.8
Accounting for El Niño	4.4	56.3	39.7	84.1
Accounting for Declining Capital Inflows	4.4	56.3	40.3	83.3
Policy Reforms (Deviation from Baseline Scenario in Percentage Points)				
Nominal Devaluation	−0.2	1.4	1.5	1.1
Real Devaluation (restrictive monetary policy)	0.0	−0.5	−0.8	0.1
Labor Market Reform	0.3	−0.9	−1.5	0.0
Tax Reform (revenue-neutral)	0.3	−1.4	−1.9	−0.4
Gas Projects (higher government consumption)	0.4	−0.4	−1.1	1.0
Gas Projects (constant government consumption)	0.6	−1.5	−2.8	0.9
Improved Access to Credit for Smallholders	0.0	−0.1	−0.1	0.0
Investment in Rural Infrastructure	0.1	−0.2	−0.2	−0.3
Industrial Policy (modern agriculture)	0.0	0.4	0.7	−0.1
Industrial Policy (consumer goods)	−0.1	−0.4	−0.6	0.0
Transfer Program (lower government consumption)	0.0	−1.5	−1.0	−2.5
Transfer Program (lower public investment)	−0.2	−07	0.0	−1.7
Gas Projects plus Transfer Program	0.4	−1.8	−1.8	−1.8

[a] Ratio at the end of the 10-year simulation period.

Source: Own calculations based on the CGE model.

With lower capital inflows, the losses incurred at the macro level are spread over all sectors using formal capital, and over those producing capital goods. Since traditional agriculture and informal services lack access to formal capital, smallholders and urban informals are the only household groups which do not immediately suffer from the shock. A real devaluation of the Boliviano, however, hurts the urban informals indirectly, while it benefits modern agriculture to such an extent that the sector's loss of capital is overcompensated. Temporarily, smallholders and agricultural workers gain slightly from the shock, but lose somewhat in the medium run as a result of lower economic growth. Accordingly, rural poverty decreases slightly in the shock period, but increases by up to 0.7 percentage points afterwards. Over the entire simulation period, the rural income distribution improves quite considerably. By contrast, all urban households are negatively affected by the fall in capital inflows, and urban poverty rises markedly. The urban income distribution worsens somewhat, which is mainly due to a very pronounced decrease in urban informal income.

In sum, the baseline scenario points to some urban poverty alleviation despite rising inequality, with a headcount ratio that falls from 49.7 to 41.1 percent, and to almost stagnant rural poverty, with a headcount ratio that falls by a mere 2.3 percentage points from 86.9 to 84.6 within a 10-year period.

II. Macro policies

One of Bolivia's biggest achievements since the beginning of reforms in 1985 has been the containment of inflation by means of prudent monetary, fiscal and exchange rate policies. It might be argued that now, with an internal equilibrium that is firmly established, the exchange rate could be used to improve the external competitiveness of the Bolivian economy, given that the Boliviano has always been quite strong (*Schweickert* et al. 2003). The macroeconomic policy instruments are also still needed to bring about the real devaluations required in the face of negative external shocks.

A higher yearly devaluation of the Boliviano within the crawling peg regime – we assume that the rate rises from 5 to 10 percent – causes an almost complete exchange rate pass-through to domestic prices.[4] The ensuing real devaluation is too small to provide the incentives for a significant reallocation of resources, and the minor real adjustment that occurs has no discernible effect on aggregate economic performance. Real effects, however, originate from the financial side of the economy, which is strongly and directly affected by the devaluation. This is because in the highly dollarized Bolivian economy the value of most assets and

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[4] During recessions such as the current one, when capacities are underutilized, the pass-through will of course be lower, but the question here is whether the exchange rate can contribute to improve Bolivia's competitiveness in the medium run.

liabilities is indexed to the Dollar exchange rate. As a consequence, the net wealth position of net creditors in the financial system improves, while that of net debtors worsens. Since the economy as a whole – in particular the government – is a strong net foreign debtor, the overall wealth effect of the devaluation is negative. The deterioration of the domestic wealth position leads to a drop in aggregate real investment and a fall in the growth rate which accelerates over time due to a compound interest effect. Among the household groups, employers and employees are the only major actors on financial markets. Both are net creditors and thus benefit from higher net wealth and interest income. All other household groups are adversely affected by the negative growth effect. Unskilled workers and urban informals are most severely hurt because many of them are employed in the construction sector where production growth is lower because of lower real investment demand. As a consequence, urban inequality increases and urban poverty rises somewhat more than rural poverty.

A real devaluation can be achieved if the Central Bank conducts a restrictive monetary policy. Specifically, we assume that the Central Bank raises the minimum reserves it holds to cover imports by 50 percent, which reduces the amount of credit it extends to commercial banks. By constraining the opportunities of private banks to supply credit, such a policy temporarily lowers aggregate real investment demand and thereby exerts downward pressure on the domestic price level. The drop in real investment, in turn, causes a temporary economic slowdown. Specifically, it has a contractionary impact on capital intensive sectors and on the sectors providing capital goods. This effect dominates the restructuring of production resulting from the real devaluation, which brings about an improvement of the current account. Household incomes are only moderately affected by these adjustments. While the investment slowdown makes non-agricultural workers, in particular construction workers, slightly less well off, the real depreciation entails minor losses for urban informals and minor gains for rural households. After the short-run adjustments, the economy soon shifts back to the old growth path, and household incomes evolve largely as in the base run. As construction output rebounds rather strongly, non-agricultural workers and urban informals even realize small medium-run gains so that urban poverty declines somewhat towards the end of the simulation period.

III. Structural reforms

Compared to other Latin American countries, Bolivia has also made remarkable progress in the area of structural reforms (see, e.g., *Lora* 2001). The main exception is labor markets, where Bolivia's reform efforts have been less comprehensive than elsewhere in Latin America. Among the labor market distortions that still prevail, the wedge between formal and informal wages caused by a segmentation of the urban labor market stands out. The tax system is another area where further reforms may be warranted. In particular, the question arises of whether the income

tax, which hitherto has been of only marginal importance, should become a major source of government revenue.

If urban informals face lower barriers to enter the formal labor market as unskilled workers, e.g. as a result of reduced non-wage labor costs, the obvious direct effect is that average real wages go down for unskilled workers and up for urban informals. Improved earning opportunities in the urban informal sector, in turn, induce rural-urban migration on a significant scale, which moderately increases the incomes of those who stay in traditional agriculture. At the macro level, the efficiency gains achieved by reducing labor market segmentation – the wage differential between informal labor and unskilled labor is roughly halved – translate into average economic growth rates which are more than 0.3 percentage points higher than in the base run.

The distributional impact of the labor market liberalization is most strongly felt in urban areas where the very poor informals gain at the expense of the somewhat less poor unskilled workers. As a result, urban poverty decreases considerably, but it takes some periods for the positive effect to materialize. The rural income distribution also changes somewhat in favor of poorer groups due to the gains experienced by smallholders. This change and a slight increase in rural growth do not show up in the poverty headcount, but the rural poverty gap falls moderately.

A rise in income taxes for all household groups except smallholders and urban informals directly forces the two richest household groups, employers and employees, to consume and save less. For worker households the impact on disposable income is not strong enough to alter consumption and savings significantly.[5] The main indirect effect runs via a tax-induced fall in aggregate private consumption, which lowers the prices received by smallholders and urban informals und thus worsens their real income position. The growth effect of the tax increase depends on how the receipts are allocated between consumption and investment. Under the assumption that the government broadly retains the original structure of expenditures, it is likely to be moderately contractionary in the medium run as the rise in public investment does not suffice to fully offset the fall in private investment.

If higher income taxes are combined with lower indirect taxes so as to arrive at a revenue-neutral tax reform, the economy-wide outcome is different. Lower indirect tax rates cause an expansion of capital-intensive industries (oil and gas, mining, intermediate goods), where the indirect tax burden is highest, and thus boost investment and growth. Overall, given the current tax structure, a revenue-neutral tax reform can be expected to improve Bolivia's growth performance. As for household incomes, the decrease in indirect taxes raises private consumption expenditures, thereby offsetting the negative demand effect that higher income taxes

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[5] The impact of the tax increase on aggregate poverty and income distribution cannot be calculated because the household survey on which the distributional measures are based does not contain information on income tax payments.

have on smallholders and urban informals. The main beneficiaries of the reform are non-agricultural workers, many of whom work in the mining and the intermediate goods sector, as well as in construction, which benefits from higher investment demand. The expansion of the construction sector additionally favors urban informals so that on balance their incomes are also significantly higher than in the base run. The gains of these two groups reduce the urban headcount ratio by up to 2 percentage points, and even rural poverty falls a little due to the growth effect.

IV. Gas projects

Even more than any of the macroeconomic and structural reforms discussed above, the development of the natural gas sector, which gained momentum in the late 1990s, is expected to affect the medium-run growth trajectory of the Bolivian economy (*IMF* 2004). Two large export-oriented hydrocarbon projects with Brazil and Argentina are already under way, another project involving the export of liquefied natural gas to North America has entered the planning stage but is currently on hold (ibid.). Taken together, these projects could roughly double the share of oil&gas in total domestic production from 5 to 10 percent within a decade, and the sector could finally account for as much as 50 percent of total exports. Since oil&gas is an "enclave" industry in the sense that it uses negligible amounts of domestic inputs and generates little employment, its main links to the rest of the economy run through the fiscal accounts in the form of increased tax revenues, and through the balance of payments – gas exports improve the current account and lead to an appreciation of the real exchange rate.

Assuming (somewhat heroically in the North American case) that all gas projects are realized on schedule, they would indeed markedly raise economic growth. In 2008 and 2009, when the liquefied natural gas project is projected to reach full capacity, the growth rate could approach 6 percent.[6] The size of the growth effect will depend on how the government spends its additional revenues. If the receipts are used for consumption, the average gains over the simulation period will be about one third lower than if consumption growth is left constant and the resources are instead used to prop up public savings.[7] Choosing the latter option would increase the (very low) domestic savings rate by up to 3 percentage points compared to the base run, a remarkable improvement which macroeconomic and structural reforms are unlikely to achieve.

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[6] The growth results obtained here come quite close to the projections reported in *IMF* (2004).

[7] The average gains are likely to be slightly underestimated because the upfront investment necessary to construct and develop large gas projects is not taken into account. While most of the inputs, in particular capital goods, will need to be imported, some domestic activities such as construction and business services might benefit during the early phases of the gas projects.

In addition to these macro effects, the real appreciation of the Boliviano affects the structure of the economy in that it leads to a contraction of export-oriented sectors such as modern agriculture, mining and consumer goods, and an expansion of nontradables, in particular construction. This is the well-known Dutch Disease effect of resource booms, which, however, turns out to be rather moderate, except for the two peak years when the real exchange rate appreciates by almost 10 percent. By holding consumption growth constant, the government can slightly dampen the Dutch Disease effect. A further economy-wide repercussion is that lower consumer goods production reduces intermediate demand for agricultural raw materials. As a consequence, modern agricultural activities contract even more, while smallholders suffer from declining prices given that they are very restricted in their supply response. A restructuring of final demand away from private consumption reinforces the pressure on smallholders' prices and also hurts urban informals. This and the fact that rural-urban migration rises considerably explains that urban informals are slightly worse off as a result of the gas projects even though they benefit from the real appreciation and the expansion of the construction sector. Overall, rural areas, i.e. smallholders as well as agricultural workers, suffer significant income losses, in particular in the two peak years. In urban areas, both unskilled and skilled workers gain, with the gain of skilled workers being much more pronounced if government consumption expands as many of them are employed in the public sector.

These changes in relative factor prices induce major distributional and poverty changes. At the national level, inequality increases substantially, which is due to both rising inequality between and within urban and rural areas. In the scenario with higher government consumption, the national Gini-coefficient increases by about 1 percentage point. The outcome for the evolution of poverty during the gas boom falls short of what one might expect. Despite considerably higher growth rates, the decrease in nation-wide poverty is only moderate compared to the baseline scenario, and rural poverty even increases substantially, with a rural headcount that falls by up to 1 percentage points. The rural poverty gap ratio, which during the second half of the simulation period is about 2.5 points higher than in the baseline scenario, illustrates that many of those who were initially very poor incur additional income losses.

The distributional results would be somewhat more favorable if the government refrained from raising consumption expenditures. In this scenario, the headcount would be significantly lower in urban areas, but rural households would hardly benefit and thus would remain markedly worse off than in the absence of the gas boom. In addition, the rise in inequality would be somewhat less severe due to the dampened Dutch Disease effect, with an increase in the Gini-coefficient of about 0.5 percentage points.

V. Targeted interventions in favor of the poor

The limited translation of growth into poverty alleviation points to the problem that many of Bolivia's poor are not well integrated into the economy. Among the policies which might help increase the productivity of the poor, particularly in rural areas where poverty is most persistent, improved access to credit for smallholders and investment in public goods such as rural infrastructure and agricultural research figure prominently (*Thiele* 2003). More direct ways of raising incomes of poor households could involve the subsidization of activities where many of the poor are employed (*Klasen* 2003), or the implementation of traditional transfer programs.

Efforts to improve credit availability for smallholders, e.g. by making land tenure more secure, are likely to raise investment in traditional agriculture significantly, albeit from a very low base. The impact tends to decelerate over time, but even after 10 years real investment could still exceed the base-run level by almost 50 percent. However, since the contribution of capital to sectoral value added is very small, the investment boom only raises output by about 1 percent in the short run and by about 3 percent in the medium run. This supply response is too moderate to induce major adjustments in the rest of the economy. Aggregate investment rises slightly and average economic growth is less than 0.05 percentage points higher than in the base run. Smallholders' real income position improves somewhat as a result of the output expansion, but this does not show up in the rural headcount, and even the poverty gap falls only marginally. Hence, the loosening of smallholders' credit restrictions must be regarded as largely ineffective, at least without further complementary measures.

Specific investments in public goods – e.g. the development of more productive crop varieties or the construction of rural roads – might constitute one such complementary measure. However, even if public investments are tailored to smallholders' needs, its impact is constrained by the difficult natural conditions prevailing in the Bolivian highlands.[8] Here we assume that smallholder's average output is raised by about 6 percent compared to the base run. This expansion comes partly at the expense of modern agriculture so that smallholders realize income gains, whereas agricultural workers experience a less pronounced decline in wages. Although there is a countervailing force in the form of a small price decrease, smallholders benefit to such an extent that fewer of them migrate to urban areas. Together with a small real appreciation, this slightly improves the income position of urban informals. Despite considerably higher income gains in rural areas, reductions in the urban and rural headcount are roughly equal. The difference between the two regions manifests itself in a significantly higher fall of the rural poverty gap, which again reveals that many smallholders are far below the poverty line. In addition, inequality within rural areas decreases slightly.

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[8] Since little is known about the likely productivity effects of public investment in Bolivia's highland agriculture, the results presented here should be regarded as very tentative.

While the measures just mentioned aim at augmenting the asset base of poor households, a pro-poor industrial policy instead aims at raising the returns on existing assets, in particular on unskilled labor. One option in this area would be to support the development of modern agriculture. If the government, for instance, granted a 20 percent export subsidy, the sector would become markedly more important, particularly in terms of its share in total exports, which might increase from 15 to 25 percent. The expansion of modern agriculture is fuelled by rural migrants who are attracted by steeply increasing agricultural wages, and by a reallocation of capital. It is thus associated with lower output growth in traditional agriculture and in the capital-intensive sectors. The policy-induced structural change leads to an improvement of the current account, a small real appreciation of the Boliviano, and minor efficiency losses for the economy. With respect to household incomes, the out migration of smallholders to some extent benefits those who stay in traditional agriculture. The migration effect on smallholders' incomes remains limited because the workforce required in modern agriculture is very small compared to the number of smallholders. Lower production growth in capital-intensive sectors implies lower real incomes for workers and urban informals, which translates into moderately higher urban poverty over the whole simulation period. The rural headcount falls by almost one percentage point in the first period, but the deviation from the base run gradually disappears as the gains of agricultural workers become smaller over time.

An alternative option would be to support agriculture-based industrialization rather than primary agricultural activities. Subsidizing the consumer goods industry would entail stronger economy-wide adjustments than subsidizing modern agriculture and, as a consequence, efficiency losses would be higher. Most importantly, the Boliviano would appreciate considerably, and intermediate demand for agricultural raw materials would go up. The backward linkage to agriculture boosts the production of both agricultural sectors, but for modern agriculture this effect is overcompensated by the loss of competitiveness caused by the real appreciation. This implies that smallholders receive higher real incomes, whereas agricultural workers incur minor losses. The real appreciation improves the income situation of urban informals. Non-agricultural workers benefit from the expansion of the consumer goods industry, but as this expansion largely occurs at the expense of other sectors where they mainly work, their overall income position is not improved. Nonetheless, urban poverty declines substantially due to the gains realized by urban informals. The reduction in the rural headcount again tends to disappear over time, in this case because smallholders mainly benefit in the short run.

Transfer payments constitute the most direct means of enhancing the real income position of the poor. Here we assume that the government expands existing transfer programs so that gross incomes of the poor household groups are raised every year by roughly five percent compared to the base run. Whether the impact of such programs goes beyond the direct beneficiaries largely depends on how the

government finances the outlays. If it substitutes transfer payments for consumption expenditures, economy-wide repercussions are negligible and average growth is not affected. The only significant change is the fall in consumption expenditures itself, which leads to somewhat lower real incomes for public employees. As a consequence of the transfers, which mainly benefit smallholders and urban informals, both urban and rural poverty falls markedly. The evolution of inequality appears to be less favorable. While the nation-wide Gini-coefficient falls somewhat as the income change is stronger in rural than in urban areas, urban inequality remains constant and rural inequality even widens. These surprising regional results can be explained by the fact that the transfers tend to reach richer rather than poorer segments of the smallholders and urban informals.

Financing transfer programs through cuts in investment spending has a much stronger impact on the economy as it lowers aggregate investment and saving ratios by over one percentage point and thereby leads to reduced economic growth. The investment slowdown is most strongly felt in the construction sector, which implies that factor incomes of workers and urban informals decline. For urban informals, the decline is cushioned by a restructuring of final demand towards private consumption. The shift in final demand equally raises smallholders' factor incomes so that they enjoy direct and indirect benefits. Overall, the secondary effects via the fall in investment fully offset the transfer-induced urban poverty reduction, whereas rural poverty alleviation remains sizeable.

VI. Trade-offs and complementarities
between growth and poverty alleviation

When it comes to choosing a policy package for pro-poor growth from the available options, it is important to know whether particular measures promise to create win-win situations in that they help achieve growth and distributional objectives at the same time, or whether there are trade-offs involved.

In the area of macroeconomic policy, higher yearly devaluations of the Boliviano risk to fail on both accounts as a result of adverse balance sheet effects. A tightening of monetary policy, by contrast, may bring about the real devaluations which are regularly required to adjust to external shocks at a negligible short-run cost for the poor.

Among the two structural reforms considered here, a deregulation of the urban labor market carries the potential to make growth considerably more pro-poor by removing a substantial part of the existing wedge between formal and informal wages. Such a measure would, however, meet with strong resistance from formal workers, who arguably are much better organized than the diverse group of people working in the informal sector. This difficult political situation is probably the key factor behind the fact that profound labor market reforms have not yet been initiated.

Similar pressure from powerful interest groups – in this case mainly from public employees – stands in the way of a comprehensive tax reform. Provided that this pressure can be overcome, the introduction of a revenue-neutral tax reform may improve efficiency and reduce poverty. A pure income tax increase, by contrast, is unlikely to serve these objectives. If income taxes are set at moderate rates as assumed above, they are likely to be only mildly progressive and may even raise poverty. And with substantially higher tax rates, the efficiency losses may well turn out to be intolerable.

In the development of Bolivia's gas sector, there appears to be a trade-off between growth on the one hand and the participation of the poor – in particular the rural poor – in the growth process on the other hand. Given the prospect that nation-wide poverty might decrease only moderately as a result of the resource boom and that rural poverty might even increase, the rationale behind the recent social unrest becomes obvious. The trade-off is, however, hard to avoid as the gas sector is highly capital intensive, generates little employment, and uses limited national inputs. To what extent growth and poverty objectives can be reconciled depends on how the government allocates the additional revenues it receives. While an increase in public savings might cushion the trade-off, more specific pro-poor measures are likely to be required in order to make the impact of the gas projects socially acceptable.

Given that rural poverty constitutes the most severe problem, measures targeted at augmenting the asset base of smallholders suggest themselves as possible win-win options. It has to be taken into account, however, that natural conditions in the highlands are not very favorable, and that the growth process would have to start from very low initial capital endowments. This implies that the medium-run supply response, and thus the impact on rural poverty, will probably remain limited.

With respect to pro-poor industrial policies, the key question is whether favorable poverty outcomes can be achieved at low efficiency losses. Our simulation results indicate that efficiency losses may be kept at moderate levels, but that neither a strategy based on export-oriented agriculture nor a strategy based on agricultural processing is likely to bring about lasting improvements for the rural poor.

Transfer programs targeted towards the poor can in principle alleviate poverty without compromising growth objectives, but the precondition for this to happen – a more or less complete financing of the programs out of other current expenditures – appears to be very demanding. If investment spending has to bear the lion's share of the costs, the economic losses can become considerable.

In the coming years, the gas receipts may provide a way out of this trade-off by loosening the budget constraint of the Bolivian government. If gas revenues are used instead of public investment funds to finance transfers, the combination of the gas projects and the transfer programs produces a clear win-win situation, with

higher growth and a marked alleviation of rural and urban poverty.[9] The only major drawback of this policy option is that both the gas projects and the transfer programs lead to a significant increase in rural inequality, raising the rural Gini-coefficient by almost three percentage points in the second half of the simulation period.

D. Concluding remarks

The main general conclusion to be drawn from the foregoing analysis is that in Bolivia the opportunities for achieving pro-poor growth differ enormously between urban and rural areas. This has been true for the 1990s, where until the outbreak of the recent crisis urban households have benefited disproportionately from foreign investment led growth. And it is also true with respect to future prospects, which are less favorable for rural households due to several factors. First, the rural economy will inevitably have to cope with recurrent disruptions caused by external shocks. Second, difficult natural conditions in combination with very low initial capital endowments will limit the impact of efforts to increase the asset base of poor farmers. Nonetheless, investments in public goods such as rural infrastructure or agricultural research should be taken into consideration as they could at least entail some productivity improvements.[10] If it turns out that significant productivity gains can be expected, measures aimed at improving smallholders' access to credit, such as increased tenure security or additional micro credit initiatives, might also have a positive pay-off in that they help realize complementary private investment.

Third, the modern, dynamic segment of the agricultural sector is too small to absorb a sizeable part of the poor rural workforce so that a pro-poor industrial policy based on modern agriculture does not appear to be promising. Finally, the development of the gas sector will largely bypass the rural economy, and will even raise rural poverty via the economy-wide repercussions it entails. This does of course not imply that the gains to be expected from the gas exports should not be realized, but rather that rural households should be compensated for the losses they incur. To achieve this, direct transfers constitute the only realistic option as only direct transfers can raise incomes significantly in the short to medium run. Such transfers should, however, be targeted very carefully. By simply expanding existing transfer programs, as assumed in the simulation reported above, the government will miss most of the poorest households. As a further caveat, the financing of transfers that are large enough to accomplish a significant poverty reduction is

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[9] A similar outcome may also be achieved by combining the transfer program with the tax reform or the labor market liberalization. The respective simulation results are not shown in Table 2 but are available on request.

[10] Unfortunately, evaluations of the impact of public investments in Bolivia are lacking. Hence, their productivity effects can only be guessed, and priority areas for public investment can hardly be identified.

only sustainable as long as the gas boom endures. All in all, it is thus likely that the prospects for rural development areas will to a large extent rely on dynamic growth of the urban economy, which would indirectly raise rural incomes via increased rural-urban migration, higher intermediate demand for agricultural raw materials, and higher consumption demand for food.

Several options can be pursued to raise urban growth and to alleviate urban poverty. Despite limited linkages to the rest of the economy, the development of the gas sector will benefit urban areas. The positive effect will be the stronger the more the gas projects boost domestic investment. Beside the funds earmarked for pro-poor spending, a substantial part of the gas revenues should thus be used to prop up public savings. The difficult task for the government then is to withstand pressures and keep public consumption under control.

In addition, the two big remaining structural reforms, a deregulation of the urban labor market and an income tax reform, would both have a significantly positive impact on growth and poverty and should thus be initiated. The main problem with these reforms is that the potential losers – non-agricultural workers and employees, respectively – can effectively lobby against them. Perhaps it will become somewhat easier to overcome their resistance if the structural reforms are carried out in combination with the gas projects as all urban household groups stand to benefit from the latter.

References

Agence Française de Développement, Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung / U.K. Department for International Development, and The World Bank (2005): Pro-Poor Growth in the 1990s: Lessons and Insights from 14 Countries. Washington, D.C.: The World Bank.

Agenor, P.-R. / *Izquierdo,* A. / *Fofack,* H. (2003): The Integrated Macroeconomic Model for Poverty Analysis: A Quantitative Macroeconomic Framework for the Analysis of Poverty Reduction Strategies. World Bank Policy Research Working Paper 3092. Washington, D.C.: World Bank.

Bourguignon, F. (2004): The Poverty-Growth-Inequality Triangle. Paper Presented at the Indian Council for Research on International Economics Relations, New Delhi, February 4, 2004.

Devarajan, S. / *Robinson,* S. (2005): The Influence of Computable General Equilibrium Models on Policy. In: Kehoe, T. J. et al. (Eds.). Frontiers in Applied General Equilibrium Modeling: In Honour of Herbert Scarf. Cambridge et al.: Cambridge University Press, 402 – 428.

Dollar, D. / *Kraay,* A. (2002): Growth is Good for the Poor. Journal of Economic Growth 7(3): 195 – 225.

Harris, J. / *Todaro,* M. P. (1970): Migration, Unemployment, and Development: A Two-Sector Analysis. American Economic Review 60(1): 126 – 143.

IMF (2004): Bolivia: Second Review Under the Stand-By Arrangement and Request for Waiver of Applicability and Modification of Performance Criteria. IMF Country Report No. 04 / 5. Washington, D.C.

Jemio, L. C. (2001): Debt, Crisis and Reform in Bolivia: Biting the Bullet, Basingstoke: Palgrave in association with Institute of Social Studies.

Klasen, S. (2003): In Search of the Holy Grail. How to Achieve Pro-poor Growth. In: B. Tungodden / N. Stern Eds.), Towards Pro-poor Policies. Proceedings from the ABCDE Europe Conference. Washington, D.C.

Klasen, S. / *Lay,* J. / *Spatz,* J. / *Thiele,* R. / *Wiebelt,* M. (2004): Operationalizing Pro-Poor Growth: A Country Case Study for Bolivia. Report Commissioned by Kreditanstalt für Wiederaufbau and the World Bank.

Lora, E. (2001): Las Reformas Estructurales en América Latina: Qué se ha Reformado y Cómo Medirlo. Interamerican Development Bank. Washington, D.C.

Ravallion, M. (2001): Growth, Inequality, and Poverty: Looking Beyond Averages. World Development 29(11): 1803 – 1815.

República de Bolivia (2001): Bolivia: Poverty Reduction Strategy. La Paz.

Rosensweig, J. A. / *Taylor,* L. (1990): Devaluation, Capital Flows and Crowding-out: A CGE Model with Portfolio Choice for Thailand. In: L. Taylor (Ed.), Socially Relevant Policy Analysis: Structuralist Computable Equilibrium Models for the Developing World, Cambridge, Mass.: MIT Press.

Schweickert, R. / *Thiele,* R. / *Wiebelt,* M. (2003): Makroökonomische Reformen und Armutsbekämpfung in Bolivien: Ebnet die HIPC-Initiative den Weg zu sozialverträglicher Anpassung? Kiel Discussion Papers 398. Institute for World Economics, Kiel.

Schweickert, R. / *Thiele,* R. / *Wiebelt,* M. (2005): Exchange Rate Policy in a Dollarized Economy: A CGE Analysis for Bolivia. Kiel Working Paper 1255. Institute for World Economics, Kiel.

Thiele, R. (2003): The Social Impact of Structural Adjustment in Bolivia. Journal of International Development 15(1): 1–21.

Thiele, R. / *Piazolo,* D. (2003): A Social Accounting Matrix for Bolivia Featuring Formal and Informal Activities. Cuadernos de Economía 40: 285–318.

Wiebelt, M. (2004): GEMPIA – A Dynamic Real-Financial General Equilibrium Model for Poverty Impact Analysis. Kiel Working Papers 1230. Institute for World Economics, Kiel.

Broadening Access to Primary Education: Contract Teacher Programs and their Impact on Education Outcomes in Africa

An Econometric Evaluation for the Republic of Niger

By *Jean Bourdon,* Dijon, *Markus Frölich,* London,
and *Katharina Michaelowa,* Hamburg*

Abstract

For Sub-Saharan Africa as a whole, but particularly for countries in the Sahel zone, full primary enrolment and completion at acceptable quality as codified in the Millennium Development Goals and the Education for All objectives still remains a major challenge. In order to enhance education supply, many of these countries have launched large scale teacher recruitment programs in recent years, whereby the teachers are no longer engaged in civil servant positions, but on the basis of fixed-term contracts typically implying considerably lower salaries and a sharply reduced duration of professional training. While this policy has led to a boost of primary enrolment, stakeholders in the education system generally fear an important loss in the quality of education. Using data from the "Program on the Analysis of Education Systems" (PASEC) for Niger in 2000/2001, we show that once confounding factors are controlled for, the performance of contract teachers is not generally worse than the performance of other teachers. Matching students taught by contract teachers to those taught by civil servants provides no significant evidence of an advantage of the latter in grade 5. In grade 2, there is evidence for a sizeable advantage of traditional teachers – but only as long as job experience is not appropriately taken into account. Given the strong impact on enrolment and the generally insignificant effect on education quality, the overall assessment of the program remains clearly positive.

A. Introduction

As highlighted in the Millennium Development Goals, enhancing access to primary education is an integral part of poverty reduction. It is as much an objective

in itself as a necessary tool for economic development and growth. Governments who fail to provide children and adults in their country with the opportunity to acquire basic knowledge and skills, fail to satisfy basic needs and thus fail with respect to a highly relevant dimension of poverty reduction. As a tool for economic development and growth, the influence of education works both directly, via enhanced productivity, and indirectly, channeled by the influence of education on health, nutrition, reduced population growth and so forth. These linkages are now largely documented in the empirical literature (for an overview, see e.g. *Michaelowa* 2001a).

While the objective of providing at least a basic education for all children has been reiterated over and over again by the international community, and has been codified not only in the Millennium Development Goals, but also in the Education for All (EFA) objectives in 1990 and in 2000, many countries still face considerable problems in meeting the challenge. These countries are primarily located in sub-Saharan Africa, and the situation is at worst in the francophone countries of the Sahel region. According to *Bruns, Mingat* and *Rakotomalala* (2002, Tables 1.1 and 2.4) only 45 % of African children complete primary school, and all francophone sub-Saharan African countries except Gabon and Togo show figures that lie below or around this regional average. Out of seven countries with primary completion rates at 25 % or below, six are francophone. With primary completion rates below 20 % and an overall net primary enrolment rate of only 31 %, Niger holds the sad record of the worst performer worldwide at the end of the 1990s (*UIS* 2004, *PASEC* 2005a).

In terms of development over time, although there has been notable progress in some countries like Benin, Guinea, Mali and Mauritania, in more than half of the francophone African countries, completion rates have stagnated or even declined over the 1990s. The difficulties faced by francophone sub-Saharan Africa are further exacerbated by current inefficiencies in the allocation of financial resources. In a multivariate regression analysis with regional dummies, *Mingat* and *Suchaut* (2000, p. 8) show that the relative disadvantage of francophone and especially Sahelian countries even holds when GDP per capita is corrected for.

One major constraint for the supply of public education in these countries has always been the relatively high financial burden of teacher remuneration. In the Sahel countries Burkina Faso, Mali and Niger, towards the end of the 1990s, primary teacher salaries amounted to more than 6 times GDP per capita, as compared to 2 – 5 times GDP per capita in most other African countries and 1.3 times GDP per capita in OECD countries (*MINEDAF* 2002, p. 117, *OECD* 2002, Table D6.1). The most extreme case was Niger, with a ratio as high as 9.6. At such high rates in relation to national income, it was obviously impossible for the country to hire the necessary number of teachers to meet the rising demand for education exacerbated by high population growth. To a somewhat lesser extent, the same applies for the other countries in the Sahel region and a high number of other predominantly francophone African countries.

In order to reverse the trend and to enhance education supply, many of these countries have launched large scale teacher recruitment programs in recent years, whereby the teachers are no longer engaged in traditional civil servant positions, but on the basis of fixed-term contracts typically implying considerably lower salaries and a sharply reduced duration of professional training. Even earlier, parents of school-aged children often resort to private initiatives, opening their own schools with privately engaged teachers, on contracts at considerably lower rates than those foreseen in the public sector.

Overall, the employment of these "contract teachers" has led to a boost of primary enrolment which has already become evident in the most recent national education statistics. At the same time, stakeholders in the education system generally fear an important loss in education quality. They argue that the relaxation of professional training requirements and the loss in teacher job satisfaction supposedly implied by reduced salaries and less job security will necessarily lead to a collapse of the education system in the long run. Therefore, policy makers have to cope with increasing political pressure, typically organized by teacher unions, if they want to continue to privilege enrolment. Moreover, they are largely uninformed about the impact on educational quality these policies really bring about.

It is the objective of this paper to quantify the effects of the contract teacher statute on education quality in terms of primary student achievement and to find out whether the suggested trade-off between enrolment and education quality really exists. Based on micro data provided by the "Program on the Analysis of Education Systems" (PASEC)[1] from a student and teacher survey carried out in Niger, we will analyze whether the engagement of "contract teachers" truly has a significant impact on student learning. Interpreting the teacher's statute as a "contract teacher" as a "treatment" in the sense of the treatment evaluation literature, we will make use of propensity score matching as suggested by Rosenbaum and Rubin (1983) to compare similar students, differing only with respect to their teachers. On this basis, we will check the robustness of initial results on this question reported in the PASEC country report (*PASEC* 2005a).

Some earlier studies have attempted to estimate the impact of contract teachers in other countries. *PASEC* (2003, 2004, 2005b) provide some regression estimates for Guinea, Togo and Mali. *Bourdon* (2005) reproduces the results for Mali using propensity score matching. *Vegas* and *de Laat* (2003) reexamine the PASEC data for Togo. *Michaelowa* (2001b, 2002) analyzes the evidence from earlier PASEC surveys in Burkina Faso, Cameroon, Côte d'Ivoire, Madagascar and Senegal. These studies will allow us to consider the results for Niger in a broader regional context and to compare national differences of the teacher recruitment programs employed.

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[1] Original French title: "Programme d'analyse des systèmes éducatifs de la CONFE-MEN", whereby CONFEMEN stands for the Conference of Francophone Education Ministers ("Conférence des ministres de l'éducation des pays ayant le français en partage"). To obtain the original data set, contact pasec@sentoo.sn.

This paper is structured as follows: Based on information compiled by *Bernard, Tiyab* and *Vianou* (2004) Section 2 demonstrates the quantitative relevance of contract teacher programs and their development over time for both Niger and other countries of the region. Section 3 provides an overview of the data available for the analysis of contract teachers' impact on student achievement in Niger. Section 4 discusses the estimation approach and presents the results. The latter will then be put in perspective and compared to the results of other country studies in order to conclude with some policy recommendations in Section 5.

B. The relevance of contract teacher programs and their development over time

According to data from the Nigerian administration compiled by *PASEC* (2005a), the country's population more than doubled between 1977 and 2001. Between 1990 and 2003 alone, it increased from 7.7 to 11.5 million. More than half of the population is below 15 years of age. Thus, population pressure constitutes a considerable challenge for the provision of educational services. Since, at the same time, economic growth has never been able to match population growth, available resources per head have declined, resulting in lower tax revenue per capita and reductions in the degree of freedom for public expenditure. In addition, even as a percentage of GDP, educational expenditure was subject to severe cuts, decreasing from around 4.5 % in 1990 to 2.6 % in 2002.

The challenge of providing education to a strongly increasing population of children and youth under tight budget constraints is similar for many other countries in the region. According to estimates of UNESCO / Pôle de Dakar, the members of the Economic Community of Western African States (ECOWAS) as a whole faced an increase in primary student numbers of 53 % between 1987 and 2001, and will have to cope with a further increase of 83 % between 2001 and 2015 in order to meet the EFA objectives. If class size is given, this results in an equally important need for additional teachers (*Amelewonou, Brossard* and *Gacougnolle* 2004). Theoretically, an alternative could be a further increase of the student-teacher ratio, but at a given average class size of over 45 (with often much higher class sizes, especially in urban areas) this option is generally considered as unviable.

However, given tight budget constraints, it became obvious towards the late 1990s that engaging more teachers on traditional civil servants contracts with salaries and other benefits was illusionary as well. These salaries were far above the market rates as they originated in the French law on the equality of remuneration for civil servants voted on the initiative of Lamine Gueye (native from Senegal) in 1950.

In order to be sustainable, an education system must be able to exist on the country's own resources, at least in the long run, i.e. expenditure must remain in a viable proportion to national income. From this perspective, traditional civil ser-

vant teacher salaries in many Western African countries, notably in the Sahel region, appeared to be clearly unsustainable.

With primary teacher salaries amounting to about 9 times GDP per capita in the late 1990s, teacher remuneration in Niger as compared to per capita income was the highest worldwide (see *Table 1,* column 1). In 1998, the country therefore decided to introduce a new teacher recruitment system whereby new teachers would no longer be integrated in the civil service, but employed on fixed term contracts with a salary about half as high as traditional teacher salaries.[2] While other countries followed similar policies, the policy shift in Niger was particularly marked and brought about the massive employment of new teachers. After 1998, almost 2800 new teachers were recruited every year, as compared to an average of 520 per year between 1990 and 1998 (*PASEC* 2005a), so that in the year 2000, public "contract teachers" already made up 50 % of the entire primary teacher population (see right hand side of *Table 1*). In other countries, public authorities were generally more reluctant, but private stakeholders such as parents and local communities often took over the initiative.

While the purpose of introducing the statute of "contract teachers" has always been to further enrolment at reduced cost, the concrete implementation of this policy has been quite different in each country. While some countries like Niger and Togo started to employ all new teachers on fixed term contracts, countries like Mali continued to engage a limited number of civil servants. Moreover, there are considerable cross-country differences in the relative salary of the new contract teachers. As depicted on the left hand side of *Table 1,* in some countries like Cameroon and Mali, public contract teachers receive only about 25 % of the traditional teacher salaries. In other countries the discrepancy is much less extreme, in particular in Burkina Faso where one can hardly make out a real difference. Privately employed contract teachers earn much lower salaries than traditional teachers in all countries, and often even much less than the new public contract teachers do.

Further differences exist with respect to entry requirements in terms of educational attainment and professional training. Typically, professional training has been considerably reduced from several years in specialized teacher training institutes ("Ecoles Normales") to a few months, or even weeks provided by diverse institutions or as on-the-job training under the mentorship of senior teachers. This reduction in teacher training also reduced the cost incurred by the education system, in particular as teacher candidates often received scholarships during this training period, i.e. before being actually employed in schools.

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[2] Obviously other ways of reducing the financial burden of teachers salaries would also have been conceivable, in particular a reduction of civil servants' remuneration could have been considered. However, it is generally perceived as politically very difficult or even impossible to change existing rights and regulations for civil servant already in office (insider-outsider problem).

Table 1

Distribution of primary teachers according to their statute

Country	Teacher remuneration			Distribution across statutes		
	Civil Servants	Contract teachers		Civil servants	Contract teachers	
		Public	*Private*		*Public*	*Private*
Benin (2002)	5,2	2,1	1,3	55 %	16 %	29 %
Burkina Faso (2002)	5,8	5,6	2,2	64 %	24 %	12 %
Cameroon (2002)	5,3	1,4	0,8	35 %	20 %	45 %
Chad (2002)	8,2	–	2,3	32 %	0 %	68 %
Congo (2003)	2,4	0,9	0,6	42 %	4 %	54 %
Côte d'Ivoire (2001)	4,8	–	–	87 %	0 %	13 %
Guinea (2000)	3,5	1,1	–	52 %	30 %	18 %
Mali (2000)	5,8	1,5	0,9	71 %	8 %	21 %
Niger (2000)	8,9	3,5	–	46 %	50 %	4 %
Senegal (2003)	5,7	2,6	–	44 %	41 %	15 %
Togo (2001)	6,4	3,3	1,3	35 %	30 %	35 %
Mean	5,6	2,4	1,3	51 %	20 %	29 %

Notes: Public: under contract with public authorities; *Private:* under contract with parents or local communities. On average, in OECD countries, primary school teachers' salary corresponds to 1.3 times GDP per capita; in Germany and UK the factor is 1.5, and in the US, it is 1.1 to name but a few examples. (However, one should be cautious with direct comparisons given the scarcity of human capital in developing countries.)

Source: World Bank, Africa Region (quoted from *Bernard, Tiyab* and *Vianou* 2004, p. 5), *OECD* (2002, Table D6.1).

In some countries like Guinea, cuts in the duration of professional training have gone hand in hand with a redefinition of course content and an attempt to adjust the curricula to issues truly relevant to teaching practice. A mandatory training period of 15–18 months including 6–9 months of practical teaching experience under the supervision of a senior colleague was built into the new recruitment procedure (*Faoura* 2004, pp. 105 ff.)[3] In Mali, teacher candidates who have not attended other forms of pedagogical training, have to follow a three-month course preparing them for their work (*PASEC* 2005b). As opposed to the situation in Guinea and Mali, contract teachers in Niger only receive a 45-day training, and even the latter requirement is not always met in practice. While some contract teachers have effectively attended longer training courses, they can be assumed to have been candidates for traditional teaching positions who have not been able to find a position on the labor market. Traditional civil servant teachers had to follow a training administered in the "Ecole Normale" for one or two years.

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[3] The revision of the training program was actually at the center of reforms in Guinea. The new contract teachers are known under the name of the training program "Formation initiale des maîtres de Guinée" (FIMG) – a pilot program initiated by the World Bank – rather than as "contract teachers" (*PASEC* 2003).

Similar cross-country differences exist with respect to educational attainment required to enter the teaching profession. While in Guinea and Mali, a higher secondary completion exam ("baccalauréat") is required as a minimum, contract teachers in Niger may also start from a level of completed 10th grade ("BEPC") if they clear the entrance exam.

All of these factors seem to put Niger in a particularly difficult situation with respect to potential impacts of its contract teacher program on education quality. These impacts will be considered in more detail in the following sections.Theoretically, we will have to consider the following potential effects: (1) an incentive effect of the teaching contract, (2) a selection effect (changed demand for and supply of new teachers), and (3) a dynamic effect.

The direction of the incentive effect cannot be determined theoretically: On the one hand, the unfavorable conditions of new teacher contracts could be regarded as unfair and demotivating, and short-term contracts could prevent personal investments in pedagogical training and school specific human capital. On the other hand, for contract teachers, further employment prospects depend on performance and, among other things, parents' satisfaction, so that from this perspective, the contract statute could be expected to have a positive incentive effect.

As far as the selection effect is concerned, the changed employment conditions could lead to a different composition of teacher candidates. On the one hand, we would expect a lower number of highly skilled candidates due to the inferior contract conditions. On the other hand, the reduced entry requirements could reduce entry costs and increase the attractiveness of (temporary) teaching positions. The higher demand for teachers would lead us to expect a lower quality of the marginal (newly employed) teacher.

The dynamic effect, finally, refers to a potential change of teacher behavior over time. In particular, the inferior contract conditions may induce a reduced retention period of teaching staff. This effect could lead to a different distribution of job experience before and after the reform.

As we will see below, the data at hand will allow us to estimate a combination of the overall incentive and selection effect without, however, allowing us to distinguish between these effects or between any of the underlying indirect effects. At the same time, a consideration of the dynamic effect cannot be provided so far because the distribution of job experience in the teaching population has not yet reached its equilibrium due to the relatively recent introduction of the new program, and is thus truncated from above.

C. The PASEC data set for Niger
and selected characteristics of contract teachers,
their students and schools

The evaluation of the impact of the contract teacher program in Niger can be based on a stratified survey of schools and students in the 2nd and 5th grade of primary education during the academic year 2000/2001. The impact of the program will thus be measured on the basis of student achievement. Sampling was carried out in a way that each inspection, i.e. each school district, should be covered, and within these districts, half of the schools were drawn randomly from those schools which comprise the 2nd and the 5th grade level. If several classes existed within a grade level of a given school, one class was randomly selected. Depending on whether the teacher of the classes drawn in this way was a civil servant or a contract teacher, a nearby school with similar characteristics was selected to provide evidence for the other type of teacher statute. As, however, it was not always possible to find the opposite category for both grades simultaneously in the same school, the final sample is equally spread between contract teachers and teachers on traditional civil servant positions only for grade 2. In grade 5, we find twice as many civil servants as contract teachers. To a certain extent, this may reflect the real proportions, as contract teachers tend to be employed more often for lower than for higher grades. All in all, the sample includes 280 classes (of which 140 in 2nd and 140 in 5th grade) within 26 inspections. In each class, 15 students were randomly selected to take a test in French and Mathematics. These tests were designed by PASEC for assessing educational standards in francophone Africa and are not used by the Nigerian authorities for any official purposes, e.g. teacher assessments. These standardized tests are oriented at the typical curriculum of francophone African primary education. Both tests were administered in French language. The Math test contains a wide variety of items ranging from calculus over problem solving (application to situations of daily life) to simple geometry. The French test covers general understanding and orthography as well as grammar skills. Tests were administered in the classroom, item by item, following detailed instructions on the way to present each question and the time to be allocated to its response. Students were tested at the beginning and at the end of the academic year. Test results for both pre- and post-test are coded in terms of the percentage of test items answered correctly in each of the two subjects French and Math. The average test scores in grade 2 are 42 % for French and 41 % for Math, with a standard deviation of 25 % and 26 %. In grade 5 average test scores are 28 % for French and 31 % for Math with a standard deviation of 15 % and 16 % respectively.[4]

In addition, students were interviewed on their personal characteristics (gender, age), their family background (e.g. family possessions, parents' literacy, use of the

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[4] These values differ from those presented in Annex 3 because in this section, the values refer to the distribution of students while in the annex, they refer to the distribution of classes.

French language at home) and their prior educational background (e.g. PASEC scores at the beginning of the academic year, grade repetition). Moreover, rich data on teachers and schools was collected using separate teacher and director questionnaires. Finally, this data was complemented by information provided by Niger's ministry of basic education and alphabetization (MEB_1A 2004) on diverse regional characteristics and characteristics of the school districts (such as the regional enrolment rate, the growth of the regional school aged population etc.).

Table 2 provides an overview of some selected characteristics of students, teachers, classrooms, schools and regions. The columns show the overall mean of the respective variable, as well as the averages for classes taught by contract teachers and civil servant teachers respectively. The total number of observations is less than 2100 (= 140 × 15) for each grade level because in some (rare) cases, teacher and director questionnaires were not duly filled in. In other cases, the students' final scores are missing due to their absence on the day of the posttest. These missing values at the student level account for the bulk of missing observations. As Niger is an extremely poor country, the high rate of absence on the day of the final exam can probably be explained to a large extent by early drop-out, by sickness, or by household and harvesting activities on the day of the evaluation. Simple correlation indicates that the occurrence of these missing values is independent of the teacher's statute as a civil servant or a contract teacher.

Generally, when full questionnaires or test results were missing, the observations concerned had to be deleted from the data set. Whenever only information for individual variables was missing, however, missing values could generally be imputed using related questions taken from the same or other questionnaires. If information from several other variables could be included for imputation, imputation was carried out using linear regression on all of these variables. In addition, missing value indicators were generated and included in subsequent estimations. In principle, including missing value indicators in the empirical analyses renders the imputation irrelevant. However, several of these missing value indicators are highly, but not perfectly, correlated, leading to collinearity problems in later regressions. Therefore, not all missing value indicators can be included, such that plausibly imputed values become important. The imputed values also permit to reduce the covariate space in that most of the missing value indicators turn out to be highly insignificant in subsequent regressions. This instills confidence in the fact that students with missing items do not represent a very selected subpopulation.

A comparison of test scores in Table 2 indicates that on average, in the sample for both 2nd and 5th grade, students taught by teachers on civil servant contracts obtained higher test scores. However, these differences are only partly significant (at the 5 % level), and furthermore, they may be related to the factors other than the teachers' contract statute. They may, for instance, be a consequence of the assignment of contract teachers to different learning environments, or to different characteristics of the teachers themselves.

The general comparison of mean values for various context variables suggests that bias in the perceived difference between contract and civil servant teachers may partly arise from the fact that the former seem to be employed primarily in classes or schools where students already had lower scores at the beginning of the academic year. *Table 2* shows that students' initial scores in French and Math differ about as much between the two groups as the final scores measured at the end of the year. Thus, looking at progress rather than the final outcome alone, the performance of the traditional teachers does not seem to be much different from the performance of contract teachers.

Moreover, there are important differences in teacher characteristics which should have been expected given the relatively recent introduction of the program and the legal constraints related to its implementation. In particular, as only adults between 18 and 35 years of age are eligible for employment as contract teachers, at the time of the survey, the maximum age of a contract teacher could be 39. For this reason, on average, contract teachers in the sample are much younger than their peers in the civil service. The same situation is reflected in teachers' job experience. While a few teachers seem to have been employed on related tasks for some years before they became contract teachers, the maximum job experience for this group in the sample is 8 years. Among traditional teachers, those with job experience of less than 4 years are rare exceptions. Theoretically, no civil servant teachers should have been engaged after the introduction of the contract teacher program at all, but in some rare cases, this rule seems to have been violated, or alternatively, some teachers may have interrupted their work for some years after having been initially employed before 1998. All in all, there remains a sharp difference of almost 8 years between the average job experience of contract teachers and civil servants. If job experience has a positive impact on student achievement, this difference may lead to an important underestimation of contract teachers' performance.

With respect to teachers' educational attainment and the duration of their pedagogical training, differences are less pronounced than what might have been expected. Despite the fact that no baccalauréat is required for entry, in 5th grade, contract teachers actually tend to be more highly educated than traditional civil servants. This may be due to the saturation of the labor market and a certain oversupply of upper secondary graduates who are willing to reorient their professional objectives towards teaching, at least until other job opportunities open up for them. Overall, the differences appear to be insignificant.

As far as pedagogical training is concerned, for 5th grade teachers, we do find the expected significant differences. Only one of the contract teachers has gone through more than the minimum training required. At 2nd grade, however, several contract teachers recruited on the new program seem to have followed the traditional teacher training some time earlier. At the same time, both in 2nd and in 5th grade, the majority of traditional teachers do not meet the official employment criterion of at least one year of pedagogical training. The value of the training index utilized in *Table 2* is above 3 if a teacher effectively spent at least one year

Table 2: **Selected teacher, school and student characteristics, by teachers' statute and grade, 2000/2001**

Variables	All teachers	Grade 2		All teachers	Grade 5	
		Civil servants	Contract teachers		Civil servants	Contract teachers
Number of students	1881	940	941	1905	1494	411
Number of classes	123	60	63	121	93	28
Student characteristics						
Test scores (in% of correct answers, averages)						
Final score French	42.3 (1.65)	43.7 (2.50)	40.0 (2.15)	28.5 (0.88)	29.2 (1.05)	25.9 (1.40)
Final score Math	40.6 (1.48)	42.3 (2.41)	38.4 (1.74)	31.3 (0.90)	32.2 (1.05)	28.1 (1.57)
Initial score French	16.5 (1.23)	16.8 (1.66)	15.2 (1.80)	25.4 (0.86)	26.0 (0.97)	23.3 (1.77)
Initial score Math	34.6 (1.92)	36.2 (2.57)	31.5 (2.78)	29.1 (0.92)	29.9 (1.05)	26.5 (1.85)
Other student characteristics						
Index of household possessions (1–8)	0.53 (0.04)	0.55 (0.06)	0.52 (0.06)	0.56 (0.04)	0.52 (0.05)	0.68 (0.11)
Index of household tasks in which student is involved	3.50 (0.12)	3.46 (0.18)	3.57 (0.17)	4.30 (0.12)	4.23 (0.14)	4.55 (0.22)
Share of students with books at home	n.a.	n.a.	n.a.	0.28 (0.02)	0.28 (0.02)	0.27 (0.04)
Share of students with French book	0.20 (0.02)	0.18 (0.02)	0.22 (0.02)	0.28 (0.02)	0.28 (0.02)	0.26 (0.03)
Share of students with Math book	0.13 (0.01)	0.13 (0.02)	0.13 (0.02)	0.16 (0.01)	0.17 (0.02)	0.16 (0.02)
Share of illiterate mothers	n.a.	n.a.	n.a.	0.32 (0.02)	0.29 (0.02)	0.40 (0.04)
Share of literate fathers	n.a.	n.a.	n.a.	0.55 (0.02)	0.54 (0.02)	0.58 (0.04)
Share of students speaking French at home	0.06 (0.01)	0.06 (0.02)	0.06 (0.02)	0.09 (0.02)	0.09 (0.02)	0.09 (0.04)
Share of students speaking Arab at home	0.02 (0.01)	0.02 (0.01)	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)
Share of students speaking Tamacheq at home	0.02 (0.00)	0.02 (0.01)	0.02 (0.01)	0.02 (0.00)	0.02 (0.00)	0.05 (0.01)
Teacher characteristics						
Age (in years)	30.6 (0.53)	33.7 (0.75)	27.6 (0.52)	33.0 (0.53)	34.2 (0.58)	28.9 (0.86)
Job experience (in years)	6.26 (0.61)	10.27 (1.01)	2.44 (0.16)	9.45 (0.71)	11.4 (0.81)	2.82 (0.34)
Index of teachers' educational attainment (0–6)	3.78 (0.08)	3.82 (0.12)	3.75 (0.12)	4.09 (0.09)	4.05 (0.10)	4.21 (0.18)
Duration of teacher training index (0–4)	1.73 (0.10)	1.62 (0.13)	1.84 (0.15)	1.61 (0.08)	1.72 (0.10)	1.25 (0.10)
Classroom and school characteristics						
Class size	44.2 (1.33)	44.8 (2.15)	43.6 (1.61)	45.1 (1.33)	44.1 (1.54)	48.5 (2.58)
Share of schools with active parents	0.69 (0.04)	0.63 (0.06)	0.75 (0.06)	0.72 (0.04)	0.76 (0.04)	0.57 (0.10)
Share of schools participating in pilot projects	0.37 (0.04)	0.33 (0.06)	0.40 (0.06)	0.36 (0.04)	0.42 (0.05)	0.18 (0.07
Index of school equipment (0–10)	3.84 (0.21)	3.85 (0.29)	3.83 (0.31)	3.99 (0.22)	3.87 (0.26)	4.39 (0.41)
Share of classes where blackboard and chalk available	0.91 (0.03)	0.88 (0.04)	0.94 (0.03)	0.93 (0.02)	0.90 (0.03)	1.00 0.00
Index of directors' educational attainment (0–6)	3.99 (0.10)	3.90 (0.14)	4.08 (0.15)	4.01 (0.10)	4.05 (0.12)	3.86 (0.22)
School location in a rural area	0.34 (0.04)	0.30 (0.06)	0.38 (0.06)	0.32 (0.04)	0.30 (0.05)	0.39 (0.09)
Regional characteristics						
Population growth rate, boys 7–12	0.62 (0.02)	0.61 (0.03)	0.62 (0.02)	0.59 (0.02)	0.57 (0.02)	0.65 (0.04)
Share of buildings bad ondition	38.6 (0.81)	39.3 (1.15)	38.0 (1.14)	37.9 (0.87)	38.3 (1.01)	36.5 (1.72)
Share of multi-grade schools	0.08 (0.01)	0.08 (0.01)	0.09 (0.01)	0.08 (0.01)	0.09 (0.01)	0.06 (0.01)

Note: Standard errors in parenthesis. At student level, clustering into classes is taken into account.

in a training course, while the average for civil servant teachers does not even reach 1.8 in practice. In many cases, this regulation must have been waived so that the differences between contract teachers and civil servants are less pronounced than expected.

With respect to other descriptors of students' learning environment, only a slight difference can be made out between the two groups of teachers, especially in 2nd grade. This probably reflects the effort to survey a nearby, "similar" school with a civil servant teacher for each school surveyed with a contract teacher. By doing so, the sampling procedure attempted to replicate a truly experimental situation as closely as possible. Nevertheless, for some variables, some differences remain, notably in 5th grade where – due to the constraint to survey classes from the same school as in 2nd grade – the appropriate pair of teachers could not always be selected. In this context, we note in particular that 5th grade contract teachers tend to teach in regions with higher pressure of population growth and in classes with more students, but that students' family environment tends to be more favorable (higher index of household possessions, higher share of literate mothers). In the following, we will examine whether, once these confounding factors are taken into account, the superiority of traditional teachers will still find some support.

D. Evaluating the effect of the contract teacher program on the basis of propensity score matching

In order to control for confounding factors and to identify the true effect of the contract teacher program, we try to match classes taught by contract teachers with classes taught by civil servants. Following the terminology of the treatment evaluation literature, the type of teacher (contract teacher or civil servant) is considered as a "treatment" to which the class is subjected. The empirical strategy attempts to select control classes corresponding in their characteristics to those classes who received the treatment. If all variables simultaneously influencing the treatment decision and student achievement are taken into account, the "selection on observables" (*Heckman* and *Robb* 1985) or "conditional independence" (*Lechner* 1999) assumption (CIA) is satisfied and the impact of the contract teacher statute can be identified. Let Y^0 denote the average test score outcome in a class taught by a regular teacher and let Y^1 denote the test score outcome if this class were taught by a contract teacher. The difference $Y^1 - Y^0$ in these potential outcomes represents the gain or loss in achievement if a regular teacher were to be replaced by a contract teacher. Let X denote all the confounding variables which simultaneously influence these potential outcomes and the probability that the teacher is employed under this non civil-servant contract, including student, teacher, classroom, school and regional characteristics. As our data set is very rich and includes all variables typically assumed to be relevant for student achievement, we are confident that the CIA is satisfied. By conditioning on X, the potential outcomes are then identified as:

$$E[Y^1|X] = E(Y|D = 1, X)$$

and

$$E[Y^0|X] = E(Y|D = 0, X) ,$$

where D denotes the observed contract status of the teacher ($D = 1$ for contract teachers, $D = 0$ for regular teachers). With this relationship and by averaging with respect to the population distribution of X, the average treatment effect on the treated[5] is identified as

(1)

$$E[Y^1 Y^0] = \int \left[E(Y^1|X) - E(Y^0|X) \right] \cdot dF_{X|D=1} = \int \left[E(Y|D = 1, X) - E(Y|D = 0, X) \right] \cdot dF_{X|D=1} .$$

This matching approach is preferred to traditional regression analysis for two reasons: First, in addition to the conditional independence assumption, regression analysis requires the assumption of particular functional relationships. Generally, for convenience, the functional form is assumed to be linear which actually seems rather implausible when inputs into the educational production process are concerned. Second, on the basis of this hypothetical functional relationship, regression analysis expands its predictions into areas for which no appropriate control observations are available. It thereby tends to compare classes which, under closer scrutiny, one would be very reluctant to compare. In regression analysis, the problem of comparing the incomparable does not become apparent, however, as it is simply assumed away. Given the differences between the treated and the control group highlighted in the previous section, this could lead to a considerable distortion of results. Therefore, ensuring that characteristics of those observations compared with each other are in a common range (i.e. have common support) should be an explicit matter of concern.[6]

As demonstrated by *Rosenbaum* and *Rubin* (1983), the estimation of the treatment effect can be facilitated if the information incorporated in the relevant control variables is first projected into a single variable, the propensity score $p(x) = P(D = 1|X = x)$. They showed that if matching on X is consistent, matching with respect to the propensity score $p(x)$ is consistent as well. The multidimensional problem of matching on X is thereby reduced to the one-dimensional problem of matching on $p(X)$. The propensity score can be estimated e.g. by a probit regres-

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[5] See Section 4.1 for an explanation why we focus on the average treatment effect on the treated (ATT) rather than on the average treatment effect on the untreated (ATU) or the average treatment effect (ATE).

[6] A third advantage is that the matching approach relaxes the assumptions about the independence of the error term. Whereas in a traditional linear model approach it must be assumed that the error term is independent of the regressors, i.e. $E[u|X, D] = 0$, this assumption may be relaxed here to $E[u|X, D] = E[u|X]$, i.e. the error term could still be correlated with the regressors X.

sion of the binary treatment variable "contract teacher status" on X. In the context of this preliminary estimation of a binary treatment variable, results are typically more robust with respect to different distributional assumptions than they are at the level of the final (continuous) outcome variable Y (see e.g. *Black* and *Smith,* 2004, footnote 13). Moreover, given that at class level our sample only includes a relatively small number of observations, a parametric approach for the estimation of the propensity score is useful to improve the robustness of results with respect to other variations in model specification. We therefore follow the general trend in the literature to use a probit model for the estimation of the propensity score.

For the estimation of the conditional expectation function we avoid parametric assumptions and adopt Nadaraya-Watson kernel regression using a Gaussian kernel with a bandwidth of 0.06 as suggested by *Leuven* and *Sianesi* (2003). While nearest neighbor matching or radius matching might come conceptually closer to the original idea of comparing only classes with identical (or very similar) characteristics, kernel matching makes more efficient use of the available information as it does not discard any observations, but weighs the observations according to the appropriateness of the match.

I. Ensuring common support

As mentioned above, given that teachers under the new contract teacher program are necessarily different from teachers in civil service with respect to a number of criteria, ensuring common support requires particular attention. As discussed in Section 3, finding similar characteristics in both groups is less problematic than expected for the education and training variables, but highly problematic for teachers' job experience and age. As mentioned earlier, the maximum age and job experience among contract teachers is 39 and 8 years, respectively, while civil servant teachers are generally older and more experienced.

We will pursue two different approaches to deal with this problem. In the first approach (specification 1), neither teacher's job experience nor age is controlled for. This is justified if experience and age are no relevant determinants of students' educational achievement – an assumption for which we find some supporting evidence. Alternatively, this estimate can be interpreted as the treatment effect for a student when replacing a civil servant teacher with one of the new contract teachers. Since the new contract teachers, by the implementation of the reform, must have on average lower age and experience, this measures the *combined* effect of changing contract status and lowering experience. If the effect of experience on educational achievement was indeed zero, this would correspond to the effect of a change in contract status only.

In the second approach (specification 2) to the support problem, we restrict our analysis to the population of teachers with at most 8 years of job experience. In other words, all civil servant teachers with more than 8 years of job experience

(and a correspondingly high age) are deleted, which leads to a considerable reduction in sample size. While age can be discarded as insignificant, job experience is then controlled for in the matching estimator and the estimated effect can be interpreted as replacing a civil servant teacher with a contract teacher with the *same* job experience. Hence, this effect differs from specification 1, where the combined effect of changing contract status and lowering experience was estimated. However, these two estimates differ further in that they refer to different populations, which might yield different estimates even if job experience had no effect on educational achievement.

For the first approach, in an initial step, we examine whether teacher job experience and age actually affect student achievement. If it could be established that they are only related to the teacher's statute but not to achievement, omitting them from the model would not induce a bias. In the literature, teachers' age is generally not considered as a relevant determinant of student achievement, but teacher job experience is. Typically, it appears to be relevant in a non-linear way, with a positive effect in the initial years which diminishes over time (see e.g. *Michaelowa* 2001b, *Bernard* 1999, and *Rivkin, Hanushek* and *Kain* 2005). However, a closer look at the data for Niger suggests that the situation here might not necessarily be the same. In a simple OLS regression, we find a positively significant impact of job experience only for 5th grade achievement, and this effect appears to be driven exclusively by some strong performers among teachers with extensive job experience. Annex 1 shows a partial scatter plot for student achievement and teacher job experience for the subgroup of voluntary teachers. It suggests that in 5th grade, only three schools (labeled 91, 120 and 121) with teachers with more than 20 years of job experience are responsible for the overall positive relationship. Dropping these outliers from the regression, no impact of job experience can be observed any more. In 2nd grade, the relationship is not significant in the first place.

Based on this preliminary analysis we may conclude that there is no evidence for job experience being a truly relevant predictor of student achievement in the context of primary schools in Niger, so that once the three outliers are eliminated from the sample, we do not need to consider this variable any further. This will be the assumption for our specification 1.

In the second approach (specification 2), we include job experience as well as the other variables which are systemically related to the introduction of the contract teacher statute (variables on teacher's education and training). As mentioned above, this requires the deletion of all observations for teachers with job experience > 8 years. If the additional control variables are really irrelevant, their introduction should not considerably alter the overall results. However, due to the restriction of the population, results will only refer to the subpopulation of relatively young (i.e. inexperienced) teachers.

In addition to job experience, one more characteristic in our model strongly influences student achievement and, in 5th grade, is not represented among contract

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teachers at all. It is a matter of class management, the so called "double shift" teaching. Double shift teaching describes a situation where two classes use the same classroom at different times of the day, whereby the teacher may be the same or a different one for the two groups. This can be observed most frequently in densely populated urban areas lacking adequate infrastructure (and a sufficiently high number of teachers), and often leads to less hours of effective teaching and reduced learning outcomes (*Michaelowa* 2001b). Closer scrutiny of the data reveals that in Niger, double shift teaching appears to be extremely rare in the higher grades of primary education, so that even for civil servant teachers, we only find one observation in grade 5. For this reason, the most obvious solution to the support problem is to simply delete this one observation from the 5th grade data set. In 2nd grade, double shift teaching is more widely spread and can be included in the control variables without any problem.

The preliminary adjustments of the data set allow us to eliminate the most obvious sources of the common support problem. Nevertheless, it remains that for certain combinations of these control variables it may be impossible to find appropriate matches. This can be taken care of later on by simply imposing a common support restriction on the propensity score as a whole. In this context, it should be noted that the observations we may have to delete from the data set depend on whether we are merely interested in the treatment effect on the treated, the treatment effect on the untreated, or the average treatment effect reflecting both. Restricting our analysis to the average effect of the treatment on the treated (ATT), we have to be cautious about the inclusion of observations on contract teacher classes whose characteristics lie outside the range of observable characteristics for the control group. However, if we were interested in the effect a contract teacher would have on those classes who have effectively been taught by a civil servant (average treatment effect on the untreated, ATU), we would need to ensure that characteristics of civil servant teacher classes stay within the range of characteristics observed in contract teacher classes. This condition appears to be much more difficult to meet since our data show more variation in the characteristics of civil servant teachers than in the characteristics of contract teachers. We will therefore restrict our discussion to the average treatment effect on the treated. From a policy point of view, this also appears to be most interesting since the relevant policy question is not whether active civil servant teachers should be replaced by contract teachers, but whether the newly engaged contract teachers show an acceptable performance or whether their statute needs to be changed back into the one of a civil servant.

II. Determining relevant control variables and estimation of the propensity score

To determine the relevant control variables, the usual approach is to carry out repeated regressions of the binary treatment variable on various sets of regressors and to keep the most significant variables in the final specification. As our treat-

ment variable is defined at the class level, the number of observations is relatively limited and starting regressions with a very large number of regressors becomes problematic. In particular, several combinations of variables for which observations are very scarce, lead to perfect predictions of the probit model. We therefore adopt a different approach starting with a closer look at the potential determinants of student test scores.

Estimation of education production functions has become a focus of many studies in recent years including numerous studies for developing countries ever since micro survey data have become available in the late 1990s. A recent summary is provided in the EFA Global Monitoring Report 2005 on education quality (*UNESCO 2004*). The variables presented in Section 3 (*Table 2*) represent a collection of plausible predictors drawn from this literature. We take these variables (or some composite indicators based on the information of these variables) as the basis for the selection of the relevant variables for our model for Niger. The final selection is then determined through an iterative process between provisional OLS regressions of student achievement and probit regressions of the contract teacher statute. Like the probit regressions, regressions of student achievement are carried out merely at the class level, and class averages are computed for variables originally measured at the level of the individual student. As a general rule, variables are retained for the final estimation of the propensity score if their *p*-values are below 20 % in both the achievement regression and the regression of the teacher statute.[7] We always retain the pre-test scores, even if they are insignificant in the teacher status regression, as they are very important determinants of the final achievement outcomes and incorporate the value-added approach to measuring the impact of teacher statute.

As discussed in Section 4.1, in the second specification, the sample is reduced to classes of teachers with no more than 8 years of job experience. This allows us to introduce job experience as an additional control variable without facing insurmountable problems to ensure common support. In this second specification, we also include teachers' educational attainment and the duration of teacher training. As these variables are structurally linked to the contract teacher statute – although to a lesser extent than we had expected according to formal regulation – and as they are generally believed to be (and frequently empirically established as) relevant predictors of student achievement, it may be more prudent to keep these variables and not rely on simple OLS achievement regressions as a reason for eliminating them from the model.

By reducing the sample and adding the additional explanatory variables, some predictors used in specification 1 do not appear to exert any relevant influence any

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[7] Starting with the achievement regressions, a stepwise backward selection procedure was used with a significance level of 20 % for removal from the model. When a forward selection procedure was carried out alternatively, no additional variables were included in the model and the total number of regressors was reduced. To be sure not to omit any relevant determinant of student achievement, we used the more comprehensive model resulting from the backward selection.

more. As their p-values are far beyond the 20 % cut-off point, they are no longer included in specification 2. Alternative regressions retaining these variables in the model yield very similar results.

It should be noted that we face some problems specifying the model for grade 2 because some potentially relevant explanatory variables (parents' literacy and the availability of books at home) are not available for younger students. This could lead to biased estimates of the treatment effect. Assuming that the average socio-economic background of students in the same school does not vary substantially across grades,[8] we thus use the available information for 5th grade students in the same schools as a proxy for the unobserved 2nd grade variables. One of these proxies is retained as a relevant predictor in the final specification.

Table 3 presents the final selection of variables and their impact on the probability to be taught by a contract teacher, i.e. the results of the probit regressions used to construct the propensity score. It can be observed that unless teacher job experience and training are included in the model, the overall explanatory power of these regressions is very low, especially in grade 2 (pseudo $R^2 = 0.06$). In fact, in specification 1 for grade 2, only parents' literacy and the average number of textbooks per student turn out to be significant at the level of 10 %. It appears that 2nd grade students in the contract teacher classes included in our sample often come from relatively disadvantaged family backgrounds (in terms of literacy) while at the same time, they are relatively well equipped in terms of textbooks. In 5th grade, the pseudo R^2 is still not very high (18 %), but parents' literacy, the share of Tamacheq speaking students, the participation of the school in a pilot project, the location of the school in a rural area and the number of multi-grade schools in the region, all seem to play a certain role in determining the statute of the teacher by whom students are taught in a particular school. To understand the role of Tamacheq it should be noted that this is the language spoken by the nomadic population in the northern arid areas of the country who generally also show a strong learning disadvantage, particularly in grade 5.

Given the information about the survey design provided in Section 3 and the discussion of *Table 2* thereafter, the generally low explanatory power of specification 1 in the probit regressions should not come as a surprise. It basically confirms that right from the beginning, the sampling process ensured data collection in a way that came close to data collection from an experimental design. As in 2nd grade for each class with a contract teacher another "similar" class with a civil servant teacher was selected from a nearby school, our probit results confirm that the underlying initial assessment of "similarity" was based on the relevant criteria so that very few of these are significant in ex post regression analysis. For grade 5,

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[8] More precisely, we only need to assume that *differences* between schools with respect to these variables are unaffected by grade. This remains a plausible assumption even if we consider that at higher grades, the proportion of well-off students may increase due to drop-out being positively correlated with poverty.

the situation is somewhat different because at the sampling stage, appropriate matches could not be found to the same extent as in grade 2.

Table 3

Estimation of the propensity score[1,2]

Probit estimates	Grade 2				Grade 5			
	Specification 1		Specification2		Specification 1		Specification 2	
Dependent variable: Teacher is a contract teacher	Coef.	$P > \lvert z \rvert$	Coef.	$P > \lvert z \rvert$	Coef.	$P > \lvert z \rvert$	Coef.	$P > \lvert z \rvert$
Initial score, average Math and French	–0.01	0.15	–0.02	0.15	–0.02	0.22	–0.02	0.37
Index of parents' literacy $(0-2)$[3]	**–0.68**	**0.06**	**–1.32**	**0.01**	**0.96**	**0.04**		
Average number of textbooks per student $(0-2)$	**0.95**	**0.04**	**1.82**	**0.01**				
Share of Tamacheq speaking students					**5.78**	**0.01**	**9.92**	**0.07**
School is participating in a pilot project					**–0.66**	**0.04**	**–0.81**	**0.06**
Class size	0.04	0.20						
Class size squared	–0.00	0.12						
School is situated in a rural area					**0.85**	**0.03**		
Share of multi-grade classes in the region					**–6.35**	**0.06**	–6.68	0.18
Teacher's job experience (in years)			**–0.64**	**0.00**			**–0.32**	**0.01**
Index of teacher's educational attainment $(0-6)$			–0.28	0.13			–0.36	0.16
Duration of teacher training index $(0-4)$			**0.38**	**0.05**			**–0.54**	**0.04**
Constant	–0.08	0.92	**3.83**	**0.00**	–0.76	0.23	**4.43**	**0.01**
N	123		97		117		69	
Pseudo R^2	0.06		0.38		0.18		0.37	
LR, Prob $>$ chi^2	0.06		0.00		0.00		0.00	

[1] Bold figures indicate significance at the 10 % level.

[2] In each grade, the same specifications were used to calculate the propensity score for Math and French separately. In this case, the joint pre-test score was replaced by the initial score in the respective subject matter. Results are presented in Annex 2, Tables A2.1 and A2.2.

[3] For grade 2 this variable does not exist. However, assuming that parents' literacy level does not differ much within a given school, the missing information was approximated by information available for grade 5 (see also footnote 5).

However, only if teacher job experience, educational attainment and training are taken into account (specification 2), does the situation change considerably. As these variables are directly related to the teacher statute rather than to the school, they could not be considered when searching for a "similar" school at the sampling stage. While educational attainment appears to be less relevant, teacher training and, in particular, teacher job experience are highly significant predictors of the teacher's statute in both grades.

III. Matching results for the effect of the contract teacher statute

Table 4 presents the results of a comparison between the scores of classes with a contract teacher with the counterfactual outcome of the same classes if they had had a traditional teacher. Estimates are presented for both specifications by subject and grade. The estimation procedure imposes common support on the basis of the propensity score. 90 % confidence intervals are estimated using bootstrapped standard errors (500 replications). The estimated bias is calculated from the bootstrapped distribution and indicates to what extent the normality assumption underlying the estimation of the confidence interval is actually adequate.

Table 4 shows that in 5th grade, the control for inappropriate comparisons implied by the matching procedure considerably reduces the observed underperformance of contract teachers (as compared to the gross differences observed in *Table 2*). This difference is no longer significant, not even at the 10 % level. In specification 2, the coefficient even becomes positive – although it remains insignificant.

As expected, matching produces much less effect in 2nd grade. The differences in scores observed earlier in *Table 2* are reproduced and even reinforced here. These differences (to the advantage of the traditional teacher statute) are not only significant but also sizeable. The observed increase in performance of 6 percentage points corresponds to almost 40 % of a standard deviation and to 15 % of the mean score (average for Math and French across all 2nd grade classes).[9] A potential explanation for the strong differences between the results for grade 2 and grade 5 may be that out of the group of contract teachers, only the best are employed for classes in higher grades, which are often considered as more important by both parents and principals.

However, once job experience and teacher's education and training are introduced as additional controls (specification 2), even in grade 2 the difference between both types of teachers is no more significant. For French, as well as French and Math combined, the point estimates even switch signs. These results are relatively robust with respect to the inclusion of other controls.

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[9] See Annex 3 for the general statistics on the distribution of scores.

Table 4: Estimation of the effect of the contract teacher statute (ATT)[1]

Specification	N²[2]		Grade 2		[90% Conf. Interval]		N²[2]		Grade 5		[90% Conf. Interval]	
		ATT[3]	Bias	Std. Err.[4]				ATT[3]	Bias	Std. Err.[4]		
1 Math+French	123 (121)	**-5.43**	0.69	2.80	-10.04	-0.81	117 (114)	-0.67	-0.01	1.56	-3.25	1.90
1 French	123 (120)	**-6.52**	0.96	2.88	-11.27	-1.77	117 (114)	-0.23	-0.07	1.63	-2.93	2.46
1 Math	123 (121)	-5.03	0.65	3.29	-10.46	0.39	117 (113)	-0.44	-0.62	1.79	-3.39	2.51
2 Math+French	97 (89)	0.83	-0.64	5.43	-8.11	9.77	69 (56)	3.09	-1.21	3.63	-2.90	9.08
2 French	97 (89)	1.93	-1.30	6.27	-8.41	12.27	69 (56)	4.40	-1.81	3.96	-2.12	10.94
2 Math	97 (90)	-0.80	-0.29	6.00	-12.80	7.00	69 (58)	2.18	-0.95	3.77	-4.04	8.40

[1] Figures computed using PSmatch2 (*Leuwen* and *Sianesi* 2003).
[2] Number of observations after imposing common support in brackets.
[3] Bold figures indicate significance at the 10 % level.
[4] Calculated on the basis of 500 bootstrap replications.

Obviously, for both grades, specification 2 suffers from the limited number of observations in the restricted sample. Moreover, the estimated bias reveals that the bootstrap distribution is not well centered around the mean so that the estimated confidence interval may not be truly reliable. However, adjusting the confidence interval to the bias does not change our results.

Annex 4 provides an overview of the effect of matching on the balancing of characteristics between the groups of students taught by contract teachers and civil servants respectively. It confirms once again that with respect to the variables considered in specification 1, matching appears to be relevant primarily in grade 5, while in grade 2, characteristics are relatively well balanced right from the beginning. However, once teacher job experience and training are introduced as additional controls for the reduced sample (specification 2), results of the balancing statistics clearly reveal the relevance of matching for both grades.

All in all, our final results on the impact of the contract teacher statute do not confirm the concerns about a potential deterioration of education quality. The overall assessment of the contract teacher program in Niger is clearly positive for grade 5, since the positive effects on enrolment are not diminished by any significant negative effect on student performance, whichever model specification is used. In grade 2, at first glance, we seem to face a quantity-quality trade-off, but the limitation of the sample to younger teachers and the control for job experience and teacher training lead to different results according to which, once again, the teacher statute does not seem to play any significant role.

Nevertheless, even if one was to believe the results of the full sample without control for teacher job experience rather than the results of the reduced sample, the comparison of the losses due to reduced quality and the gains due to increased enrolment might still turn into a positive overall assessment. Assuming a fixed budget for primary education and taking into account that public contract teachers earn (less than) 50 % of civil servant teacher salaries (*Table 2*), only about half the number of traditional teachers could have been employed. Ceteris paribus, given that public contract teachers represented 50 % of all teachers in 2000 (*Table 1*), this implies that without the contract teacher program, the total number of teachers would have been only 75 % of what it effectively was. At unchanged class size, this would have implied that, correspondingly, only 75 % of today's students would have been enrolled. Now the potential reduction in achievement of 5.4 percentage points for all 2nd grade students can be compared to a situation where 75 % of the students do not face these quality losses, but 25 % are not enrolled at all. In this case, a positive assessment of the contract teacher program is obtained whenever the performance of unenrolled children is expected to lie at least one standard deviation below the performance of those enrolled.[10]

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[10] This result is obtained by computing $0.75 \times 5.4 / 0.25 \times 16.3 = 0.99$, where 5.4 is the point estimate for Math and French combined using specification 1, and 16.3 is the standard deviation of test scores.

Finally, it must be considered that those who would not have been enrolled typically belong to the most disadvantaged (i.e. poorest) groups of the society. This implies that the contract teacher program has had an additional positive effect on distribution and on the benefit incidence of public expenditure on education for the poor.

E. Experiences from other countries and conclusions

All in all, this paper has shown that contract teacher programs have enabled Niger and other countries to considerably enhance enrolment. The introduction of these programs therefore represented an important step towards universal primary enrolment and completion as agreed upon internationally in the Millennium Development Goals and the Education for All objectives. From this perspective, they also represent a major step towards the reduction of poverty. Nevertheless, a certain quantity-quality trade-off might exist and has to be taken seriously, as schooling will only enhance children's abilities to master their everyday lives if at least a certain minimum quality can be ensured. For the specific case of Niger, we find a significant deterioration of education quality measured in terms of student achievement only for grade 2, and even there, only as long as we do not restrict our sample to younger teachers so that we can control for job experience. Comparing the different specifications, it appears that the negative effect of contract teachers in the full sample is largely an artifact of their limited job experience. Moreover, in any case, the positive impact on enrolment seems to dominate over potential losses in quality.

This overall assessment is in line with the conclusions reached by *PASEC* (2005a) – despite the fact that the authors tend to find a significant negative effect in 5th rather than in 2nd grade. However, the simple (clustered) linear regression analysis used seems to lead to somewhat less robust results – as indicated by the coefficients and varying significance levels of various specifications presented in the annex of their study.

Similar results have also been found for Togo and Guinea. In Togo, the effect of contract teachers on student achievement was shown to be significantly negative for both grades, and in Guinea, a significantly negative impact was found for grade 2 (*PASEC* 2005a, 2004, 2003, and *Vegas* and *de Laat* 2003). At the same time, the PASEC studies suggest that this negative impact may be driven to some extent by the impact of reduced teacher training. In fact, if the sample in Togo is split between teachers with and without initial training, the contract teacher statute is no more significant in the former. While Guinean teachers all receive some training, its structure and duration was reformed from the first to the second cohort, and indeed, the second cohort does not have any significantly negative (but partially even a slight positive effect) on students' learning.

Interestingly, in some countries, contract teacher programs have also led to an obvious improvement of results. A positive impact of contract teachers, significant

for grade 2, was found in Mali, and this result was rather robust to the use of different estimation methods and model specifications (*PASEC* 2005b, *Bourdon* 2005). Moreover, an early study on the five countries Burkina Faso, Cameroon, Côte d'Ivoire, Madagascar and Senegal also found a significant and positive effect (*Michaelowa* 2001b). As opposed to Niger, where virtually all contract teachers are employed by public authorities, in all these cases the majority of contract teachers were engaged by parents or local communities. It seems that these teachers are relatively highly motivated and also miss classes less often than their peers employed in the civil service (*Michaelowa* 2002).

This suggests the relevance of the impact of this new type of contracts on incentives. While a teacher engaged as a civil servant faces hardly any incentives to increase his or her effort, the situation is different for teachers engaged on a short-term contract which may or may not be prolonged. But more importantly, if teachers are directly engaged by parents or the local community, they will feel the recognition of their effort and they can also be very directly held responsible for their work. The evidence available so far suggests that this may easily outweigh lower pay and adverse working conditions.

As contract teacher programs have been shown to be highly relevant tools in progress towards Education for All, towards a strengthening of capabilities and hence, towards poverty reduction, it seems to be important to further examine under which conditions their positive impact on enrolment can go hand in hand with an equally positive effect on education quality. While contract teacher programs appear to have been worthwhile policies in all countries, the quality-quantity trade-off apparent in some countries might still be considerably reduced. This requires further research based on a distinction between the different types of contract teachers.

References

Amelewonou, Kokou / *Brossard,* Mathieu / *Gacougnolle,* Luc (2004): La question enseignante dans la perspective de la scolarisation primaire universelle en 2015 dans les pays de la CEDEAO, CEMAC et PALOP, Dakar: Pôle de Dakar – Coopération française / UNESCO (http: // www.poledakar.org / article.php?id³rticle=112, 21 / 03 / 05).

Bernard, Jean-Marc (1999): Les Enseignants du primaire dans Cinq Pays du Programme d'Analyse des Systèmes Educatifs de la CONFEMEN : Le Rôle du Maître dans le Processus d'Acquisition des Élèves, Report for the Working Group on the Teaching Profession, ADEA, French Section, Paris.

Bernard, Jean-Marc / *Kouak Tiyab,* Beïfith / *Vianou,* Katia (2004): Profils enseignants et qualité de l'éducation primaire en Afrique subsaharienne francophone: Bilan et perspectives de dix années de recherche du PASEC, mimeo, PASEC / CONFEMEN.

Black, Dan / *Smith,* Jeffrey (2004): How Robust is the Evidence on the Effects of College Quality? Evidence from Matching, Journal of Econometrics Vol. 121, No. 1 – 2, pp. 99 – 124.

Bourdon, Jean (2005): Les maîtres contractuels sont-ils aussi efficaces que les maîtres titu-laires? Essai d'appariement sur les données de l'enquête PASEC sur le Mali, mimeo, IREDU, University of Burgundy.

Bruns, Barbara / *Mingat,* Alain / *Rakotomalala,* Ramahatra (2002): A Chance for Every Child, Washington: The World Bank.

Faoura, Thiam (ed.) (2004): La réforme de la formation initiale des maîtres en Guinée (FIMG): étude-bilan de la mise en œuvre, Paris: L'Harmattan (ADEA publication).

Heckman James / *Robb,* Richard (1985): Alternative Methods for Evaluating the Impact of Interventions, in: James Heckman and Burton Singer (eds): Longitudinal Analysis of Labour Market Data, Cambridge: Cambridge University Press, pp. 156 – 245.

Lechner, Michael (1999): Earnings and Employment Effects of Continuous Off-the Job Train-ing in East Germany after Unification, in: Journal of Business and Economic Statistics Vol. 17, No. 1, pp. 74 – 90.

Leuven, Eric / *Sianesi,* Barbara (2003): PSMATCH2: Stata Module to Perform Full Mahala-nobis and Propensity Score Matching, Common Support Graphing, and Covariate Imbal-ance Testing (http: // ideas.repec.org / boc / bocode / s432001.html, 1 / 4 / 05).

MEB₁A (2004): Statistiques de l'éducation 2003 – 2004, Niamey: Ministère de l'Éducation de base 1 et de l'alphabétisation, République du Niger.

Michaelowa, Katharina (2001a): Die Bedeutung von Bildung in Niedrigeinkommensländern: Das Beispiel Afrika, in: Renate Schubert (ed.): Entwicklungsperspektiven von Niedrig-einkommensländern – zur Bedeutung von Wissen und Institutionen, Berlin: Duncker & Humblot, pp. 127 – 152.

Michaelowa, Katharina (2001b): Primary Education Quality in Francophone Sub-Saharan Africa: Determinants of Learning Achievement and Efficiency Considerations, in: World Development, Vol. 29, No. 10, pp. 1699 – 1716.

Michaelowa, Katharina (2002): Teacher Job Satisfaction, Student Achievement, and the Cost of Primary Education in Francophone Sub-Saharan Africa, HWWA Discussion Paper No. 188, Hamburg.

MINEDAF (2002): Universal Primary Education: Goal for All, statistical document, Confer-ence of the Ministers of Education of African Member States (MINEDAF VIII), Dar-Es-Salaam: UNESCO.

Mingat, Alain / *Suchaut,* Bruno (2000): Une analyse économique comparative des systèmes éducatifs africains, Paris: De Boeck.

OECD (2002): Education at a Glance, Paris

PASEC (2003): Le Programme de formation initiale des maîtres et la double vacation en Gui-née, Dakar: CONFEMEN.

PASEC (2005a): Les enseignants contractuels et la qualité de l'enseignement de base I au Niger : Quel bilan?, Dakar : CONFEMEN, forthcoming

PASEC (2005b): Impact du statut enseignant sur les acquisitions dans le premier cycle l'enseignement fondamental public au Mali, Dakar : CONFEMEN, forthcoming

PASEC (2004): Recrutement et formation des enseignants du premier degré au Togo: Quelles priorités?, Dakar : CONFEMEN.

Rivkin, Steven / *Hanushek,* Eric / *Kain,* John (2005): Teachers, Schools, and Academic Achievement, Econometrica Vol. 73, No. 2, pp. 417 – 458

Rosenbaum, Paul / *Rubin,* Donald (1983): The Central Role of the Propensity Score in Observational Studies for Causal Effects, in : Biometrika Vol. 70, No. 1, pp. 41 – 55

Vegas, Emiliana / *de Laat,* Joost (2003): Do Differences in Teacher Contracts Affect Student Performance? Evidence from Togo, Working Paper No. 26955, The World Bank

UIS (2005): Education: Statistical Tables (http://portal.unesco.org/uis/ev.php?URL_ID=5187&URL_DO=DO_TOPIC&URL_SECTION=201, 21/3/05)

UNESCO (2004): Education for All – The Quality Imperative, EFA Global Monitoring Report 2005, Paris: UNESCO

Annex

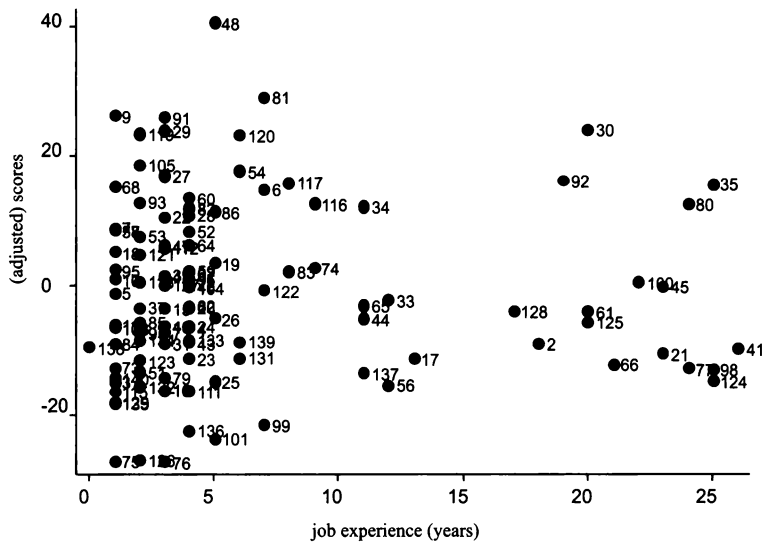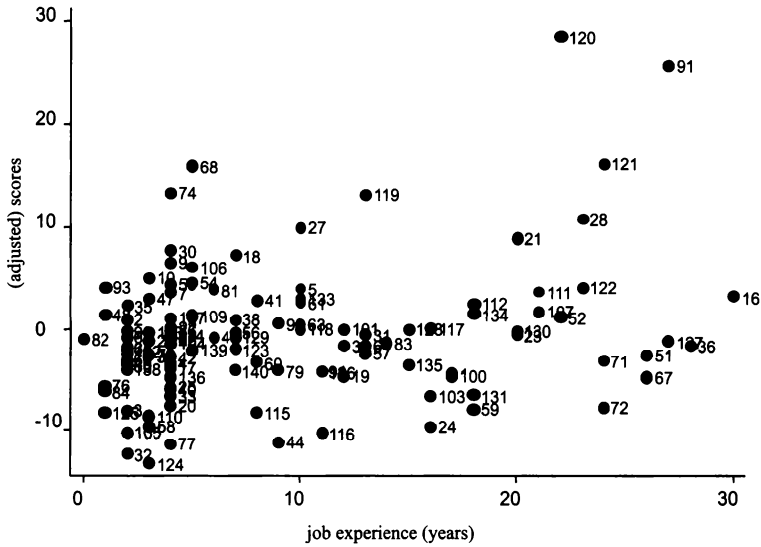## Annex 1: Relationship between final test scores and teacher job experience

Figure A1.1: Partial scatter plot of final test scores (class average) on teacher job experience, for classes taught by civil servant teachers, grade 2

Notes: The partial scatter plots reflect the relationship between class level student achievement and job experience once all other variables are controlled for which satisfy the condition of a stepwise backward selection procedure with a significance level of 20 % for removal from the model. Labels refer to school identification numbers.

Figure A1.2: Partial scatter plot of final test scores (class average)
on teacher job experience, for classes taught by civil servant teachers, grade 5

Annex 2: Estimation of the propensity score, by subject taught

Table A2.1

French[1]

Probit estimates	Grade 2				Grade 5			
	Specification 1		Specification2		Specification 1		Specification 2	
Dependent variable: Teacher is a contract teacher	Coef.	$P > \|z\|$	Coef.	$P > \|z\|$	Coef.	$P > \|z\|$	Coef.	$P > \|z\|$
Initial score, French	–0.01	0.36	–0.01	0.34	–0.02	0.29	–0.02	0.45
Index of parents' literacy $(0-2)$[2]	**–0.67**	**0.06**	**–1.31**	**0.01**	**0.90**	**0.05**		
Average number of textbooks per student $(0-2)$	**0.89**	**0.05**	**1.76**	**0.01**				
Share of Tamacheq speaking students					**5.77**	**0.02**	**9.44**	**0.07**
School is participating in a pilot project					**–0.71**	**0.03**	**–0.89**	**0.04**
Class size	0.04	0.19						
Class size squared	–0.00	0.13						
School is situated in a rural area					**0.86**	**0.03**		
Share of multi-grade classes in the region					**–6.77**	**0.05**	–6.73	0.18
Teacher's job experience (in years)			**–0.63**	**0.00**			**–0.33**	**0.01**
Index of teacher's educational attainment $(0-6)$			–0.25	0.17			–0.37	0.14
Duration of teacher training index $(0-4)$			**0.36**	**0.06**			**–0.54**	**0.04**
Constant	–0.24	0.77	**3.55**	**0.00**	–0.80	0.21	**4.37**	**0.01**
N	123		97		117		69	
Pseudo R^2	0.06		0.37		0.18		0.37	
LR, Prob $>$ chi^2	0.09		0.00		0.00		0.00	

[1] Bold figures indicate significance at the 10 % level.

[2] For grade 2 this variable does not exist. However, assuming that parents' literacy level does not differ much within a given school, the missing information was approximated by information available for grade 5 (see also footnote 7).

Table A2.2

Mathematics[1]

Probit estimates	Grade 2				Grade 5			
	Specification 1		Specification2		Specification 1		Specification 2	
Dependent variable: Teacher is a contract teacher	Coef.	$P > \|z\|$	Coef.	$P > \|z\|$	Coef.	$P > \|z\|$	Coef.	$P > \|z\|$
Initial score, Mathematics	**–0.01**	**0.09**	**–0.01**	**0.10**	–0.02	0.24	–0.02	0.36
Index of parents' literacy $(0-2)^2$	**–0.69**	**0.05**	**–1.34**	**0.01**	**0.97**	**0.04**		
Average number of textbooks per student $(0-2)$	**0.98**	**0.03**	**1.86**	**0.01**				
Share of Tamacheq speaking students					**5.68**	**0.01**	**9.87**	**0.06**
School is participating in a pilot project					**–0.64**	**0.05**	–0.74	0.11
Class size	0.04	0.19						
Class size squared	–0.00	0.11						
School is situated in a rural area					**0.82**	**0.03**		
Share of multi-grade classes in the region					**–6.28**	**0.07**	–6.78	0.17
Teacher's job experience (in years)			**–0.64**	**0.00**			**–0.32**	**0.01**
Index of teacher's educational attainment $(0-6)$			–0.30	0.12			–0.35	0.16
Duration of teacher training index $(0-4)$			**0.40**	**0.05**			**–0.53**	**0.05**
Constant	–0.01	0.99	**3.98**	**0.00**	–0.81	0.20	**4.38**	**0.00**
N	123		97		117		69	
Pseudo R^2	0.07		0.39		0.18		0.37	
LR, Prob $>$ chi^2	0.04		0.00		0.00		0.00	

[1] Bold figures indicate significance at the 10 % level.

[2] For grade 2 this variable does not exist. However, assuming that parents' literacy level does not differ much within a given school, the missing information was approximated by information available for grade 5 (see also footnote 7).

Annex 3: The distribution of test scores

Table A3.1

The distribution of class average test scores by subject and grade

	Grade 2		Grade 5	
	Mean	Std. deviation	Mean	Std. deviation
Math+French	41.1	16.3	29.9	9.4
French	40.5	17.9	28.5	10.1
Mathematics	39.7	16.4	31.2	9.9

Annex 4: Balancing characteristics of treated and controls before and after matching[1,2] (Mathematics and French combined)

Table A4.1

Comparison of means, grade 2, specification 1

Variable and sample	Mean		% reduct		t-test	
	Treated	Control	% bias	|bias|	t	$p > \|t\|$
Initial score, average Math and French						
Unmatched	22.53	25.66	−19.2		−1.05	0.29
Matched	22.53	24.87	−14.3	25.2	−0.82	0.42
Average number of textbooks per student (0 − 2)						
Unmatched	0.33	0.31	7		0.39	0.70
Matched	0.33	0.35	−7.5	−6.7	−0.38	0.71
Index of parents' literacy (0 − 2)						
Unmatched	0.82	0.92	−26.9		−1.48	0.14
Matched	0.82	0.86	−10.1	62.5	−0.53	0.60
Class size						
Unmatched	43.43	44.83	−9.4		−0.52	0.61
Matched	43.43	42.79	4.3	54.2	0.27	0.79
Class size squared						
Unmatched	2050.10	2281.70	−16.7		−0.92	0.36
Matched	2050.10	1999.90	−3.6	78.3	0.24	0.81

[1] Means for the matched groups are computed after imposing common support.
[2] Figures are computed using PSmatch2 (*Leuwen* and *Sianesi* 2003).

Table A4.2

Comparison of means, grade 2, specification 2

Variable and sample	Mean		% reduct		t-test	
	Treated	Control	% bias	|bias|	t	p > |t|
Teacher's job experience (in years)						
Unmatched	2.64	4.47	−117		−5.61	0.00
Matched	2.64	2.70	−4.1	96.5	−0.2	0.84
Index of teacher's educational index (0 – 4)						
Unmatched	3.82	4.03	−23		−1.04	0.30
Matched	3.82	4.05	−25.5	−10.8	−1.23	0.22
Duration of teachers training index (0 – 4)						
Unmatched	1.67	1.65	2.5		0.11	0.91
Matched	1.67	1.46	21.2	−744.9	1.05	0.30
Initial score, average Math and French						
Unmatched	24.02	27.47	−20.9		−0.95	0.35
Matched	24.02	24.22	−1.2	94.3	−0.06	0.95
Average number of textbooks per student (0 – 2)						
Unmatched	0.34	0.34	0		0.00	1.00
Matched	0.34	0.38	−14.5	−86449.8	−0.66	0.51
Index of parents' literacy (0 – 2)						
Unmatched	0.81	0.90	−21.4		−0.98	0.33
Matched	0.81	0.73	21.9	−2.5	0.99	0.32

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Table A4.3

Comparison of means, grade 5, specification 1

Variable and sample	Mean		% reduct		t-test	
	Treated	Control	% bias	|bias|	t	p > |t|
Initial score, average Math and French						
Unmatched	25.93	28.23	−25.3		−1.11	0.27
Matched	25.93	26.24	−3.4	86.6	−0.19	0.85
Index of parents' literacy (0 – 2)						
Unmatched	0.93	0.84	22.5		1.02	0.31
Matched	0.93	0.94	−3.3	85.2	−0.17	0.87
Share of Tamacheq speaking students						
Unmatched	0.03	0.02	21.5		1.00	0.32
Matched	0.03	0.03	6.4	70.3	0.31	0.76
School is participating in a pilot project						
Unmatched	0.20	0.43	−49.9		−2.09	0.04
Matched	0.20	0.26	−12.6	74.7	−0.72	0.47
School is located in a rural area						
Unmatched	0.40	0.30	20.1		0.91	0.37
Matched	0.40	0.36	7.9	60.5	0.42	0.68
Share of muli-grade schools						
Unmatched	0.07	0.09	−39.3		−1.56	0.12
Matched	0.07	0.07	4.3	89.0	0.26	0.80

Table A4.4

Comparison of means, grade 5, specification 2

Variable and sample	Mean		% reduct		*t*-test	
	Treated	Control	% bias	|bias|	*t*	*p* > |*t*|
Teacher's job experience (in years)						
Unmatched	3.47	4.34	−46.4		−1.62	0.11
Matched	3.47	4.00	−28.6	38.5	−1.06	0.29
Index of teacher's educational attainment (0 − 6)						
Unmatched	4.67	4.56	12.5		0.39	0.70
Matched	4.67	4.46	25	−99.7	0.93	0.36
Duration of teacher training index (0 − 4)						
Unmatched	1.27	1.95	−80.4		−2.39	0.02
Matched	1.27	1.42	−17.9	77.7	−0.84	0.40
Initial score, average Math and French						
Unmatched	27.69	27.06	6.9		0.23	0.82
Matched	27.69	26.65	11.4	−64.2	0.38	0.70
Share of Tamacheq speaking students						
Unmatched	0.02	0.01	28.6		1.05	0.30
Matched	0.02	0.02	−3.6	87.3	−0.11	0.91
School is participating in a pilot project						
Unmatched	0.33	0.41	−16.5		−0.54	0.59
Matched	0.33	0.28	11.2	31.8	0.44	0.66
Share of mulit-grade schools						
Unmatched	0.07	0.09	−34.2		−1.05	0.30
Matched	0.07	0.06	14.4	57.5	0.63	0.53

Pro-poor Growth and Gender Inequality

By *Stephan Klasen,* Göttingen*

Abstract

This paper examines to what extent gender gaps in education, health, employment, produc-tive assets and inputs can affect pro poor growth (in the sense of increasing monetary in-comes of the poor). After discussing serious methodological problems with examining gender issues in the context of an income-based pro-poor growth framework, the paper considers theory and evidence on the impact of gender inequality on pro poor growth. While there is a considerable literature suggesting negative impacts of gender gaps on growth, there is much less information on the impact of gender gaps on inequality. The paper then examines the experiences of country cases and finds that gender inequality can have a significant effect on pro-poor growth, but that the importance and type of effects differ considerably between dif-ferent regions. It also appears that the effects of gender gaps on pro-poor growth operate primarily via an impact on growth rather than an impact on distributional change.

A. Introduction

Understanding the determinants of pro-poor growth which we define here to mean the average income growth rate of poor households[1] has become a central focus of policy research concerned with accelerating poverty reduction in develop-ing countries. It was also the focus of a recently concluded international research program on 'Operationalizing Pro-Poor Growth' (OPPG) undertaken by an inter-national team of development economists and supported by the World Bank-DFID-AfD-BMZ-GTZ-KfW which involved cross-country- research, country case

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[1] See discussion below and *Klasen* (2004b, 2005) for a detailed discussion on the defini-tion of pro-poor growth.

studies, and thematic analyses. This paper is based on my gender thematic paper written for that research program.

Issues of gender inequality could be of importance in the analysis of pro-poor growth for two reasons. The first one is a well-being concern asking whether both genders are benefiting equally from pro-poor growth.[2] Large gender disparities in important indicators of development should be of concern to us as they may hold back progress on overall development[3] and compromise progress on gender equity which has been accepted as a major development goal by the signatories of the UN Convention on the Elimination of Discrimination against Women (CEDAW) and the signatories of the UN Millennium Declaration including the Millenium Development Goals. On a more operational level, identifying such gender gaps would allow policy-makers to target those suffering from such gaps for priority interventions.

Secondly, we may be interested in gender as an 'agency' concern (see *Sen,* 1990 and 1998) by asking to what extent males and females are able to contribute to pro-poor growth and how their respective contributions can be strengthened to accelerate pro-poor growth. In this paper, we will largely focus on this issue, i.e. examine the question to what extent gender inequality affects the ability of countries to achieve high rates of pro poor growth.

To date, the measurement and analysis of pro-poor growth has been confined to the income dimension of poverty which causes a number of serious methodological problems for studying gender issues in relation to pro poor growth. This is discussed in section 2. Section 3 reviews the literature on gender and pro poor growth, trying to identify the most important channels how gender inequality can affect economic growth and distributional change, the two drivers of pro-poor growth. Section 4 will then assess the situation concerning selected gender issues in the 14 countries included in the OPPG research program as case studies (Bangladesh, Bolivia, Brazil, Burkina Faso, El Salvador, Ghana, India, Indonesia, Romania, Senegal, Tunisia, Vietnam, Uganda, and Zambia). This will be done using quantitative information on selected gender issues, relevant literature, and the (rather limited) discussion from the OPPG case studies. This section will also attempt to distill lessons about the influence of particular gender issues on the observed record of pro poor growth. Section 5 will then conclude with policy implications.

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[2] See, for example, *Klasen* (2006) and *Klasen* and *Wink* (2003).

[3] This is the case if societies exhibit inequality aversion (as empirically they seem to). This insight is at the heart of the Gender-Related Development Index (*UNDP,* 1995). For a discussion, see *Bardhan* and *Klasen* (1999, 2000).

B. Gender inequality and
income-based pro-poor growth measures:
methodological problems

The measurement of pro-poor growth takes household incomes per capita as its starting point. The *Ravallion* and *Chen* (2003) measure, adopted for the OPPG work program, is based on the growth incidence curve, which plots the income growth rates of centiles (sorted from poor to rich) of the initial income distribution. Based on this curve, the measure of pro-poor growth is the average of income growth rates by centile up until the poverty line in the initial period, or, alternatively, the integral of the area under the growth incidence curve up until the poverty line.

Using this household income-based approach to the measurement of poverty and pro-poor growth, three methodological problems immediately appear for an analysis of gender issues. From a well-being perspective, such an income-based approach will not be very helpful in investigating whether both sexes are benefiting equally from growth and poverty reduction. This is due to the fact that incomes are measured at the household level and cannot easily be attributed to individual members for conceptual and practical reasons.[4] This problem would be less severe if a broader and more outcome-oriented approach to poverty measurement, such as Sen's capability approach (e.g. *Sen,* 1998) was chosen as it is generally easier to measure capabilities (such as the ability to be healthy or educated) at an individual level than attribute household incomes to individuals.

More serious for our focus on the agency aspects of gender inequality is a second methodological problem. A focus on household incomes seriously underestimates and misrepresents the contribution of many women to well-being within households (see *Waring,* 1988; *UNDP,* 1995; *Blackden* and *Bhanu,* 1999). In poor countries, many women (and some older girl children as well) are engaged in non-market production that is not captured in the standard income concept used in household surveys. They nevertheless produce valuable outcomes, such as better health, education, and nutrition of their families and children. Neither their contribution nor the outcome of their contribution is directly visible in an income-based concept of pro-poor growth. It will only show up indirectly in our income-based measures if the outcomes of their household production (such as better health, edu-

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[4] The most important conceptual problem relates to household-specific public goods (e.g. housing, utilities, durable goods) the benefit from which cannot easily be allocated to individual members. Among the practical problems are that in most household income and expenditure surveys many sources of household incomes (e.g. from remittances, transfers, or own production) and consumption of private goods (e.g. food and transportation) are not reported by individual recipient or beneficiary. As a result, it is not possible to say whether certain household members are poorer in an income sense than others and thus the convention usually adopted is to assume that everyone or no one in a household is poor. For a discussion, see *Klasen* (2006).

cation, and nutrition of its members) lead to increases in earned incomes. Also here, these problems could, in principle, be tackled. Through the use of time use surveys, one could get a sense of non-market production. Treating poverty as a multi-dimensional problem that relates to low incomes, poor health and education, poor access to vital services, etc. would then allow an analysis of the outcomes of these contributions and thus make visible the contributions of female household and caring labor to reducing poverty in this broader perspective (see also below).

A third problem is closely related. An income-based focus on poverty measurement underplays the potentially important role of bargaining power of males and females within households for poverty reduction. The focus in such an approach is on total household income or expenditure and not usually on the contributors to this income or on the determinants of how these incomes get spent. There is a large literature showing that bargaining power of adult males and females appears to be heavily influenced by their contributions to household income. In turn, bargaining power has important impacts on the way households decide on resource allocation to goods that directly affect household welfare such as spending on food, education, and health care.[5] In an income-based poverty analysis, this will only enter the picture if the effects of these decisions have an impact on household incomes, and thus the important contribution of gender differences in bargaining power on household decisions will only be fully visible if a broader perspective to poverty measurement was adopted.

As shown in *Klasen* (2005) and *Grosse, Harttgen,* and *Klasen* (2005), it is possible to remedy these serious short-coming of the income-based metric of the analysis while retaining the useful analytical tools of pro-poor growth measurement. This is done by applying the growth incidence curve and the rate of pro poor growth to non-income indicators. For illustration, *Figure 1* shows a growth incidence curve (we use absolute growth rather than percentage growth rates) by sex for the indicator average education of adult members of the household for Bolivia from 1989–1998. Such a growth incidence curve plots the absolute increments in years of schooling between 1989 and 1998 for males and females, sorted by the percentile distribution of schooling in 1989. It shows that educational growth was experienced by males and females at all levels of initial education (except at the very bottom and in the 7th and 8th decile), but that the growth incidence curve differs by gender and is not uniform across initial education levels. Such a non-income growth incidence curve (NIGIC) could then be compared to an income-based growth incidence curve and the relationship between incomes and non-income dimensions of poverty, disaggregated by gender, could be much more easily analyzed at all points of the income distribution.[6]

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[5] For a review of these findings see *World Bank* (2001) and a particularly interesting individual study, *Thomas* (1997).

[6] See *Klasen* (2005) for a more detailed discussion of this issue, its potential and limitations.

Figure 1: Absolute change of average education for males and females
in Bolivia by initial levels of education, 1989–1998

While it is therefore possible to study pro-poor growth in a wider dimension, the remaining discussion will be limited to the income dimension as this was the focus of the OPPG research program and, to date, of virtually all literature on pro-poor growth.

C. Gender inequality and pro-poor growth: insights from the literature

By definition, the rate of pro poor growth (measured in the income dimension) is influenced by distribution-neutral economic growth and changes in income inequality.[7] It is therefore important to assess to what extent gender inequality can affect either overall economic growth or distributional change. Given the methodological problems described above, some of the identified effects will be rather indirect.[8]

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[7] See *Bourguignon* (2003) for a careful analysis of the respective contributions of growth and inequality reduction to poverty reduction, both from a theoretical as well as an empirical point of view. See also *Datt* and *Ravallion* (1992) for a decomposition of poverty reduction into a growth and a distribution component.

[8] For example, gender gaps in education might affect the education levels of the next generation which will in turn affect income growth with some delay. If one considered non-income dimensions of poverty as well, some of the linkages described discussed here would be much more direct.

Let me begin with a discussion of the potential impact of gender inequality on economic growth. Clearly, any impact will depend on the type of gender inequality and I will particularly focus on impacts of gender inequality in education, employment, pay, and access to assets and resources for self-employment in agricultural and non-agricultural sectors.

In principle, it is possible to write down models where gender inequality in these dimensions might be beneficial for economic growth. For example, starting from a Becker-type model of specialization within the household where males concentrate on market and females on non-market production, gender inequality in education and employment would be an efficient strategy as both would (through internal trade within the household) gain from the specialization of each partner in their respective activities (*Becker,* 1981). In practise, it appears that the relevance of this model is open to question. In particular, females in poor countries hardly ever specialize entirely on home production but are also involved in market production (often in agriculture, the informal sector, but also the formal sector). Moreover, to the extent specialization exists, it is unclear that education for females would be inefficient given the effects female education has on the production of human capital within households (see below). There are also a number of fundamental questions regarding this modelling approach which have been discussed extensively elsewhere (see *Sen,* 1990; *Klasen,* 2003a). But ultimately, the strength of these arguments will rest on their empirical relevance which will be discussed below.

In contrast to such an approach, a range of models have shown that gender inequality in education and employment reduces economic growth.[9] As argued by *Dollar* and *Gatti* (1999) and *Klasen* (2002) and assuming that there is an equal distribution of talent among males and females, gender inequality in education and employment is a form of distortion that artificially reduces the pool of talent from which to draw for production. In a similar model by *Esteve-Volart* (2004), gender gaps in access to managerial positions and employment more generally distorts the allocation of talent and the production and productivity of human capital, all of which serves to reduce economic growth.

A related formulation is presented by *Knowles* et al. (2002) suggesting that if there are declining marginal returns to education and imperfect substitutability between male and female education in production, restricting the education of girls to lower levels of education while educating boys at higher levels means that the *marginal* return to educating girls is higher than that of boys, a finding that has also been shown empirically (see *Schultz,* 1993). Thus such gender inequality would therefore reduce the total returns to education in a society and therefore reduce economic growth.

A second argument relates to positive externalities of female education and employment. Promoting female education and employment increases female knowl-

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[9] See *Klasen* (1999, 2002) for more details.

edge, their bargaining power (and say over household decision), as well as the opportunity cost of their time. There is a large theoretical and empirical literature demonstrating that this serves to reduce fertility levels, reduce child mortality levels, and promote the education of the next generation (e.g. *World Bank,* 2001; *Thomas,* 1997). Each factor in turn has a positive impact on economic growth. In fact, in models by *Lagerlöf* (2003) and *Galor* and *Weil* (1996), the fertility effects of gender gaps in education and earnings are so large that countries can get stuck in low-income traps where high fertility, low investment in each child, and large gender gaps in education and employment reinforce each other.[10] This could be particularly relevant for low income countries that have not entered the demographic transition (which applies to a significant number of countries in sub-Saharan Africa) and these countries might therefore be stuck in such low-level poverty equilibria, partly due to high levels of gender inequality.

Related to these arguments, *Bloom* and *Williamson* (1998) have emphasized the timing of these demographic effects matter for growth. In particular, they argue that low gender gaps in education will help initiate the demographic transition which will lead to a temporarily favourable age structure of the population, known as the 'demographic gift', in which the share of working age people (compared to the declining number of young and the not yet large number of elderly dependents) is very high. This 'demographic gift' can boost economic growth by increasing the ratio of workers to the population, and by raising savings and investment rates. The timing of the demographic transition, which is critically influenced by the levels of female education, could therefore be an important factor in promoting economic growth and *Bloom* and *Williamson* (1998) argue that it indeed accounted for a considerable share of high growth in East Asia in past decades.

A third argument relates to the role of gender gaps in education, employment, and pay in promoting international competitiveness. As argued by *Seguino* (2000), the combination of an educated, employable but rather poorly paid female labour force might give a country a competitive edge in the exports of light manufacturing (e.g. textiles, toys, consumer electronics) which is intensive in the use of female labour. While the sustainability of such a strategy is open to question (as the use of female labour should put upward pressure on female wages), it is argued that the export-promotion strategies of East Asia was supported by low gender gaps in education and employment but sizable gender wage gaps.[11]

A fourth argument relates to the impact of gender gaps in access to productive assets and inputs. In situations where women and men undertake different and/or separate productive activities (as is the case in agriculture in much of Africa but also in non-agricultural activities in many developing countries), differential access to productive assets and inputs constitutes a distortion in the sense that

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[10] Lagerlöf emphasizes gender gaps in education, while Galor and Weil concentrate on earnings gaps.

[11] See *Klasen* (2002) and *Tzannatos* (1999) for further discussion of these issues.

'women's activities' are under-resourced and under-capitalized while 'male activities' are (comparatively) over-resourced and over-capitalized. Due to declining marginal returns and/or the loss associated with talented women being starved of economic resources, such a distortion reduces aggregate output (e.g. *World Bank*, 2001; *Blackden* et al., forthcoming, *Udry*, 1996).[12]

On the empirical side, there is now a preponderance of cross-country evidence suggesting that gender inequality in education reduces economic growth (e.g. *Dollar* and *Gatti*, 1999; *Knowles* et al. 2002; *Klasen*, 2002, *Yamarik* and *Ghosh*, 2003; Forbes, 2000).[13] This finding is robust to a variety of econometric specifications, data, time periods, and country groupings, so that it can be considered quite robust. The estimated effects in these papers are quite large suggesting that particularly in South Asia, Sub-Saharan Africa, and the Middle East, gender gaps in education reduced growth significantly in past decades. In *Abu-Ghaida* and *Klasen* (2004), these effects are also estimated to persist in coming years in those countries where gender gaps in education remain sizable. In line with the theoretical literature, there are several channels through which gender inequality in education affects growth. As shown by *Klasen* (2002), gender inequality appears to affect growth directly supporting the distortion arguments, but they also appear to have an indirect impact via demographic effects supporting the externality arguments made above. This is also in line with the large cross-country and micro evidence that gender inequality in education leads to higher fertility, higher child mortality, higher undernutrition, and lower educational investments (e.g. *Schultz*, 1997; *Klasen*, 1999; *Smith* and *Haddad*, 1999; *World Bank*, 2001, *Abu-Ghaida* and *Klasen*, 2004).

There is also some cross-country evidence that gender inequality in employment similarly reduces economic growth, although these findings are much less robust at this stage due to a variety of unresolved data and econometric issues (e.g. *Klasen*, 1999; *Klasen* and *Lamanna* 2003). In the context of the OPPG work program, *Esteve-Volart* (2004) provides interesting cross-regional evidence within India on the effect of gender gaps in access to employment and managerial positions on per capita income. By examining the comparative growth record of Indian states between 1961–1991 she finds that a 10 % increase in the female-male ratio of managers would increase the output of a state by 2 % and a 10 % increase in the female-male ratio of workers would increase output by 8 %.[14]

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[12] Lastly, there is an emerging literature suggesting that women are less prone to corruption and nepotism than men (*World Bank* 2001). Improving access to women to the workforce and decision-making bodies is therefore likely to improve governance in business and government.

[13] There were initial findings from *Barro* (1991) and *Barro* and *Lee* (1994) that suggested that female education reduced economic growth (while male education increased it). It turned out, however, that their estimates were driven by econometric and data problems. For a full discussion, see *Klasen* (2002) and *Lorgelly* and *Owen* (1999).

[14] While the latter effect can be observed in both the agricultural as well as the non-agricultural sector, the former is only apparent in the non-agricultural sector.

There is also considerable micro evidence that points out that gender inequalities in access to productive assets (such as land, fertilizer, seeds, credit, etc.) reduce the productivity of female producers and by more than the same inequality increases the productivity of male producers. For surveys of this literature, see *Blackden* and *Bhanu* (1999), *World Bank* (2001), *Bamberger* et al. (2001), and *World Bank* (2002). To the extent that this gender inequality is particularly severe among poor producers, it also increases poverty directly (beyond the indirect impact of such inequality on growth and thus on poverty), although the size of this effect has not been quantified. Indirect evidence by *Ravallion* and *Datt* (2002) from India suggests that there could be an important effect here: they find that female literacy was the most important determinant of the poverty impact of non-farm rural growth in India in the last three decades. Similarly, there is evidence from Bangladesh pointing towards the role access to credit for females can play in reducing poverty by strengthening the productive roles of women (see *Khandker,* 1998 and *World Bank* 2001).

Thus there is a substantial theoretical and empirical literature suggesting that gender inequality in education, employment, and access to productive assets and inputs reduces economic growth and thus affects pro-poor growth through this growth effect. It is now important to investigate whether we would expect gender inequality to have a systematic effect on income distribution, the second key component affecting pro-poor growth.

It is not a priori clear how gender inequality could affect the distribution of household incomes. While gender inequality in education, employment, and bargaining power surely affects the intrahousehold distribution of resources (see e.g. *Thomas* 1997, *World Bank* 2001), it is much less clear whether it also affects the income inequality between households, which is the only relevant inequality we can investigate when analyzing income poverty and income inequality.[15] This is due to the fact that females live in poor and non-poor households alike and thus the impact of gender inequality on the inter-household income inequality will depend on the size and effects of gender gaps in poor relative to rich households. If gender gaps (e.g. in education, employment or access to productive inputs) are larger and have greater consequences for household incomes among poorer households, a closing of the gender gap would disproportionately increase incomes among the poor and thus serve to lower inequality. This might be plausible if, for example, it is the case that the effect of gender gaps on fertility is much larger among poor households than rich ones and as a result, poor households have much larger families with little investment in each child. As shown by *Kremer* and *Chen* (2002) this would then serve to increase inequality between poor and rich households who invest much more in each of their (many fewer) children.

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[15] In principle, it is likely that intrahousehold inequality in resource allocation can affect the income distribution among *individuals*. For a discussion, see *Haddad* and *Kanbur* (1990). But since poverty and inequality (and thus pro-poor growth) is always measured at the household level (with an implicit assumption of equal distribution), the impact of intrahousehold inequality is not considered. For a discussion, see *Klasen* (2006).

Conversely, there could be situations where gender gaps are larger or more consequential among the rich and closing them would serve to increase inter-household income inequality.[16] Thus it is not a priori clear that gender gaps will affect inter-household inequality, nor the direction of such effects.[17]

Regarding the empirical impact of gender inequality on income distribution, there have been fewer empirical investigations. There is some evidence with regard to the fertility-poverty nexus described above. Given that the poor are the ones burdened the most with large families, it has been found by *Eastwood* and *Lipton* (2001), *Kremer* and *Chen* (2002), *Klasen* (2004c) and *Bourguignon* (2001) that income distribution has been influenced significantly by the differences between fertility decline among rich and poor households which in turn is related to large gender gaps (or simply low absolute achievements) in female education and female bargaining power (see also *Klasen* 2004b).

This survey of the theoretical and empirical literature has suggested that gender inequality in education, employment, access to productive assets reduces growth and thus also pro-poor growth. It is much less clear, whether and how it affects the income distribution, the second component driving pro-poor growth. It will therefore be important now to investigate to what extent gender inequality has affected pro-poor growth through the growth and distribution channel in the 14 country case studies included in the OPPG project.

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[16] For example, in India the labor force participation rates among middle-class women is often much lower than among poor women. This difference in inequality in employment helps to reduce inter-household income inequality as poor households have (by necessity) two earners and richer ones often only one male earner. Conversely, policies to promote female labor force participation could then have a larger effect among richer women and thus serve to increase inter-household income inequality.

[17] While the impact of gender inequality on inter-household inequality is less clear, the ways females and males form households (most commonly through marriage) will have a significant impact on inter-household income inequality. To the extent there is 'positive assortative matching' in the marriage market (*Becker* 1981), i.e. that females with high education and income earning potential will tend to marry males with similarly high education and income earnings potential, such a trend will magnify inter-household income inequality. Such positive matching, particularly along the dimension of education, appears to be of great importance in developing countries. In fact, the correlation in education levels between spouses appears to have increased in a number of countries (*Quisumbing* and *Hallman*, 2003; *Faffchamps* and *Quisumbing*, 2004). It is also relevant in the OPPG countries. For example, the correlation coefficient between the level of educational attainment of spouses in Bolivia was 0.71 in 1989, and 0.68 in 1998, clear signs of strong positive assortative mating with the associated tendency to raise income inequality. While this tendency is only partly amenable to policy interventions, it is quite clear that more inclusive educational systems that are open to students of different backgrounds, classes, and abilities can contribute to lowering the high income, education, and class correlation of spouses.

D. Gender and pro-poor growth
in the OPPG case study countries

When examining the relationship between gender and pro-poor growth in the 14 case study countries, it is critical to note that the gender issues that might influence pro-poor growth differ drastically between the regions. In *Table 1* below, a regional classification is suggested that identifies the most important growth-related gender issues in each region, highlights some differences within regions and states recent trends in these gender issues.[18]

In the countries from Sub Saharan Africa, the relevant gender issues relate particularly to fertility, education, agriculture, and the formal labour market. All have high (and only slowly falling) fertility, low but in some countries improving female education, slowly falling gender gaps in education, high female labour force participation in the informal and agricultural sector, but low female representation in the formal sector. Due to their reproductive and productive roles, combined with poorly developed household infrastructure (access to water, fuel, markets), women suffer from acute time poverty which further reduces their ability to contribute to economic activities (see *Blackden* and *Bhanu,* 1999; *World Bank,* 2005). In addition, AIDS places an extra time burden on women in the affected countries.

In line with this characterization, the country case studies emphasize some of these particular constraints. In particular, most case studies report that women are an underutilized resource in agriculture. They often have little or no formal control over land, have reduced access to fertilizer, credit, and other vital inputs, often play little role in cash crop production, and are therefore unable to produce as productively as males. From the discussion above, it is clear that such inequality in access to productive resources is inefficient and should reduce economic growth, and thus poverty reduction. In fact, in the case of Burkina Faso, this inefficiency was formally demonstrated in an econometric analysis by *Udry* (1996).[19] A related issue is the impact of agricultural reforms and the impact on male and females. Given the importance of women as agricultural producers, the reforms that increased the incentives for agricultural production (e.g. abolition of marketing boards, devaluations, reduction or elimination of export taxes, freeing up of marketing and input supplies) are likely to have aided women as producers, as is discussed in the Zambia case study (see *Thurlow* and *Wobst,* 2004 and *Blackden* et al., forthcoming).

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[18] In the working paper version of this paper, available at http://www.bmz.de/de/themen/armut/arbeitsfelder/wirtschaft/Gender.pdf, a much more detailed discussion and quantitative information is provided to justify these regional groupings (while highlighting some important intra-regional differences).

[19] See also *World Bank* (2005), *Klasen* (2004a), and *Blackden* and *Bhanu* (1999) for further discussions.

Secondly, the African case studies report declines in the gender gaps in educational enrolments which should, according to the discussion above, serve to improve growth and poverty reduction through the direct and indirect channels described above. A particular worrying sign is, however, that the improvement in the gap has been brought about in part by declines in male enrolment rates, particularly in Zambia and Ghana (see also *Abu-Ghaida* and *Klasen,* 2004), which means that overall human capital is declining (even it is more gender-balanced).

Three important issues regarding women's contribution to growth are also highlighted in the case studies. First, women seem to be facing severe constraints in access to formal sector employment in most of the case study countries. These barriers relate to access to employment as well as pay, and are due to a combination of economic, cultural, and institutional barriers.[20] They are also related to educational gaps but persist despite them in a number of countries (e.g. Ghana, Burkina Faso, Uganda, Zambia). Thus also here women appear to be an under-utilized resource.[21] Second, the burden on women's time is raised in the Ghana study (*Aryeetey* and *McKay,* 2004) and is likely to influence the productive contributions women are able to make to growth and poverty reduction. Here the role of local and houseold infrastructure (particular, roads, water and fuel access) will play a key role in freeing women's time for more productive activities which should have beneficial growth effects (*Blackden* and *Bhanu,* 1999; *Blackden* et al., forthcoming). Lastly, the role of AIDS is discussed in the Zambia study but should be emphasized more in the other countries that are affected (including particularly Uganda). Women have a higher incidence of HIV / AIDS and thus their productive contribution and human capital accumulation will invariably suffer. In addition, women play a large role as carers for people affected by AIDS which draws them away from other productive activities.

A second group of the case study countries from South Asia and North Africa (India, Bangladesh, and Tunisia) combine sharply falling fertility, significantly improving female education from a situation with very high gender gaps, and quite low (but in some countries rising) female labour force participation rates. The speed of the fertility decline and the reduction of gender gaps in education have been much faster in Tunisia and Bangladesh than in India, where the progress has been slower and much more uneven. Also, Tunisia and Bangladesh (in contrast to India) have experienced rising female labour force participation, including rising employment in an export-oriented light manufacturing sector (*World Bank,* 2001, 2004).

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[20] See *Morrison* and *Jütting* (2004) for a discussion of these issues.

[21] Interestingly, the Zambia case study notes that this has shielded women from the unfavourable developments in formal employment and wages that was associated with the economic reform processes and the protracted economic crises.

Table 1: Gender and growth issues in case study countries

Region	Countries included	Growth-Relevant Gender Issues	Differences within Region	Trends in Priority Gender Issues
Sub-Saharan Africa	Burkina Faso, Ghana, Senegal, Uganda, Zambia	High fertility, significant gender gaps in education, low levels of female education, low female share of formal employment, inequality in access to land and inputs, time poverty	Role of AIDS in imposing time burden on women and affecting human capital accumulation (Zambia, Uganda); Levels and gaps in education (lower in Uganda, Ghana); separate versus joint production in agriculture (West Africa versus East and Southern Africa)	Little change in fertility (exception Ghana) and in education levels, and slow reduction of gaps (exception Uganda), burden of AIDS worsening (exception Uganda), little change in access to land and inputs.
South Asia and North Africa	Bangladesh, India, Tunisia	Moderate fertility, large gender gaps in education and employment, rising female employment in manufacturing / services	Higher female education and greater expansion of female employment (Bangladesh and Tunisia)	Strong fertility decline, sharp expansion of education, quick reduction of gaps (exception India), large expansion in female employment (exception India)
Latin America	Bolivia, Brazil, El Salvador	Moderate fertility, low gender gaps in education, high female labour force participation, but unequal access to formal sector	Important role of women in export-production (El Salvador)	Strong fertility decline, further expansion of education, large expansion of female employment
East Asia	Vietnam, Indonesia	Low fertility, low gender gaps in education, large female-participation in export industries, large pay gaps	Role of transition on employment opportunities of women (Vietnam)	Rapid expansion of female education and employment in manufacturing (including exports) and services; slight reduction in gender pay gaps
Transition Countries	Romania	Low fertility, no gender gaps in education, high female labour force participation	Depth of economic crisis affects female employment changes	Decline in female employment and relative pay

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As suggested by the case studies and the discussion in the previous section, gender issues are particularly important and relevant to pro-poor growth in these regions as the gender gaps in critical indicators are particularly large and consequential for pro-poor growth.[22] This is due to the fact that these regions started out in the 1960s with particularly large gaps in education, employment opportunities (and even survival), and access to assets and inputs (*Klasen*, 2002 and *Klasen* and *Wink*, 2003). As a result, the role of public policy in strengthening the contribution of women is particularly relevant here it can explain the different speed of improvements in the different countries. In particular, Bangladesh and Tunisia are two examples where a strong commitment to the expansion of female education and the promotion of export-industries that largely employ females appear to have paid off as these two countries show much faster improvements in these two dimensions than other countries in the region (e.g. *World Bank* 2001, 2004; *Klasen* and *Wink*, 2003).

Focusing on the education and employment gaps, the Bangladesh case study notes that the food-for-education programs and the subsidies for girls to go to secondary school in Bangladesh have particularly helped in closing the gender gaps in education (see *Sen*, 2005; *World Bank*, 2001). In contrast, action in India was concentrated in only a few regions and thus overall progress was much lower (e.g. *Drèze* and *Sen*, 1995). The pay-off to these investments, in terms of reduced fertility levels and improved economic opportunities for women is impressive. Tunisia and Bangladesh reduced their fertility levels much faster than other countries, including India. In addition, as noted by the two case studies, Tunisia and Bangladesh have experienced significant increases in female labour force participation rates in recent years including a rapid expansion of female employment in light manufacturing (*Sen*, 2005; *Ayadi* et al. 2004; see also *World Bank* 2004). This was aided in both contexts by the sharp fertility decline (which enabled greater female labour force participation) as well as a push to promote export-oriented policies, policies to invite foreign direct investment in export-oriented light manufacturing industries, and policies to promote employment opportunities of women. While there are serious questions about pay and working conditions in some of these industries, these developments were critical to promote women's productive contribution, and will raise the bargaining power of women with positive repercussions for their own well-being and that of their families (*World Bank*, 2001). Moreover, the significant expansion of credit access for poor women in Bangladesh is likely to have further increased their ability to participate in the economy (*Sen*, 2005). Thus the concerted push for female education and employment, accompanied by the rapid fertility decline, has made a significant contribution to the high and export-oriented growth performance of these two countries.

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[22] It is not possible to discuss the potential reasons for the large gender gaps in South Asia and North Africa in this paper. See, for example, *Klasen* (2003b) and *Boserup* (1970) and the literature cited there for a discussion

While the average record in India is more varied, differentials within India show that improvements in women's access to education and employment can promote growth and poverty reduction. As shown by the India case study, states with higher education spending succeeded in reducing the gender gaps in education more; those states also had the higher poverty elasticity, so that their education spending paid off in terms of poverty reduction (see also *Ravallion* and *Datt,* 2002). There is a similarly large gradient in labour force participation across Indian states. While in South-Eastern states female labour force participation rates are high and rising and have recently benefited from the growth of the IT-intensive service industry, in Northern India they remain low. It appears that the costs to these gender gaps are significant; the India case study reports evidence that a 10 % increase in the female-to male ratio of total workers would increase real output per capita by 8 % (*Besley, Burgess,* and *Esteve-Volart,* 2004). A last interesting finding from India is that the reservation of seats for women in local government appears to have had a significant impact on the investment decisions of women and have particularly helped to promote issues that women have found to be particularly important (such as time-saving infrastructure, see *Duflo* and *Chattophadyay* (2003)).

The Latin American case study countries (El Salvador, Brazil, and Bolivia) combine rapidly falling fertility with high female education. Female labour force participation has been rising rapidly in recent years from low levels, with females entering all parts of the formal and informal labour market but continue to be burdened with considerable employment and pay discrimination. Differences among these countries include the type of female labour force participation, which in El Salvador includes a heavy orientation of female-dominated light manufacturing while it is more oriented towards services and informal sectors in Brazil and Bolivia. Quite clearly, the most growth-relevant gender issue in these countries is in the labour markets where females continue to face significant barriers to employment, equal pay, and promotion opportunities.

Due to the small gender gaps in education, the high levels of female education and low fertility levels, the potential of women to play an active role in the labour force is particularly high. As noted by the case studies, this potential has only partly been realized so far. While in El Salvador there was a rapid expansion of female employment, also in export-oriented (maquila) manufacturing, the expansion of female formal sector employment in Brazil and Bolivia was lower, although the female labour force participation increased considerably there as well. In El Salvador, the situation was significantly influenced by the high male war deaths as well as high male emigration rates which sharply increased the rate of female-headed households and women's employment (*Marquez,* 2004). In all three countries, women continue to face significant barriers in terms of employment access, pay, and promotion, so that many women continue to be relegated into low value informal sector activities or domestic service and other low-wage service occupations (*Klasen* et al. 2004; *Menezes-Filho* and *Vasconcellos,* 2004). Reducing

these barriers to formal sector employment remains the most important challenge to promote the contribution of women to pro-poor growth in these countries.

The East Asian countries (Indonesia and Vietnam) combine sharply falling fertility levels, rapidly rising female education from a moderate level and the sharp reduction of gender gaps there, high and rising female labour force participation rates driven by big opportunities for female employment in export-oriented manufacturing (but also in agriculture). The biggest difference among the two is related to the transition process in Vietnam. While women appear to gain from export-oriented activities in the private sector, they are also disproportionately affected by lay-offs from the public sector.

In the East Asian cases, female employment has played a particularly important role in furthering economic growth. In both countries, gender gaps in education are low, female education levels are high, fertility rates have come down dramatically, and female employment is high or has been rising rapidly. Women have played a particularly important role in the expansion of export-oriented manufacturing industries which have become an important source of the growth of these countries. Whether this critical contribution of females to export-oriented growth was aided by the very large gender pay gaps as suggested by *Seguino* (2000) is not investigated in the case studies but clearly merits further investigation. In any case, the high demand for female labour in export industries appears to have reduced wage discrimination in Vietnam and Indonesia (*Klump* and *Bonschab,* 2004; *Tzannatos,* 1999). It has also induced considerable migration of women to these export-oriented jobs which has contributed to a decline in regional inequality in Vietnam. In both countries, however, significant barriers and problems exist in terms of access to employment, pay, and working conditions for women in the modern sector. Thus despite recent improvements, the participation of women in the modern sector is still not remotely on an equal footing and pay gaps remain very large (*Klump* and *Bonschab,* 2004; *Tzannatos,* 1999). In Vietnam, the downsizing of state-owned enterprises has put further pressure on women as they were disproportionately affected by the lay-offs. This effect was, however, fortuitously mitigated by growth of export industries and should now be coming to an end. Thus the East Asian countries on the whole demonstrate how low gender gaps in education and employment, low fertility rates, and a strategy that specifically promotes female employment can make an important contribution to pro-poor growth.

Romania stands alone in the group of transition countries from Eastern Europe. While it shares some features with the other transition country Vietnam (such as the lay-off of females from state industries) one should treat the Eastern European transition countries as a category all of their own, and female labour force participation is very high. Here the main issues centre around often higher rates of female unemployment, some employment and pay discrimination in the labour market, and social protection policies (see *Gheorgiu* et al. 2004, *Klasen,* 1993). Here as in other transition countries, the issue is more one of defending women's strong position in the labour market in an era of high unemployment, emerging labour market

discrimination, and shrinking budgets for childcare, rather than further promoting women's contribution.

What messages can be distilled from these country case studies? If we focus on the agency aspect of gender issues, the case studies show that women can make a significant contribution to economic growth and poverty reduction. This can only happen, however, if they are given the opportunities to contribute productively. This first of all requires fertility decline and improvements in female education. In addition, countries that have adopted export-oriented growth strategies appear to have been particularly adept at harnessing female labour for the promotion of growth and poverty reduction. But also here, success has been hampered by remaining gender gaps in education and discrimination in access to employment. Whether the existing pay gaps might have been a way to increase the competitiveness of female labour and thus improve growth as argued by *Seguino* (2000) or whether they were a barrier preventing more women from joining the labour force is difficult to say without a careful investigation of this particular issue in a country context as the cross-country evidence on this is weak and beset with methodological and data problems. There is also great potential for women to contribute through agricultural and self-employment activities to growth and poverty reduction. But this will only occur if women gain equal access to credit, modern inputs, have secure property rights, and be able to control the proceeds of their labour. Public support in these matters is likely to be important, as is support for labour-saving infrastructure that would free up women's time for more productive activities (*Blackden* and *Bhanu,* 1999).

The discussion so far has centred entirely on the impact of gender issues on economic growth. Little mention has been made of the impact of gender gaps on income distribution (the second factor affecting pro-poor growth) and unfortunately this is a topic that has not been discussed at all in the case studies. From the discussion above it is also unclear whether we would expect large effects here. The one area where there are plausible effects of gender gaps on income inequality is related to the female education-fertility nexus. As shown in *Table 2* below, the regions differ greatly in the fertility differential by female education levels. In particular, in the African case studies, the differential is particularly large with uneducated females having more than 6 children, compared to 3–5 among more educated women. Moreover, more educated women seem to have reduced their fertility more than uneducated ones. Similar gradients exist in fertility rates between poor and rich households. Both would serve to increase inequality in exactly the way proposed by *Kremer* and *Chen* (2002) with poor and uneducated households having many children, few investments in each child and thus continued poverty, while rich and educated households invest more in each child and thus are able to further improve their income position. Thus high fertility not only appears to be a barrier for a greater female contribution to growth, but the fertility gradient between poor and rich households serves to increase inequality (see also below).

Table 2

Total fertility rate by female education and household wealth

	No Education	Primary Education	Secondary Education +	Total Fertility Rate
Sub-Saharan Africa				
Burkina Faso 1992/93	6.8	5.6	3.1	6.5
Burkina Faso 1998/99	6.7	5.0	3.0	6.4
Ghana 1988	7.0	6.2	3.6	6.4
Ghana 1993	6.0	5.0	2.8	5.2
Ghana 1998	5.7	5.0	3.5	4.4
Ghana 2003	6,0	5.3	3.0[1]	4,4
Senegal 1986	6.8	5.5	3.6	6.4
Senegal 1992/93	6.5	5.7	3.7	6.0
Senegal 1997	6.3	5.2	3.1	5.7
Uganda 2001	7,8	7,3	3,9	6,7
Zambia 1992	7.1	6.8	4.9	6.5
Zambia 1996	6.8	6.7	4.5	6.1
Zambia 2001/02	7.4	6.5	3.9	5.9
North Africa				
Tunisia 1988	4.9	3.9	2.3	4.2
South & Southeast Asia				
Bangladesh 1993/94	3.8	3.4	2.6	3.4
Bangladesh 1996/97	3.9	3.2	2.1	3.3
Bangladesh 1999/2000	4.1	3.3	2.4	3.3
India 1992/93	4.0	3.0	2.4	3.4
India 1998/99	3.5[2]	2.6[2]	2.2[2]	2.8
Indonesia 1987	3.4	3.4	2.5	3.1
Indonesia 1991	3.3	3.3	2.6	3.0
Indonesia 1994	2.9	3.1	2.6	2.9
Indonesia 1997	2.7	3.1	2.6	2.8
Vietnam 1997	3.5	2.7	2.1	2.3
Latin America				
Bolivia 1989	6.4	6.0	3.3	5.0
Bolivia 1994	6.5	6.1	3.2	4.8
Bolivia 1998	7.1	5.7	2.9	4.2
Brazil 1986	6.2	3.6	2.0	3.4
Brazil 1991	5.8	3.6	2.0	3.7
Brazil 1996	4.9	3.3	2.1	2.5
El Salvador 1985	5.7	4.2	2.4	4.2

Survey	Total Fertility Rate	Wealth Index Quintiles				
		Lowest	*Second*	*Middle*	*Forth*	*Highest*
Ghana 2003	4,4	6,4	5,9	4,9	3,3	2,8
India 1998/99	2,8	$3,37^{(3)}$		$2,85^{(3)}$	$2,10^{(3)}$	
Indonesia 2001	2,8	3,0	2,6	2,7	2,5	2,2
Uganda 2001	6,7	8,5	8,2	7,5	6,3	4,1

(1) Simple Average of Middle / JSS and Secondary +.
(2) Measured by Illiterate, Literate < Middle School Complete, Middle School Complete, High School Complete and Above.
(3) Standard of living Index: Low / Medium / High.

Source: DHS.

It is useful to complement this qualitative discussion with some analysis of the impact of initial conditions regarding important gender gaps and changes in these gaps on pro-poor growth. In *Figure 2* we show some suggestive correlations between the rate of pro poor growth (using the Ravallion-Chen measure) and important gender-related measures.[23] On the y-axis we always report the rate of pro poor growth as calculated by the authors of the case study and on the *x*-axis, we report the particular gender indicator. The first and the second diagram shows that high rates of pro poor growth are associated with low levels of initial fertility (in 1980) and high rates of fertility decline (between 1980 and 2000). It thus appears that high initial fertility significantly limits the opportunities for pro poor growth. This would support the contention that high fertility is a barrier to economic growth per se and might also have distributional consequences (see below and *Klasen* 2004c). The fourth through the sixth diagrams show that the higher the ratio of female to male secondary education in the initial year, the higher female literacy, and the faster the reduction of the gender gap in adult literacy, the faster was the rate of pro poor growth. It thus appears that investments in female education are significantly associated with higher rates of pro poor growth. Similarly, as shown in the third diagram, pro poor growth was faster, the larger the life expectancy gap favouring women was.[24] Lastly, the last diagram shows that expansion of female labour force participation is associated with higher rates of pro-poor growth, suggesting that female employment can make a significant contribution to pro-poor growth.

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[23] Given the endogenous nature of these variables, one cannot infer causation, but the results may be suggestive nevertheless (see also *Dollar* and *Gatti,* 1999 and *World Bank,* 2001).

[24] One should note that, for largely biological reasons, we would expect a life expectancy gap favoring females of about 3 – 7 years in the absence of discrimination. Thus quite a few countries listed in the diagram had an advantage less than that, suggesting gender bias in mortality hurting females.

Correlation Diagram 1: Rate of pro-poor growth corr. initial Total Fertility Rate

$y = -0{,}0037x + 0{,}0409$
$R^2 = 0{,}226$

Correlation Diagram 2: Rate of pro-poor growth corr. annual percentage decline Total Fertility Rate

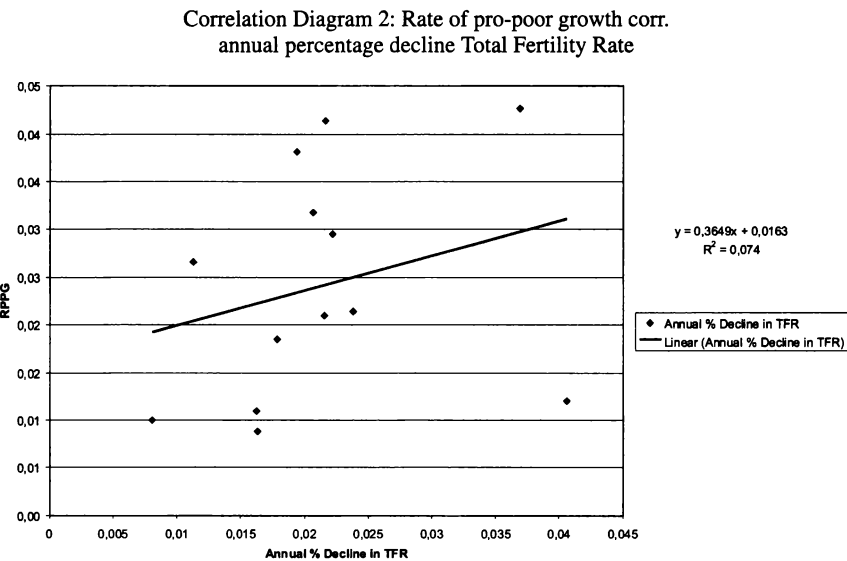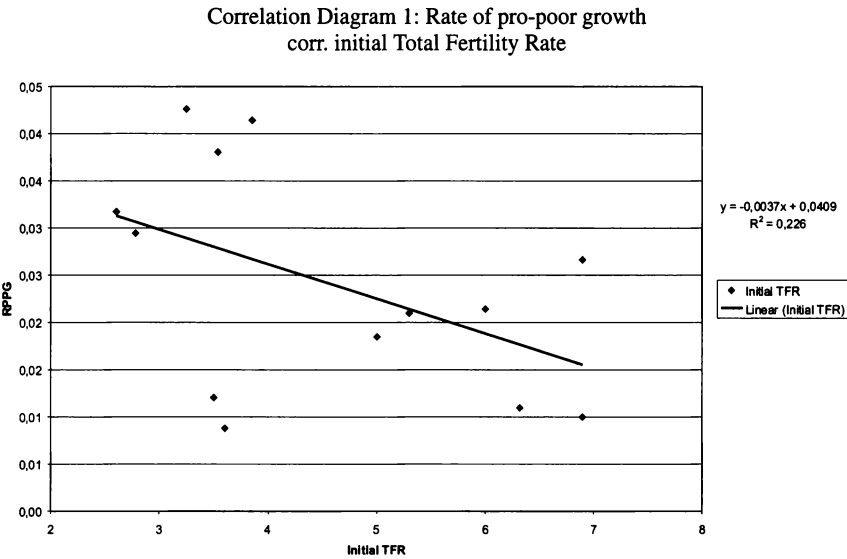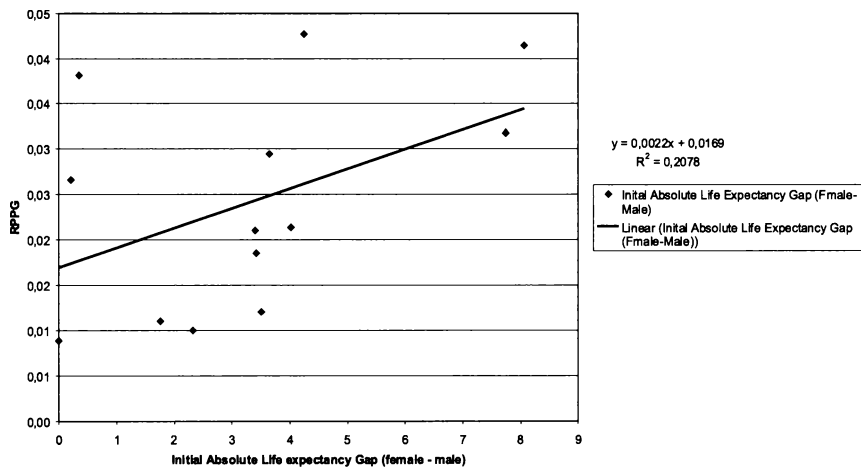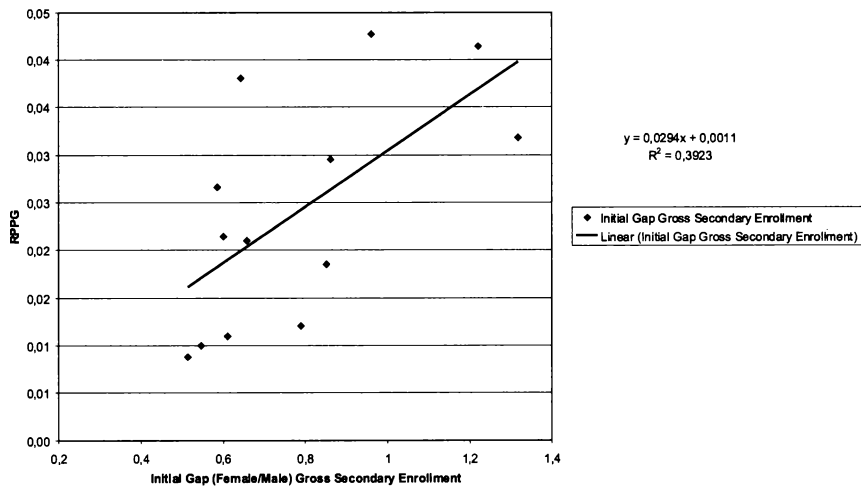

$y = 0{,}3649x + 0{,}0163$
$R^2 = 0{,}074$

Figure 2: Gender and pro-poor growth: some correlations

Correlation Diagram 3: Rate of pro-poor growth corr.
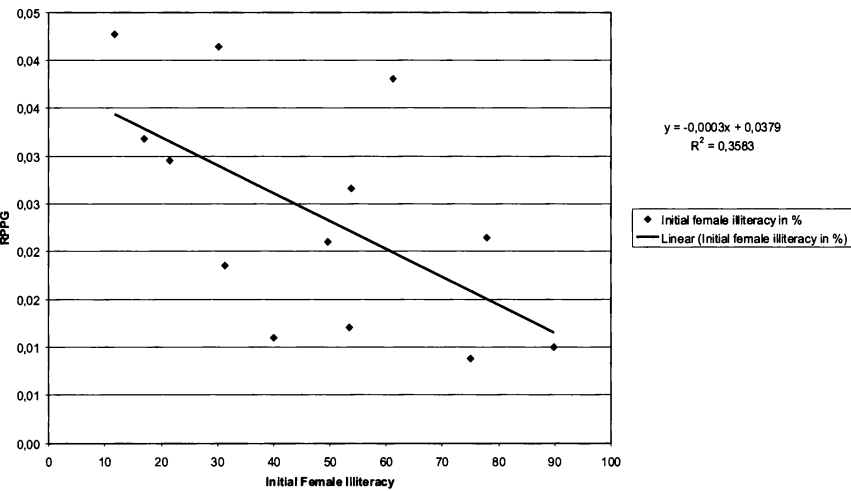initial absolute life expectancy gap (female / male)

Correlation Diagram 4: Rate of pro-poor growth corr.
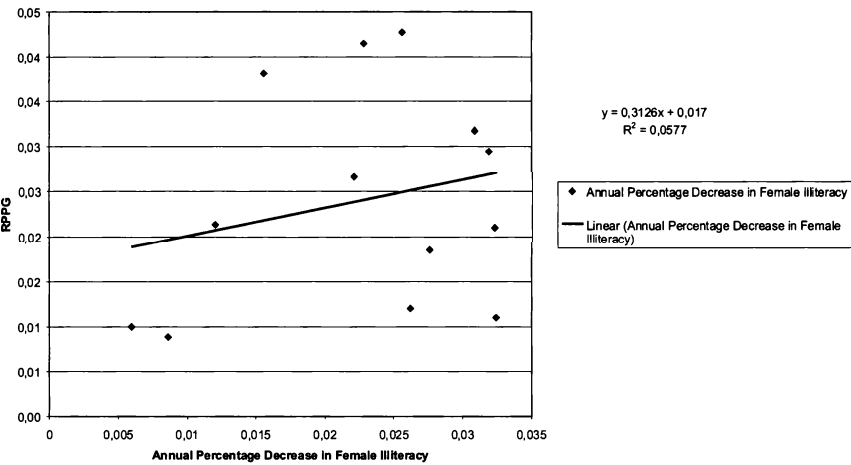initial gap (female / male) gross secondary enrollment

Continued Figure 2

Correlation Diagram 5: Rate of pro-poor growth corr.
initial female illiteracy

$y = -0,0003x + 0,0379$
$R^2 = 0,3583$

Correlation Diagram 6: Rate of pro-poor growth corr.
annual percentage decline in female illiteracy

$y = 0,3126x + 0,017$
$R^2 = 0,0577$

Continued Figure 2

Correlation Diagram 7: Rate of pro-poor growth corr.
annual percentage change in female labour force participation rate
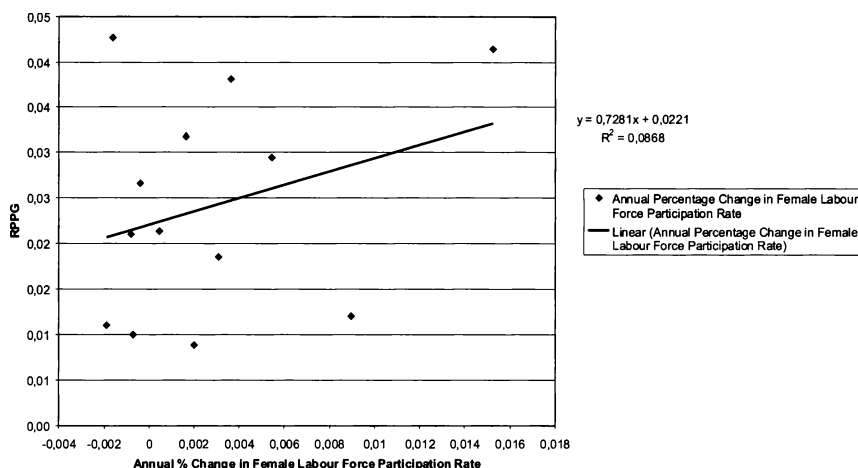
Continued Figure 2

We also separately investigate the correlations between the seven indicators just discussed and growth and changes in inequality, the two constituent elements of pro-poor growth (figures not shown here, but available on request). As expected from the discussion above, the seven indicators of gender gaps have a much larger growth effect while their impact on distributional change is very small and hardly ever significant. The one exception is that the countries that experienced the fastest decrease in female literacy also experienced the largest reduction in inequality. Thus promoting female education does not only appear to be growth-enhancing, but inequality-reducing.[25] But apart from this one exception, it is the impact of gender gaps on *economic growth* (rather than on *distributional change*) that is largely driving the correlations shown below.

E. Conclusions and policy issues

The theoretical discussion and the findings from the case studies clearly indicate that successfully addressing gender gaps and removing gender-specific can make a

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[25] Interestingly, the countries with the largest fertility decline observed a significant increase in inequality (although the magnitude of the effect is quite small and barely significant). This suggests that in those countries the fertility decline disproportionately affected the non-poor and enabled them to improve their incomes while it has not had a large impact on the poor yet. One would expect that further declines in fertility would be concentrated among the poor and then serve to lead to declining inequality.

significant contribution to pro-poor growth. While in some countries, women have been able to contribute significantly to pro-poor growth, in all countries there are particular gaps and problems that limit their contribution. It appears that four items are particularly important to strengthen women's contribution to pro-poor growth: First, a growth strategy that is associated with rising labour demand for women. Here, strategies focusing on export-oriented manufacturing or services appear particularly promising as the case studies from Bangladesh, Tunisia, and Indonesia suggest. They need to be complemented with strategies that improve female access to employment, particularly in the formal sector, to benefit from these opportunities. Second, removal of gender gaps in education is particularly critical for women to be able to grasp these opportunities and contribute to growth through direct and indirect means. Fortunately, there has been great progress in most regions of the world in this area, with only Africa and parts of South Asia lagging behind. Third, improving access to productive assets and inputs will be of particular importance for improving agricultural performance in Africa, and non-agricultural performance in most developing regions. Lastly, supporting policies (female education, reproductive health and family planning policies, policies to strengthen female bargaining power, etc.) to promote a fertility decline in high fertility countries to enable women to participate more fully in economic growth (see *Klasen,* 2004c). Ensuring that fertility decline reaches the poorer segments of the population would be particularly important as it would not only boost growth, but also reduce inequality. At the same time, the priority issues to be addressed in terms of gender inequality differ greatly between regions.

In Africa, the three main issues to receive attention are strengthening women as producers in agriculture which would involve more secure property rights and access to land, and better access to credit, modern inputs, and other means of production. This is an area that should also receive far greater support from donors whose involvement in agriculture has been declining in recent years. The second issue to focus on would be a reduction of barriers to female participation in formal labour markets. The third issue is to improve female education, reproductive health and family planning services in order to promote the onset of the fertility transition, particularly among poor households. In South Asia and North Africa, it is critical to consolidate and continue the progress made in reducing gender gaps in health and education, particularly in India, where much remains to be done. Moreover, greater opportunities for female participation and pay in the formal labour market will be of critical importance. In Latin America, the main constraint to women's contribution to pro poor growth appears to lie in their reduced access and discriminatory treatment in the labour market. Removal or these barriers should further enable women to participate in the labour market, particularly if the countries provided opportunities for export or service-oriented production. Also in Vietnam and Indonesia, the main remaining barrier appears to be the labour market which still awards much lower pay for women and often forces them to work under very poor working conditions.

As discussed in the beginning, the focus on the income dimension of pro poor growth has limited a more thorough discussion of gender issues for poverty reduction. This also has implications for policy recommendations. If one were to take a broader view of pro poor growth, other policy issues would deserve more prominence. Most important among them is a much greater focus on strengthening women's bargaining power within households which would translate into more investment into the health and education of children and greater gender equity more generally. Among the policies to consider are female-targeted transfer programs (such as the well-known demand-side transfer programs in Mexico and Brazil), legal and institutional changes to strengthen the rights of women within marriage and in divorce, greater protection against domestic and sexual violence (also with a view to reduce the spread of AIDS in affected countries), apart from greater access to education and employment. Similarly, strengthening women's political participation should help in empowering women and prioritising their needs which would contribute to promote pro-poor growth.

References

Abu-Ghaida, D. / Klasen, S. (2004): The Costs of Missing the Millenium Development Goals on Gender Equity. World Development 32:1075 – 1107.

Aryeetey, E. / McKay, A. (2004): Operationalizing Pro-poor Growth: A case study of Ghana. Mimeographed. Washington D.C.: The World Bank.

Ayadi, M. / Boulila, G. / Lahouel, M. / Montigny, P. (2004): Pro-poor Growth in Tunisia. Mimeographed. Washington D.C.: The World Bank.

Barro, R. (1991): Economic Growth in a Cross-Section of Countries. Quarterly Journal of Economics 106: 407 – 443.

Barro, R / Lee, J. (1994): Sources of Economic Growth. Carnegie-Rochester Series on Public Policy 40: 1 – 46.

Bamberger, M. / Blackden, M. / Fort, L. / Manoukian, V. (2001): Gender. In: World Bank (ed.), Poverty Reduction Strategy Paper Sourcebook. Washington D.C.: The World Bank.

Bardhan, K. / Klasen, S. (2000): On UNDP's Revisions to the Gender-Related Development Index" Journal of Human Development 1: 191 – 195

Bardhan, K. / Klasen, S. (1999): "UNDP's Gender-Related Indices: A Critical Review," World Development 27: 985 – 1010 (1999).

Becker, G. (1981): A Treatise on the Family. Chicago: University of Chicago Press.

Besley, T. / Burgess, R. / Esteve.Volart, B. (2004): Operationalising Pro-poor Growth: India Case Study. Mimeographed, DFID.

Blackden, M. / Bhanu, C. (1999): Gender, Growth, and Poverty Reduction. World Bank Technical Paper No. 428. Washington D.C.: The World Bank.

Blackden, M. / *Canagarajah*, S. / *Klasen*, S. / *Lawson*, D. (Forthcoming): Gender and Growth in Africa: Evidence and Issues. To appear in: G. Mavrotas and A. Shorrocks (eds.), Advancing Development: Core Themes in Global Economics. London: Palgrave Macmillan.

Bloom, D. / *Williamson*, J. (1998): Demographic Transition and Economic Miracles in Emerging Asia. World Bank Economic Review 12: 419 – 55.

Boserup, E. (1970): Woman's role in economic development. London: Earthscan Publications.

Bourguignon, F. (2001): The distributional effects of growth: Micro versus Macro Approaches. Mimeographed, Paris: Delta.

Bourguignon, F. (2003): The Growth Elasticity of Poverty Reduction. In: T. Eicher and S. Turnovsky, Inequality and Growth. Cambridge: MIT Press.

Datt, G. / *Ravallion*, M. (1992): Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Applications to Brazil and India in the 1980s. Journal of Development Economics 38(2): 275 – 295.

Dollar, D. / *Gatti*, R. (1999): "Gender Inequality, Income and Growth: Are Good Times good for Women?" World Bank Policy Research Report Working Paper No. 1. Washington D.C.: The World Bank.

Drèze, J. / *Sen*, A. (1995): India: Economic Development and Social Opportunity. New York: Oxford University Press.

Duflo, E. / *Chattophadyay*, R. (2003): Women as Policy-Makers. Mimeographed, MIT.

Eastwood, R. / *Lipton*, M. (2001): Pro-poor growth and pro-growth poverty reduction: meaning, evidence, and policy implications. Asian Development Review 19: 1 – 37.

Esteve-Volart, B. (2004): Gender Discrimination and Growth: Theory and Evidence from India. STICERD Discussion Paper DEDPS42. London: LSE.

Fafchamps, M, / *Quisumbing*, A. (2004): Marriage, Bequest, and Assortative Matching in Rural Ethiopia. Mimeographed, Washington D.C.: IFPRI.

Forbes, K. (2000): A reassessment of the relationship between inequality and growth. American Economic Review 86: 374 – 387.

Galor, O. / *Weil*, N. (1996): The Gender Gap, Fertility, and Growth. American Economic Review 86: 374 – 87.

Gheorghiu, R. / *Paczynsiki*, W. / *Radziwill*, A. / *Sowa*, A. / *Stanculescu*, M. / *Topinka*, I. / *Turlea*, G. / *Waleski*, M. (2004): Operationalizing Pro-poor Growth: A case study of Romania. Mimeographed. Washington D.C.: The World Bank.

Grosse, M. / *Harttgen*, K. / *Klasen*, S. (2004): Measuring Pro-poor Growth using Non-Income Indicators. Ibero-America-Institute Working Paper No. 132. Göttingen: University of Göttingen.

Haddad, L. / *Kanbur*, R. (1990): How serious is the neglect of intrahousehold inequality? Economic Journal 100: 866 – 881.

Kandkher, S. (1998): Fighting Poverty with Microcredit: Experience in Bangladesh. Washington D.C.: The World Bank.

Klasen, S. (1993): "Human Development and Women's Lives in a Restructured Eastern Bloc," in: A. Schipke and A. Taylor (eds.), The Economics of Transformation: Theory and Practise in the New Market Economies. New York: Springer, 1993.

Klasen, S. (1999): Does Gender Inequality Reduce Growth and Development? World Bank Policy Research Report Working Paper No. 7. Washington D.C.: The World Bank.

Klasen, S. (2002): Low Schooling for Girls, slower Growth for All? World Bank Economic Review 16: 345–373.

Klasen, S. (2003a): "Gender in der Volkswirtschaftslehre." In: T. A. Schönwalder-Kuntze, Heel, C. Wendel und K. Wille (eds.), Störfall Gender. Hamburg: Westdeutscher Verlag.

Klasen, S. (2003b): "Weibliche Übersterblichkeit in Entwicklungsländern." In: H. Ahrens (ed.), Neuere Ansätze der theoretischen du empirischen Entwicklungsländerforschung. Berlin: Duncker und Humboldt.

Klasen, S. (2004a): "Gender and Growth in Uganda." Mimeographed, Ministry of Finance, Planning, and Economic Development.

Klasen, S. (2004b): "In Search of the Holy Grail: How to Achieve Pro Poor Growth?" In: B. Tungodden, N. Stern, and I. Kolstad (eds.), Toward Pro Poor Policies-Aid, Institutions, and Globalization. New York: Oxford University Press.

Klasen, S. (2004c): "Population Growth, (Per Capita) Economic Growth, and Poverty Reduction in Uganda: Theory and Evidence." Mimeographed, Ministry of Finance, Planning, and Economic Development.

Klasen, S. (2005): Economic Growth and Poverty Reduction: Measurement and Policy Issues. OECD Development Center Discussion Paper No. 246. Paris: OECD.

Klasen, S. (2006): Gender-Related Indicators of Well-Being. in: M. McGillivray (ed.) Human Well-Being: Concept and Measurement. London: Palgrave Macmillan.

Klasen, S. / *Lamanna,* F. (2003): "The Impact Gender Inequality in Education and Employment on Economic Growth in the Middle East and North Africa". Background paper for World Bank Study: Women in the Public Sphere. Washington, D.C.: The World Bank.

Klasen, S. / *Thiele,* R. / *Grosse,* M. / *Lay,* J. / *Spatz,* J. / *Wiebelt,* M. (2004): Operationalizing Pro-poor Growth: A case study of Bolivia. Ibero-America Institute Working Paper No. 101. Göttingen: University of Göttingen.

Klasen, S. / *Wink,* C. (2002): "A Turning-Point in Gender Bias in Mortality? An Update on the Number of Missing Women." Population and Development Review 28: 285–312.

Klasen, S. / *Wink,* C. (2003): "Missing Women: Revisiting the Debate." Feminist Economics 9: 263–299.

Klump, R / *Bonschab,* T. (2004): Operationalizing Pro-Poor Growth: A case study of Vietnam. Mimeographed. Washington D.C.: The World Bank.

Knowles, S. / *Lorgelly,* P. / *Owen,* D. (2002): Are Educational Gender Gaps a Break on Economic Development? Oxford Economic Papers 54: 118–149.

Kremer, M. / *Chen,* D. (2002): Income Distribution Dynamics with Endogenous Fertility. Journal of Economic Growth 7: 227–258.

Lagerlöf, N. P. (2003): Gender Equality and Long-Run Growth Journal of Economic Growth 8, 2003, pp. 403–426.

Lorgelly, P. / *Owen,* D. (1999): The effect of male and female schooling on economic growth in the Barro-Lee model. Empirical Economics 24: 537 – 557.

Marquez, J. (2004): Operationalizing Pro-poor Growth: A case study of El Salvador. Mimeographed. Washington D.C.: The World Bank.

Menezes-Filho, N. / *Vasconcellos,* L. (2004): Operationalizing Pro-poor Growth: A case study of Brazil. Mimeographed. Washington D.C.: The World Bank.

Morrisson, C. / *Jütting,* J. (2004): The Impact of Social Institutions on the Economic Role of Women in Developing Countries. OECD Development Center Discussion Paper No. 234. Paris: OECD.

Quisumbing, A. / *Hallman.,* K. (2003): Marriage in Transition: Evidence on Age, Education, and Assets from Six Developing Countries. Technical Report, New York: Population Council.

Ravallion, M. / *Chen,* S. (2003): Measuring Pro-poor Growth. Economics Letters 78(1): 93 – 99.

Ravallion, M. / *Datt,* G. (2002): Why has economic growth been more pro-poor in some states of India than others? Journal of Development Economics 68:381 – 400

Schultz, T. P. (1993): Returns to Women's Education. In: E. King and A. Hill (eds.), Women's education in developing countries. Washington DC: The World Bank.

Schultz, T. P. (1997): Demand for Children in Low-Income Countries. In: M. Rosenzweig and O. Stark (eds.), Handbook of Population and Family Economics. Amsterdam: Elsevier.

Seguino, S. (2000): Gender inequality and economic growth: A Cross-Country Analysis. World Development 28: 1211 – 30.

Sen, A. (1998): Development as Freedom. New York: Knopf.

Sen, A. (1990): Gender and Cooperative Conflicts. In: I. Tinker (ed.) Persistent Inequalities. Cambridge: Harvard University Press.

Sen, B. (2005): Operationalizing Pro-poor Growth: A case study of Bangladesh. Mimeographed. Washington DC: The World Bank.

Smith, L. / *Haddad,* L. (1999): Explaining Child Malnutrition in Developing Countries: A Cross-Country Analysis. IFPRI Discussion Paper No. 60. Washington D.C.: IFPRI.

Thomas, D. (1997): Incomes, Expenditures and Health Outcomes: Evidence on Intrahousehold Resource Allocation. In: L. Haddad, J. Hoddinott, and H. Alderman (eds.), Intrahousehold Resource Allocation in Developing Countries. Baltimore: Johns Hopkins Press.

Thurlow, J. / *Wobst,* P. (2004): Operationalizing Pro-poor Growth: A case study of Zambia. Mimeographed Washington D.C.: The World Bank.

Tzannatos, Z. (1999): Women and labor market changes in the global economy. World Development 27: 551 – 570.

Udry, C. (1996): Gender, Agricultural Production, and the Theory of the Household. Journal of Political Economy 104: 551 – 69.

UNDP (1995): Human Development Report. New York: Oxford University Press.

Waring, M. (1988): If Women Counted. New York: Oxford University Press.

World Bank (2001): Engendering Development. New York: Oxford University Press.

World Bank (2002): Integrating Gender into the World Bank's Work. A Strategy for Action. Washington D.C.: The World Bank.

World Bank (200): Gender and Development in the Middle East and North Africa. Washington D.C.: The World Bank.

World Bank (2005): Uganda: From Periphery to Center, A Strategic Country Gender Assessment. Report No. 30136-UG. Washington D.C.: The World Bank.

Yamarik, S. / *Ghosh,* S. (2003): Is female education productive? A reassessment. Mimeographed, Medford (MA): Tufts University.