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# Does Employment Generation Really Matter for Poverty Reduction?

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## Abstract

This paper analyzes how the employment/productivity profile of growth and its sectoral pattern are correlated with poverty reduction. The authors use a sample of 104 short-run growth spells in developing countries, between 1980 and 2001. They also identify some conditions of the labor market and the economic environment that are associated with employment-intensive growth or specific sectoral growth.

The results show that, in the short run, although the aggregate employment-rate intensity of growth does not matter for poverty reduction any more than the aggregate productivity intensity of growth, the sectoral pattern of employment growth and productivity growth is important. Employment-intensive growth in the secondary sector is associated with decreases in poverty, while employment-intensive growth in agriculture is correlated with poverty increases. Similarly, productivity-intensive growth in agriculture is associated with decreases in poverty.

Although the study does not address causality, coincidence of these phenomena in this large sample of heterogeneous countries and periods suggests that, in the short run, the sectoral productivity and employment pattern of growth may have important implications for poverty alleviation. Therefore, policies for reducing poverty should not overlook the sectoral productivity and employment implications of different growth policies.


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This paper—a product of the Poverty Reduction and Development Effectiveness Department of the Poverty Reduction and Economic Management Network—is part of a larger effort of the department to understand the role of employment as transition channel between growth and poverty reduction and to identify effective policies for the creation of more and better jobs. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at ppaci@worldbank.org, cgutierrez2@worlbank.org

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## Introduction

There is at present a large literature that has studied how growth and distributional changes affect poverty.[1] These studies have found that, although growth makes up for an important share of changes in poverty, there is a wide disparity in the extent of poverty reduction a growth process can achieve. As a result, a growing literature is now studying the question of what factors—such as sectors, initial inequality or endowments, government interventions, or the sectoral growth pattern— explain the differing impacts of growth on poverty.[2] However, the role of labor markets has received substantially less attention despite the obvious fact that the poor derive most of their income from work.[3]

Among policymakers, on the other hand, there has been a growing concern with "jobless growth" as a major obstacle for the poor to benefit from the positive growth performance experienced by many countries worldwide. This appears intuitive, as the poor derive most of their income/consumption from work: as employees, as the self-employed, or in subsistence activities. Therefore, the impact of growth on poverty is seen as depending on the extent to which growth generates employment and good earning opportunities. However, if employment growth is achieved at the expense of wage reductions, it may have a meager impact on poverty. Moreover, since in many low income countries the poor cannot afford to be unemployed, policies should be more concerned with raising the income of the working poor. Another recurrent issue for the policy discussion is whether poverty is more effectively reduced by a growth pattern that favors the sectors of the economy in which the poor are found (i.e., agriculture) in order to enhance employment opportunities or by a pattern that disproportionately advances the sectors in which the poor are not found, so that more of the poor can be drawn into the higher earning parts of the economy.[4] This issue is more important if the poor face extensive barriers to gaining access to the higher earning sectors.

Despite the clear importance of these questions for the successful shared growth strategies in low-income countries (LICs), they remain largely unexplored in the current literature and this significantly undermines the ability to provide sound evidence-based policy advice in this area. At the core of this debate are the questions of which sectoral growth patterns achieve greater poverty reduction (i.e., is agricultural growth better for reducing poverty than manufacturing growth?) as well as of whether productivity-intensive growth or employment-intensive growth is more effective. Equally important is the question of which policies are better suited to fostering poverty reducing growth patterns. The purpose of this paper is to deepen the understanding of these issues,

[1] For cross-country evidence of the link between poverty and growth, see Besley and Burgess (2004), Bourguignon (2002),Dollar and Kraay (2002), Kraay (2006), López (2004) and Ravallion (2005); for cross-regional and time series, see Ravallion and Chen (2004) and Ravallion and Datt (2002); for micro analysis, see Bibi (2005), Contreras (2001), and Menezes-Filho and Vasconcellos (2004).

[2] See, for example, Dollar and Kraay (2002), Kraay (2006), Ravallion (2005), Ravallion (2005), Ravallion and Datt (2002), Loayza and Raddatz (2006), and Bourguignon (2002).

[3] This point has been made before by Agenor (2004), Satchi and Temple (2006), and Rama and Artecona (2002).

[4] Achieving economic development by moving people out of the poorer sectors and into the richer ones has been labeled "intersectoral shifts." Both the Lewis and the Kuznets models are models of intersectoral shifts. These and later contributions are reviewed in Basu (1997).

providing empirical input into the debate by (i) studying the aggregate and sectoral employment/productivity profile of growth and its correlation with observed poverty changes, and (ii) going beyond the study of the link between the profile of growth and poverty and into the provision of some preliminary evidence as to which market conditions and economic policies help in explain the observed profile of growth.

The paper is structured as follows: section 1 presents a brief review of the theoretical and empirical evidence on the link between poverty and growth patterns. Section 2 discusses the methodology and data. Section 3 illustrates the stylized facts on the correlation between the growth patterns and poverty. Section 4 analyzes the effects of growth patterns on poverty and discusses which labor market and macroeconomic conditions explain the observed growth patterns. Section 5 presents the paper's conclusions.

# 1 Conceptual Framework: Why Would the Sectoral Growth Pattern or Its Employment Profile Matter for Poverty?

As mentioned above, there is a growing literature that is studying which factors (such as sectors, initial inequality or endowments, government interventions, or the sectoral pattern of growth) explain the effectiveness of growth in reducing poverty.[5] Among this literature an important set of papers has concentrated on the sectoral growth pattern. For example, Loayza and Raddatz (2006) find that growth in unskilled intensive sectors contributed to changes in poverty, after controlling for average growth. Ravallion and Datt (2002) link sectoral value added growth to poverty changes in India, and find that growth in agriculture helped reduce poverty while growth in manufacturing did not. Satchi and Temple (2006) show how dualism (created by frictions rather than by institutionally set wages) may play an important role in how the growth pattern translates into rises in employment and wages, and that while growth in agriculture potentially raises poverty, urban growth reduces poverty.[6] Other policy-oriented research has reached similar conclusions. For example, World Bank (2005) studied 11 countries and found evidence that access to non-farm rural employment and informal urban employment eased the poor's participation in the growth process. Other papers have concentrated on understanding the role of employment or productivity in shared growth. World Bank (2005) found that in 3 of the 14 countries studied pro-poor growth was associated with more labor-intensive growth.[7] In a related analysis, Islam (2004) uses a cross-country sample of 23 developing countries to find out whether the employment intensity of growth in manufacturing contributes to explain poverty reduction, but finds that results are not robust to the inclusion of per capita GDP growth. Prasada Rao et al. (2004) find that the significance of output per worker in explaining poverty reduction is not robust to the inclusion of the log of GDP per capita, or the estimation period.[8] More

[5] See, for example, Dollar and Kraay (2002), Kraay (2006), Ravallion (2005), Ravallion and Chen (2004), Ravallion and Datt (2002), Loayza and Raddatz (2006), and Bourguignon (2002).
[6] The authors do not explicitly consider poverty outcomes, but rather the effects of different types of growth on wages.
[7] These three countries were Indonesia, Vietnam, and Tunisia.
[8] The results suggest that the mentioned variables do not have an effect independent of the effect they have on GDP per capita, or alternatively that they are a proxy for it, when included on their own.

recently, a study by Kakwani, Neri and Son (2006) decomposes the sources of pro-poor growth in a case study for Brazil. The authors find that productivity was the major labor income source of pro-poor growth, while the role of employment growth was small. The role of productivity growth in agriculture on poverty has also been the focus of much work. The results from Computable General Equilibrium literature suggest that factor market assumptions and agricultural trade are crucial in determining the poverty reducing impact of agricultural productivity. Coxhead and Warr (1995), for example, find that, assuming full labor mobility and product prices given by world markets, rises in agricultural productivity reduced poverty. On the other hand, Fane and Warr (2002) find that agricultural productivity has a meager effect on poverty.[9] In an empirical paper Datt and Ravallion (1998) find that productivity growth in India decreased poverty.

The empirical evidence from country case studies discussed above appears to point to the fact that the sectoral growth pattern and its employment and productivity profile matter for poverty alleviation. This fact should come as no surprise because the poor and the non-poor own factors in different proportions; as long as different growth patterns affect factor demands and factor returns differently, their poverty impact is likely to differ. It is less clear from the evidence as to whether productivity or employment growth is at the core of reduction in poverty, nor as to the sectors in which growth has more impact. Nor is it clear as to whether general patterns hold across many countries, as most of the studies are country specific.

With some notable exceptions (Satchi and Temple, 2006, and Loayza and Raddatz, 2006), the available theoretical models yield little insight into these issues. In a simple competitive supply and demand framework, with no frictions or barriers to mobility, the economy is always at "full employment," employment rates are always one, and so there is no scope for "employment (rate) intensive growth." That is, there is no space for growth to modify the employment rate. Although there would be no role for "employment-intensive growth," the sectoral pattern of growth would still matter: growth in a sector would raise the demand for labor and would raise wages everywhere uniformly, but the amount of upward pressure exerted on wages would depend on the amount of labor the growing sector is demanding. More labor-intensive sectors would generate a higher demand for labor for each "unit" of growth (for example, a 1 percent growth in an employment-intensive sector would exert a higher pressure on wages than a 1 percent growth in a capital intensive sector). Under perfect mobility and factor price equalization, growth in sectors such as agriculture (which is mostly labor-intensive in developing countries) would achieve a greater reduction of poverty than, for example, growth in high tech manufacturing or utilities, which could be less labor-intensive.[10]

In models with friction and barriers to mobility (e.g., search and matching models), or in models of labor market segmentation, there is space for employment-intensive growth—that is, growth that is accompanied by increases in the employment rate. The theoretical literature on labor markets in developing countries stresses the duality and segmentation

[9] The crucial assumptions in explaining these differing results are whether or not the lower prices brought about by higher productivity are compensated through higher demand for the products. Both models assume that labor is perfectly mobile and factors equate across sectors.

[10] See Loayza and Raddatz (2006) for a model that deals with this mechanism.

of these labor markets.[11] At the core of this model is the idea that there is a "bad jobs sector" and a "good jobs sector."[12] In the good jobs sector productivity is higher and so wages are higher. In the bad jobs sector productivity is low and income from self-employment/wages is low. Because productivity in the bad jobs sectors is low, households that earn a living in the bad jobs sector are more likely to be poorer than the rest. Jobs in the good jobs sectors are rationed because wages are institutionally set above the competitive market clearing level. There may be minimum wages, unions may bargain for higher wages, firms may set "efficiency wages" and so on. Movement between the bad jobs sector and the good jobs sector may be limited, and people queue for a good job. On top of the limited mobility created by institutionally set wages, there may be geographic barriers to mobility. For example, many bad sector jobs may be in rural areas and migration to urban areas may be costly and risky, as there may be a lack of roads and little property rights enforcement on land for those who leave their land. There may also be barriers to mobility caused by discrimination and segregation, as good jobs may be given only to those of a certain ethnic group or a particular gender. Similarly, good jobs may be reserved for those with a certain education so that the unskilled poor may be left out of the good jobs sector.[13] Besides being employed, agents may be in the non-employment state, either searching and queuing for a job or being out of the labor force. Movement between the bad jobs sector and non-employment may also be limited.[14]

Under such models the sectoral pattern of growth may have a crucial role in alleviating poverty. For example, if there are extensive barriers to mobility between sectors so that factor returns do not equate across sectors, then growth in the sectors in which the poor are found may be more effective at moving people out of poverty than growth in the sectors to which the poor have limited mobility. If there are no extensive barriers to mobility, then, growth in the good jobs sectors may be more effective in pulling people into the higher earning sectors and out of poverty. On the other hand, the distribution of the poor between the non-employment state and the bad jobs sector will determine whether cutting unemployment and raising participation rates or moving people out of the bad jobs sector will have a greater impact on poverty. It will also determine the trade-offs of different policies.

[11] Labor market segmentation is now part of the standard labor economic textbooks (see, for example, Borjas [1996], Bosworth et al. [1996], and Layard, Nickel, and Jackson [1991]). The main reason is that it offers a better explanation for some empirical observations than the competitive model. An often-quoted example is the persistent existence of intra-industry wage differentials for observationally equivalent workers (Katz and Summers [1988]). For other contributions, see Dickens and Lang (1985) and Esfahani and Salehi-Isfahani (1989).

[12] The bad jobs sector is usually associated with the agricultural sector or the informal sector and the good jobs sector is generally associated with the industrial or modern sector or the formal sector. We believe that these distinctions may be too simplifying and that the division of the labor market between good and bad jobs goes beyond the formal/informal or agricultural/industrial divide.

[13] For example, in several African economies the best jobs are those in the public sector, and only the educated have access to these jobs. In Nicaragua, to be able to work in many of the maquila firms a person is required to have completed secondary education.

[14] In South Africa anecdotal evidence suggests that the informal sector is not a free entry sector: those who want to operate informally require "connection" with government officials. In countries such as Peru informal workers are subject to illegal "taxing" by local power groups.

A thorough analysis of the mechanism through which the sectoral pattern of growth and its productivity or employment intensity affect poverty requires a general equilibrium approach, as the results hinge on important assumptions about the labor and product markets. Such a model is beyond the scope of this paper. Instead, the aim of this paper is mostly empirical. We hope that by highlighting the observed correlations between the growth patterns and poverty for many countries we can provide some empirical input into the debate on how employment generation and productivity growth affect poverty in the short run. It is important to emphasize that the evidence provided here is not asserting causality, but rather the coincidence of phenomena that might or might not have a causal interpretation. Whether a causal interpretation can be given will depend largely on the theoretical model that one believes underlies the observed relationships.

# 2 Methodology and Data

## *2.1 Profiling growth: A Shapley decomposition approach*

The first task in understanding how the sectoral growth patterns and their employment and productivity profile affect poverty is to find a suitable methodology to profile growth. Ideally, the methodology should be able to provide some measures of how employment-intensive or productivity-intensive a growth process is, and how this intensity is distributed across sectors of economic activity.

A simple way of understanding how growth is associated with increases in productivity and employment at the aggregate level and by sectors is to perform a simple decomposition of per capita GDP growth in three components: productivity changes, employment rate changes and demographic changes.[15] In doing so, it should be noted that per capita GDP, $Y/N=y$ can be expressed as:

$$\frac{Y}{N} = \frac{Y}{E}\frac{E}{A}\frac{A}{N}$$

**Equation 1**

or

$$y = \omega * e * a$$

[15] We will depart from the most common measure of employment-intensive growth: the partial elasticity of employment with respect to growth $\partial E * Y / \partial Y * E$, which is obtained by regressing the log of aggregate employment against the log of total GDP, aggregate wages and other controls. There are both conceptual and empirical difficulties with this measure. Conceptually, the employment elasticity of growth looks at changes in the level of employment, not at changes in employment rates. We believe that what matters for poverty reduction is not the absolute number of employed, but the number of employed relative to the labor force: positive employment elasticity might very well be consistent with growing unemployment rates. This is particularly important for developing countries where population growth accounts for an important fraction of labor force growth. From the empirical point of view, the partial elasticity of employment with respect to growth has two difficulties. Arriving at consistent estimates at the aggregate level is a rather difficult task (see Hammermesh 1986, 1993). But perhaps most important for our purposes, it is rarely the case that enough data are available to adequately estimate the partial elasticity for a large number of countries.

where $Y$ is value added, $E$ is employment, $A$ is the population of working age and $N$ is the total population. The ratio $\omega=Y/E$ corresponds to output per worker, $e=E/A$ corresponds to the share of the working age population employed and $a=A/N$ corresponds to the share of the population of working age, that is, the ratio of working age population to total population.

The decomposition can be easily extended to multiple sectors:

$$\frac{Y}{N}=\left(\sum_s \frac{Y_s}{E_s}\frac{E_s}{A}\right)\frac{A}{N}$$

**Equation 2**

or equivalently

$$y=\left(\sum_s \omega_s * e_s\right)* a$$

where the sub-index $s$ stands for the sector of economic activity.

Our purpose is to describe growth (changes in per capita value added) through growth in each of its components, that is, changes in $\omega$, $e$, and $a$; and changes in the vectors of sectoral labor productivities and employment ($\omega_1,\omega_2,\ldots,\omega_s$) and ($e_1, e_2, \ldots,e_s$). One such methodology is to use Shapley decompositions.[16] The Shapley decomposition approach is based on the marginal effect on the value of a variable or indicator of eliminating the change in each of the contributory factors in a sequence. The method then assigns to each factor the average of its marginal contribution in all possible elimination sequences (see Shorrocks, 1999). For example, in Equation 1, the amount of growth that can be attributed to changes in output per worker ($\omega$) would be obtained by calculating the resulting growth in per capita value added under the hypothetical scenario in which employment rates *(e)* and the share of the working age population *(a)* had remained constant, but output per worker had changed as observed. The difference between the resulting hypothetical growth and the observed growth is defined as the contribution of changes in output per worker to per capita value added growth. The Annex describes the decomposition in greater detail.

Shapley decompositions have the advantage of being additive. In other words, let $\bar{\omega}$, $\bar{e}$ and $\bar{a}$ be the marginal contribution of each component to the observed change in per capita value added, obtained through the Shapley decomposition, then:

$$\bar{\omega}+\bar{e}+\bar{a}=\frac{\Delta y}{y}.$$

In a similar way decomposing Equation 2 would yield:

[16] In the case of Equation 1, the easiest way would be to take logarithms and then changes. In the case of Equation 2, the summation term hampers this approach. We opt for a unified approach that can be applied to both equations.

$$\sum_s \bar{\omega}_s + \sum_s \bar{e}_s + \bar{a} = \frac{\Delta y}{y}.$$

In this case $\bar{e}$ would be the amount of growth that can be linked to changes in the employment rate as measured by the ratio between total employment and the working age population. Although employment rates as defined by the ILO measure the population that "participates" in the labor market that is employed, throughout this paper the term "employment rate" will refer to employment as a fraction of the working age population.[17] Increases in employment rates would thus reflect both increases in participation and movements of people out of unemployment and into employment.

The term $\bar{\omega}$ will capture changes in output per worker, but its interpretation is not so straightforward. Increases in output per worker can come from three different sources: (i) increases in the capital/labor ratio; (ii) increases in total factor productivity (TFP); and (iii) relocation of jobs from bad jobs sectors (low productivity) to good jobs sectors (high productivity). To see the first two points, it should be noted that under constant returns to scale, if $Y_t=\Phi_t f(E_t,K_t)$ where $K_t$ is the capital stock and $\Phi_t$ a technological parameter (which captures TFP growth), then output per worker $Y_t/E_t= \Phi_t f(1,K_t/E_t)$. Therefore, it will capture changes in the capital/labor ratio and in TFP growth. It should be noted that it may also capture cyclical behavior of output: firms operating in economic downturns may have underutilized capital; when the demand rises again, it will be reflected as a rise in output per worker. The third point is simply the result of workers moving from a low productivity sector (or firm) to a high productivity sector (or firm), so that, in the aggregate, average output per worker will rise. Throughout this paper we will refer to output per worker as productivity, under the understanding that it captures all of the above-mentioned factors.

The component $\bar{a}$ reflects changes in the demographic structure of the population. For example, despite rises in labor productivity and employment, countries with a rapidly rising young population may see a decline in per capita income if the employment and productivity growth is not sufficient to counter the growing dependency ratio. The same might happen with countries that have a rapidly aging population.

[17] In developing countries and in particular in low income countries measuring participation is extremely difficult. In many cases unemployment is very low but the inactive include agents that are seasonally unemployed and large numbers of discouraged workers. We believe that in these cases a better measure of the labor force is the working age population rather than those participating actively in the labor market.

To differentiate sectoral employment/productivity intensity from aggregate intensities, we will use sub-indexes. The term $\overline{e}_s$ will denote the amount of growth that can be linked to changes in the share of employment of sector *s*. The term $\overline{\omega}_s$ will denote the amount of growth that can be linked to productivity changes in sector *s*. Again, the productivity term will capture TFP growth, changes in the capital/labor ratio and employment shifts within the sector.

Aggregate growth can also be profiled in terms of sectoral growth, without discriminating between productivity and employment. This is the approach followed by most papers that analyze the sectoral growth pattern. In this simple case, the Shapley decomposition boils down to aggregate growth just being the sum of growth in each sector multiplied by the (average) share of the sector in total value added. This decomposition can thus be expressed as:

$$\sum_s \overline{y}_s = \frac{\Delta y}{y}$$

and $\overline{y}_s$ would be the amount of growth that can be attributed to value added growth in sector *s*.

Using the methodology described above, a growth episode can be profiled in three different ways by the vectors $(\overline{\omega},\overline{e},\overline{a}),(\overline{\omega}_1,\overline{\omega}_2,...,\overline{\omega}_S;\overline{e}_1,\overline{e}_2,...,\overline{e}_S;\overline{a})$ and $(\overline{y}_1,\overline{y}_2,...,\overline{y}_S)$. The first vector would profile growth according to aggregate productivity, employment and demographic changes. The second vector would profile growth according to changes in sectoral productivity, in sectoral employment shares and in aggregate demographic changes. And the final vector would profile growth according to its sectoral pattern.

The traditional literature that deals with employment-intensive growth measures it as the percent change in employment in response to a 1 percent change in output, that is, the employment elasticity of output. Under this measure, however, two countries that have the same employment elasticity would be 'equivalent', independent of the amount of growth in each, despite the fact that the country with the highest growth would generate a larger number of new jobs. For example, this measure of employment intensity would treat as equivalents a country that grew by 1 percent and a country that grew by 10 percent as long as they displayed the same employment elasticity, even if they were identical in every other dimension. But it is rather unlikely that poverty would have the same response in both countries: with the same employment elasticity one country would be generating ten times as much employment as the other. A better measure of employment-intensive growth for our purposes would be $\overline{e}$. In this case a country that experienced a small growth, all of which was linked to changes in employment rates, might have the same value of $\overline{e}$ as a country that experienced high growth but only modest changes in employment rates. As long as the contribution of changes in employment rates to aggregate growth is the same, both countries would be equivalent in

terms of employment intensity. Therefore, we are taking both factors into consideration: total growth and the employment (rate) elasticity of growth.

### *2.2 Exploring the link between the sectoral growth pattern, its productivity and employment intensity and its poverty reducing impact*

Once growth has been profiled, the second step is to link the profile of growth with poverty changes. A straightforward method for this would be to regress each of the components that profiles growth against percent changes in poverty. This would be the equivalent of regressing percent changes in poverty against aggregate growth (controlling for other factors), which is the route followed by the poverty-growth literature.[18] In this case, however, we have decomposed aggregate growth into different terms. To analyze whether poverty changes are correlated with the aggregate employment and productivity profile we can estimate the following equation:

$$\frac{\Delta P}{P} = \beta_0 + \beta_1 \bar{e} + \beta_2 \bar{\omega} + \beta_3 \bar{a}$$

**Equation 3**

If movements out of non-employment and into employment reduce poverty then we would expect the coefficient of $\bar{e}$ to be significantly and negatively correlated with changes in headcount poverty *P*. On the other hand if the income of the poor rises because they change from low productivity jobs to high productivity jobs, or because their earnings are positively correlated with TFP or the capital/labor ratio, then the coefficient on $\bar{\omega}$ should be significantly and negatively correlated with changes in poverty. If increases in the fraction of the working population reduce poverty, then the coefficient on $\bar{a}$ should be significant and negative. Note that if $\beta_1 = \beta_2 = \beta_3$, then Equation 3 would boil down to $\frac{\Delta P}{P} = \beta_0 + \beta_1 \frac{\Delta y}{y}$, and what would matter would be overall growth rather than its profile.

To find out whether the sectoral growth pattern is correlated with changes in poverty, we would estimate:

$$\frac{\Delta P}{P} = \beta_0 + \sum\nolimits_{s=1}^{S} \beta_s \bar{y}_s$$

**Equation 4**

In this case, growth in a particular sector would decrease poverty if its coefficient is negative and significant. Finally, to estimate whether the sectoral productivity and employment profile of growth is correlated with changes in poverty, we would estimate:

[18] It should be noted that most of the poverty-growth literature uses changes in mean survey income as a measure for growth. Instead we are concerned with growth in per capita value added.

$$\frac{\Delta P}{P} = \beta_0 + \sum_{s=1}^{S} \beta_s \bar{e}_s + \sum_{s=1}^{S} \gamma_s \bar{\omega}_s$$

**Equation 5**

Interpretation of the coefficients is straightforward. As all variables are in percentage changes, the coefficients are the (partial) elasticity of poverty with respect to our measure of employment-intensive growth or productivity-intensive growth. Because of the way the decomposition is performed, $\beta_s$ will indicate the percentage change in the headcount poverty ratio that is likely to accompany a 1 percent increase in our employment-intensive measure in sector *s*. Analogously, the coefficient $\gamma_s$ will indicate the percentage change in the headcount poverty ratio for a 1 percent growth in our measure of productivity-intensive growth in sector *s*.

### *2.3 Which are the determinants of the growth profile?*

As mentioned previously, if we find that the profile of growth matters for poverty reduction, it is interesting to explore whether there are economic policies or labor market conditions that are correlated with particular growth patterns.

To estimate the impact of these underlying determinants, we estimate the following equation:

$$\bar{x}_{js} = g(Z_{j,t=0}, X_j) \text{ for } \bar{x}_{js} \in (\bar{e}_{j1}, \bar{e}_{j2}, ...\bar{e}_{jS}; \omega_{j1}, \omega_{j2}, ..., \omega_{jS}; \bar{e}_j, \bar{\omega}_j)$$

**Equation 6**

Where $\bar{x}_{js}$ is our measures of employment/productivity-intensive growth in country *j* in sector *s*, $Z_{j,t=0}$, is a vector of possible explanatory variable in country *j* at the beginning of the spell ($t$=0) and $X_{j,}$ are country specific control variables.

The $Z_{j,t=0}$ vector will include regulation variables and traditional variables that have been associated with growth and that might affect the investment climate in a country or TFP growth. By using the explanatory variables at the beginning of the spell, we hope to be able to better assess causality.

### *2.4 The Data*

To analyze whether employment matters for poverty reduction we make use of data on total and sectoral GDP, poverty, population and employment. The analysis covers the period between 1980 and 2004, and uses a sample of 39 developing countries, and 106 growth spells.[19]

Data on aggregate GDP come from the World Bank's World Development Indicators. To construct sectoral GDP we use data from the U.N. National Accounts, which give the

[19] The Annex lists the growth spells.

share of GDP by sector. Data on population come from the U.N. population division and data on poverty come from the World Bank Poverty Database. Finally, data on employment come from the ILO-KILM database.

U.N. data on National Accounts has value added disaggregated into seven sectors (ISCS-revision 3 definitions): agriculture, hunting, forestry and fishing; mining and utilities; manufacturing; construction; wholesale, retail, restaurant and hotels; transport, storage and communications; and other activities. Poverty data from the World Bank in PovCalNet lists several measures of poverty, several measures of income distribution and mean survey income. These data are based on household surveys and measure welfare either by income or by consumption. The KILM database has information for 20 indicators of the labor market, with several disaggregations for each. It is the most comprehensive database for labor market outcomes available. However, it has some limitations for comparability across countries and within countries across time. The main difficulty for cross-country comparability is that definitions vary by country, and the coverage of population and of segments of the labor market are not always the same. In particular, many countries report values for formal employment only, and others leave out sectors such as agriculture. However, the KILM database does provide information when this is the case, so that it is possible to control for differences in measurement and coverage. The main problem for within country comparisons is changes in sample or survey design. Again, the database provides information on these breaks in the series. In addition, the coverage for Sub-Saharan Africa is low. We use indicators on employment by sector. The database presents data for ISCS revision 2 and revision 3. Whenever revision 3 is available for a country year, we use this last classification system; otherwise, we use the available information using revision 2. In either case we make sectoral aggregations consistent with the sectoral aggregation of the U.N. National Accounts information on GDP by sector of economic activity. We also include data on employment for three other African countries based on country studies that use household data in an effort to increase the sample of African countries.[20]

To profile growth in terms of employment and productivity by sectors, we construct short run "growth spells." For each country, short run growth spells are constructed as the percentage change in value added per capita (VA) between *two consecutive comparable points in time*. One country may have several growth spells. For each growth spell in VA, the corresponding changes (for the exact same years) in employment to labor force ratios (E/A) by sectors, value added per worker (Y/E) by sectors, and ratio of labor force to total population (A/N) are constructed. To link the profile of growth to poverty, the corresponding changes in the poverty headcount ratio are constructed. Care is taken to ensure that the spells are comparable in time by taking into consideration that within a spell measured poverty is constructed using the same welfare indicator (income or consumption) and employment numbers have the same coverage. Consistency in employment measures by sectors is obtained by taking into account breaks in employment series emanating from changes in either coverage or sample, so that within a

[20] These countries are Senegal, with the source World Bank (2007a); Ghana, with the source World Bank (2007b); and Madagascar, with the source World Bank (2007c). Ghana and Madagascar drop from the sectoral regression to outlier observations.

spell, employment is measured using the same sample and coverage. The average duration of the short run spells is 2.2 years with the longest spell being 8 years.

Table 1 describes the covered sample. There are few low income countries in the sample, and a low number of countries in Sub-Saharan Africa and in the Middle East and North Africa category. The main data limitations come from the employment data, which have very low coverage in these regions. This implies that the analysis may better describe the behavior of middle income countries. Nevertheless, we are able to capture 15 percent of all low income countries.

**Table 1: Sample Description**

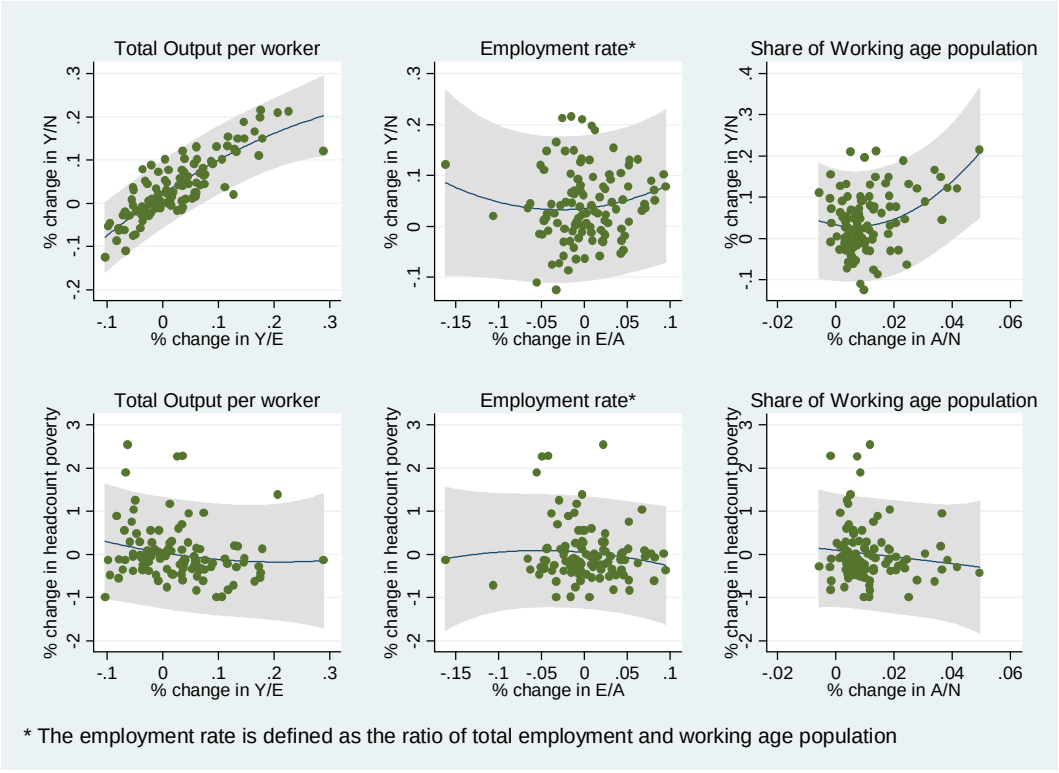
| *Countries Grouped by Region and Income Level* | *No. of Countries in the Region* | *No. of Countries in the Sample* | *% of Countries in the Sample* |
|---|---|---|---|
| ***By Region*** | | | |
| Sub-Saharan Africa | 48 | 4 | 8.3% |
| East Asia and the Pacific | 24 | 5 | 20.8% |
| Europe and Central Asia | 27 | 9 | 33.3% |
| Latin America and the Caribbean | 31 | 17 | 54.8% |
| Middle East and North Africa | 14 | 1 | 7.1% |
| South Asia | 8 | 3 | 37.5% |
| **Total** | 152 | 39 | 24.3% |
| | | | |
| ***By Income Level*** | | | |
| Low Income | 53 | 8 | 15.0% |
| Lower Middle Income | 58 | 20 | 34.5% |
| Upper Middle Income | 41 | 11 | 26.8% |
| **Total** | 152 | 39 | 24.3% |

# 3 Results: What Do the Stylized Facts Say?

Figure 1 presents stylized facts on the empirical link between growth and changes in poverty in all countries for which data were available. The first row of plots shows how poverty changes are correlated with changes in *productivity*, *employment rates* and *the share of the population of working age*. The second row of plots illustrates how per capita value added growth in that country is correlated with the same three variables. Each data point in the figure corresponds to a specific growth spell in a country. Productivity is defined as value added per worker. Employment rates are measured as the employed as a fraction of the working age population. The share of the population of working age is the ratio of the working age population to the total population. A growth spell is simply the percentage change in the variables of interest between two points in time. The spells are short and medium run: on average, each spell lasts two years, and most spells are between one and four years. The first row of plots in Figure 1 illustrates the correlation between *per capita value added* and percentage changes in productivity (first plot), employment rates (second plot) and the inverse of the dependency rate (third plot). The

strong positive correlation between changes in productivity and per capita value added stands out, meaning that productivity growth and per capita value added growth are strongly correlated. Changes in employment as well in as the share of the population of working age are also positively correlated with increases in per capita value added, but their confidence intervals are substantially wider, suggesting that the relation is less strong. The second row of plots in the figure illustrates how percentage changes in *headcount poverty* correlate with the same three components. All of these components appear to be negatively correlated with poverty, although the correlations appear to be small and the confidence intervals (the shaded area) large. The positive correlation is perhaps not surprising: higher value added per worker can translate into higher labor income either through higher wages or through higher profits from self-employment, and thus it can alleviate poverty. Higher employment rates would imply more people working and thus more people earning. Lower dependency rates mean that each working age member has fewer people to support on his/her income.

**Figure 1: Empirical Link between the Components of per Capita GDP, Growth and Changes in Poverty. Developing Countries 1980-2002**




* The employment rate is defined as the ratio of total employment and working age population

**Figure 2: Correlation of Changes in Poverty and in Value Added per Capita with Changes in Output per Worker for Three Sectors**

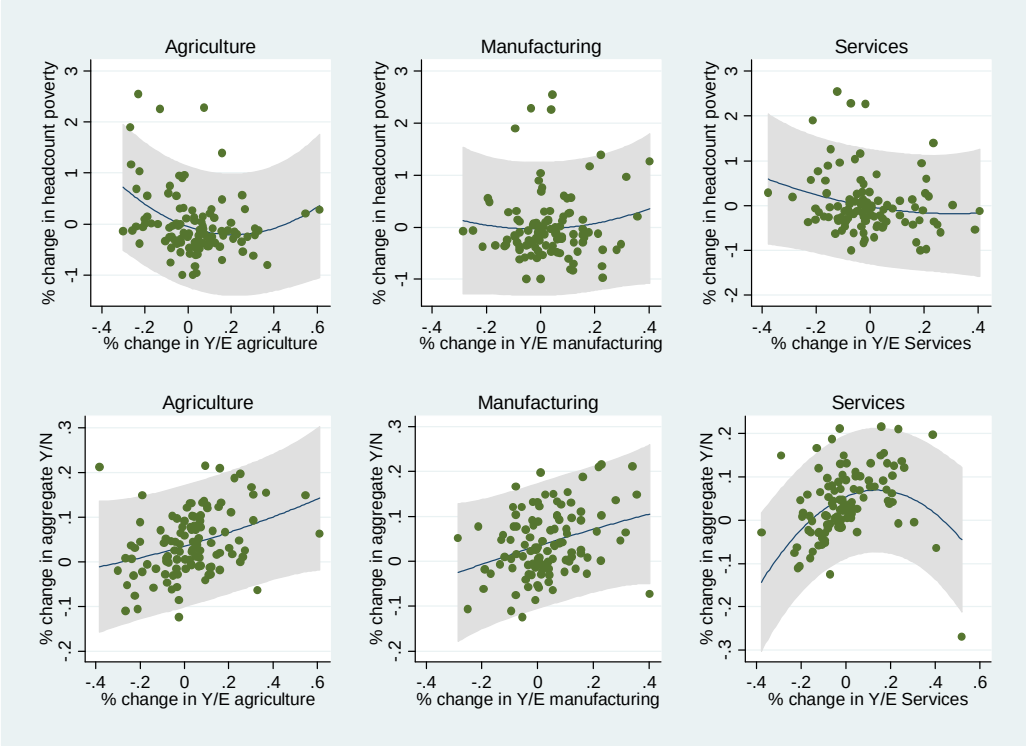



**Figure 3: Correlation of Changes in Poverty and in Value Added per Capita with Employment Growth for Three Sectors**

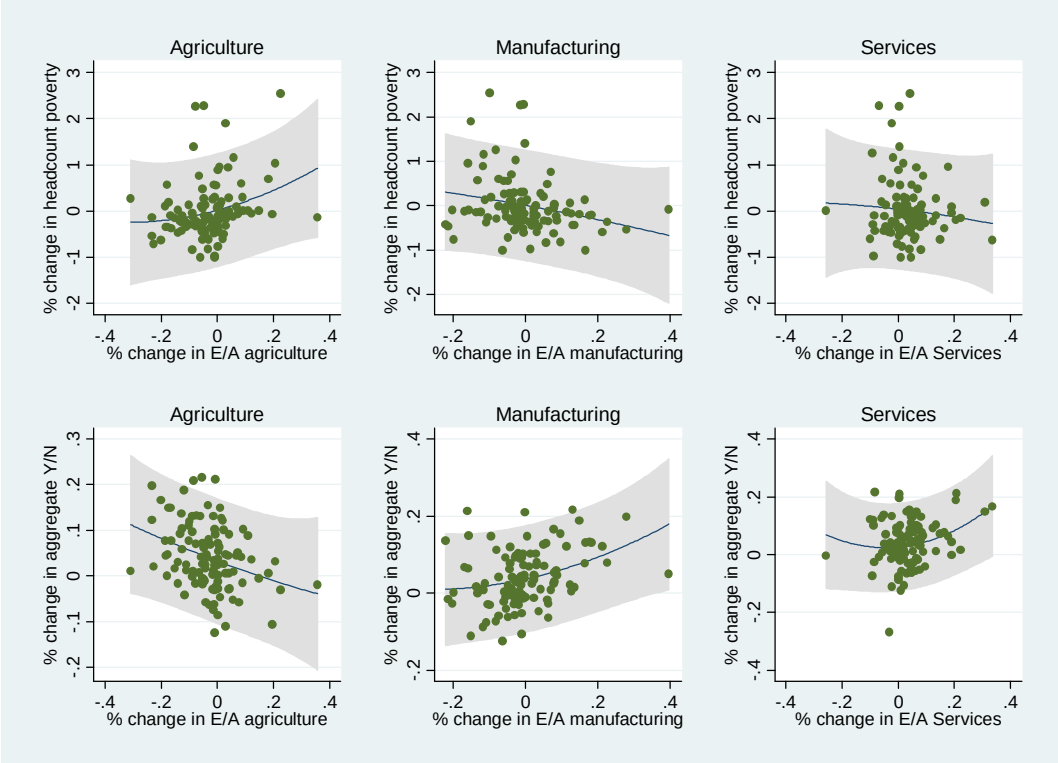


Figure 2 illustrates how changes in poverty and value added per capita are correlated with changes in productivity (value added per worker) for three selected sectors (agriculture, manufacturing and services). Again, each data point corresponds to an observed country growth spell. A simple look at the figure suggests that there may be important differences. For example, growth in output per worker in agriculture and services appears strongly correlated with poverty alleviation, while productivity growth in manufacturing does not seem to have a clear effect on poverty (first row of plots). On the other hand, changes in productivity in all sectors seem to be positively associated with aggregate growth, with no significant differences among sectors.

Figure 3 illustrates how changes in poverty and changes in per capita value added are correlated with employment growth in the selected sectors. There are clear differences among sectors. Employment growth in agriculture is associated with growing poverty, but employment growth in manufacturing and services seems to be associated with decreases in poverty. In other words, within countries, employment growth in agriculture as a share of working age population coincides with rises in poverty. It is worth highlighting that these are changes within two years (on average), so that the observed changes are not long run structural changes. The relationship between changes in overall per capita value added and employment rates in the different sectors also differ. Increases in employment in agriculture appear negatively correlated with overall growth, while the opposite holds true for manufacturing and construction. This behavior suggests important productivity differences between agriculture and non-agriculture.

# 4 Results: Growth and Poverty

## *4.1* Not All Growth Is Equal for Poverty Changes

We proceed to analyze whether growth patterns matter for poverty changes. We first analyze the relationship between poverty changes and the aggregate employment/productivity profile of growth by estimating Equation 3. We then proceed to estimate the relationship between poverty reduction and the sectoral pattern of growth (Equation 4). Finally, we analyze whether the sectoral employment and productivity profile matters for poverty reduction by estimating Equation 5. For each equation we estimate several models. Model (1) is the benchmark estimation, with no controls. In Model (2) we control for changes in inequality, as measured by the Gini coefficient of mean survey income. We do so because inequality may affect poverty and the growth pattern. [21] Models (3) to (6) check whether the results hold for different sub-samples: non upper middle income countries, non Latin American and the Caribbean countries, and positive and negative growth spells. All errors are clustered by country and outliers excluded from the sample. Our dependent variable is the headcount poverty ratio.[22]

[21] That poverty is correlated with changes in distribution is well known (see Bourguignon 2002). Inequality may also affect the pattern of growth. Specifically, higher levels of inequality may promote pro-capital or pro-labor policies or anti-agricultural bias (see Loayza and Raddatz, 2006). Initial levels of inequality and initial levels mean income, as well as the interaction of both, where also included but where never significant.

[22] For our sample, changes in poverty depth are strongly correlated with changes in headcount poverty, so we have limited ourselves to only one poverty measure.

Before estimating whether the growth pattern is correlated with poverty reduction, we checked whether aggregate growth in per capita value added is correlated with poverty reduction. In all models, except for non upper middle income countries, we find that growth explains poverty reduction. For upper middle income countries, only changes in inequality affect growth. It is also interesting to note that in negative growth episodes both aggregate growth and changes in distribution have a reduced power in explaining poverty changes, but their coefficients are significantly larger than in periods of positive growth. This result highlights possible asymmetries in the way poverty and per capita value added growth are related. Table 2 shows the results.

**Table 2: Percent Change in Headcount Ratio and Aggregate Growth**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Benchmark | Controls | Non Upper Middle Income | Non LAC | Positive Growth | Negative Growth |
| Change in Y/N (%) | -3.616*** | -3.650*** | -1.479 | -4.848*** | -3.280*** | -9.604* |
| | (-3.95) | (-4.19) | (-1.69) | (-3.39) | (-3.87) | (-1.90) |
| Change in Gini (%) | | 2.562*** | 1.565*** | 2.375*** | 1.729*** | 5.081* |
| | | (2.82) | (3.94) | (3.03) | (3.33) | (2.03) |
| Constant | 0.151* | 0.158* | 0.00409 | 0.310* | 0.130 | -0.0687 |
| | (1.79) | (1.92) | (0.06) | (1.75) | (1.41) | (-0.28) |
| Observations | 104 | 104 | 63 | 41 | 73 | 31 |
| Adjusted R-squared | 0.139 | 0.241 | 0.142 | 0.283 | 0.215 | 0.177 |

* p<.10, ** p<.05, *** p<.01. T-statistics in parentheses.

Table 3 shows the results of estimating Equation 3. Both the aggregate productivity intensity of growth and the aggregate employment intensity are negatively correlated with poverty changes, with employment having a slightly smaller significance level. In periods of negative growth, however, only employment changes seem to matter. A test for the equality of the coefficients cannot be rejected in any of the models estimated. Therefore, it appears that the impact of productivity-intensive growth is not different from employment-intensive growth. If anything, we can conclude that it is productivity-intensive growth that is more robustly correlated with poverty reduction, with the possible exception being during recessions.

To estimate whether growth patterns may matter for poverty alleviation we estimate Equation 4 using a three sector disaggregation (primary, secondary and tertiary) and a seven sector disaggregation (agriculture, mining and utilities, manufacturing, construction, commerce, services, and transport and communications). The results suggest that only the secondary and tertiary sectors and their sub-sectors have any impact on poverty. However, neither in the three sector disaggregation nor in the seven sector case could we reject equality of coefficients across

sectors and sub-sectors. This suggests that the sectoral pattern of growth does not matter for poverty (that is, whether growth is concentrated in the primary, secondary or tertiary sector is unrelated to poverty changes). Table 4 shows the estimation results for the three sector case.

**Table 3: Poverty Changes and the Employment/Productivity Intensity of Growth**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Benchmark | Controls | Non Upper Middle Income | Non LAC | Positive Growth | Negative Growth |
| Inverse of dependency A/N | -2.895 | -2.287 | 1.709 | -8.124 | 1.395 | -37.11 |
| | (-0.59) | (-0.48) | (0.24) | (-1.29) | (0.29) | (-1.70) |
| Value added per worker Y/E | -3.612*** | -3.686*** | -1.762 | -4.391** | -3.828*** | -8.137 |
| | (-3.95) | (-4.26) | (-1.24) | (-2.76) | (-3.35) | (-1.55) |
| Employment rate E/A | -4.604** | -4.783** | -0.690 | -6.905** | -3.413** | -14.48** |
| | (-2.59) | (-2.64) | (-0.37) | (-2.36) | (-2.47) | (-2.34) |
| Change in Gini (%) | | 2.586*** | 1.543*** | 2.341*** | 1.719*** | 4.217 |
| | | (2.84) | (3.59) | (3.26) | (3.42) | (1.33) |
| Constant | 0.144 | 0.146 | -0.0263 | 0.302* | 0.102 | 0.205 |
| | (1.37) | (1.45) | (-0.25) | (1.76) | (1.04) | (0.53) |
| Observations | 104 | 104 | 63 | 41 | 73 | 31 |
| Adjusted R-squared | 0.127 | 0.233 | 0.128 | 0.270 | 0.207 | 0.192 |

* p<.10, ** p<.05, *** p<.01. T-statistics in parentheses.

We now turn to the sectoral employment intensity of growth by estimating Equation 5. As mentioned previously, $\bar{e}_s$ reflects how much of the observed aggregate growth can be linked to increases in employment in sector *s*, and $\bar{\omega}_s$ corresponds to the amount of growth that can be linked to changes in productivity in sector *s*. Again we perform the estimation for seven and three sector disaggregations. We cannot reject equality of coefficients across *sub*-sectors in the seven sector case, so we only report the estimation for the three sector disaggregation. Table 5 illustrates the results. Employment-intensive growth in the secondary sector is negatively and robustly correlated with poverty reduction, except in recessions. Employment-intensive growth in agriculture is correlated with increases in poverty, except in recessions and in non LAC countries. Even so, the coefficient is significant only in non upper middle income countries. Employment-intensive growth in the tertiary sector is negatively correlated with poverty reduction for the upper middle income countries, and positively correlated (though not significantly) in the poorest countries. Productivity-intensive growth, however, does not seem to be robustly correlated with poverty reduction.

**Table 4: Poverty Changes and the Sectoral Growth Pattern**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Benchmark | Controls | Non Upper Middle Income | Non LAC | Positive Growth | Negative Growth |
| Agriculture (Primary Sector) | -4.875 | -3.813 | 0.892 | -4.891 | -3.414 | -9.645 |
| | (-1.17) | (-1.00) | (0.46) | (-0.70) | (-0.88) | (-0.71) |
| Secondary Sector | -3.876*** | -3.207** | -1.658 | -3.493 | -2.771** | -5.038 |
| | (-3.22) | (-2.71) | (-0.96) | (-1.74) | (-2.21) | (-1.11) |
| Tertiary Sector | -2.532** | -3.519*** | -1.514 | -6.144*** | -4.118*** | -4.281 |
| | (-2.61) | (-3.96) | (-1.31) | (-3.49) | (-3.31) | (-0.91) |
| Change in Gini (%) | | 2.873*** | 1.803*** | 2.829*** | 2.040*** | 4.747* |
| | | (2.91) | (4.19) | (3.01) | (3.54) | (1.92) |
| Constant | 0.0706 | 0.102 | -0.0117 | 0.258 | 0.111 | 0.0144 |
| | (1.04) | (1.50) | (-0.17) | (1.43) | (1.25) | (0.05) |
| Observations | 98 | 98 | 58 | 37 | 68 | 30 |
| Adjusted R-squared | 0.094 | 0.224 | 0.155 | 0.246 | 0.226 | 0.076 |

* p<.10, ** p<.05, *** p<.01. T-statistics in parentheses.

Several considerations are worth highlighting. First, there appears to be a difference in behavior between the Latin American and the Caribbean (LAC) Countries and the non LAC countries. Although in the LAC countries agriculture and services appear to be equated with a bad jobs sector, this is not so clear in the non LAC countries. Also, in the non LAC countries the secondary sector is significantly correlated with poverty reduction, while in the non LAC countries this is not so clear, which suggests that services in the LAC countries may be a much more heterogeneous sector, combining good and bad jobs.

Our measures of employment-intensive and productivity-intensive growth are negatively correlated, within sectors. Although this is to be expected because of decreasing marginal productivity and the fact that new entrants into the labor market are younger and so "less productive," the magnitude of the correlation is particular high for the agricultural sector (see Annex). A possible explanation is that in the short run the measurement of output is less accurate than the measurement of employment—a factor that can be particularly important in the case agriculture and services because of the implicit difficulty in measuring non-marketable output. By including productivity and employment jointly we might be unable to disentangle the sectoral effects. We explore this issue by regressing poverty against our measures of employment and productivity separately (Table 6 and 7).

**Table 5: Poverty Changes and Sectoral Employment/Productivity Intensity**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Benchmark | Controls | Non Upper Middle Income | Non LAC | Positive Growth | Negative growth |
| Employment-intensive growth in Agriculture (Primary Sector) | 2.003 | 3.393 | 8.155*** | -0.428 | 4.780 | -19.75 |
| | (0.37) | (0.68) | (3.30) | (-0.04) | (1.41) | (-0.85) |
| Employment-intensive growth in Secondary Sector | -6.578*** | -5.487*** | -4.898*** | -5.987*** | -4.845*** | 0.554 |
| | (-4.60) | (-3.89) | (-2.87) | (-3.16) | (-4.78) | (0.07) |
| Employment-intensive growth in Tertiary Sector | -2.887 | -4.529* | 0.721 | -7.414* | -2.250 | -24.88 |
| | (-1.17) | (-1.87) | (0.31) | (-2.02) | (-1.53) | (-1.68) |
| Productivity-intensive Growth in Agriculture (Primary Sector) | -4.504 | -3.344 | 0.292 | -5.345 | -3.325 | -12.88 |
| | (-1.17) | (-0.95) | (0.16) | (-0.81) | (-1.15) | (-1.04) |
| Productivity-intensive Growth in Secondary Sector | -1.753 | -1.287 | 1.254 | 1.507 | 1.523 | -5.187 |
| | (-1.16) | (-1.00) | (0.81) | (0.43) | (1.09) | (-1.05) |
| Productivity-intensive Growth in Tertiary Sector | -0.621 | -1.651 | 0.219 | -2.843 | -1.804 | -5.394 |
| | (-0.52) | (-1.62) | (0.18) | (-1.44) | (-1.29) | (-0.89) |
| Change in Gini (%) | | 2.893*** | 1.693*** | 2.869*** | 2.211*** | 4.030 |
| | | (3.24) | (4.15) | (5.05) | (4.98) | (1.38) |
| Constant | 0.0778 | 0.121 | -0.0303 | 0.173 | 0.0400 | 0.232 |
| | (1.10) | (1.66) | (-0.46) | (1.06) | (0.58) | (0.73) |
| Observations | 98 | 98 | 58 | 37 | 68 | 30 |
| Adjusted R-squared | 0.140 | 0.275 | 0.342 | 0.311 | 0.420 | 0.134 |

* p<.10, ** p<.05, *** p<.01. T-statistics in parentheses.

The main difference in the results is that productivity-intensive growth in agriculture is robustly correlated with poverty reduction and employment-intensive growth in agriculture is robustly correlated with poverty increases. It is therefore difficult to determine whether they are capturing different phenomena or the same phenomena. An alternative explanation is related to traditional sector dualism, where output in agriculture is fixed and earnings in this sector are equal to average output per worker and therefore more workers means less mean output and thus lower earnings. Therefore, employment-intensive growth in agriculture would be equivalent to the negative of productivity-intensive growth in the sector, and productivity growth in agriculture might be reflecting outflows of workers from agriculture. The positive correlation between poverty and increases in employment in agriculture might also be a response to urban crises in which poverty increases and therefore workers seek agricultural employment as a safety net, in

which case reverse causality might be operating. This would imply that employment in urban sectors such as manufacturing would be negatively correlated with agricultural employment. However, this is not the case in the observed sample: employment changes in manufacturing are positively correlated with employment changes in agriculture (see Annex), which suggests that an exogenous force is pulling employment in both sectors at the same time.

**Table 6: Poverty Changes and the Sectoral Employment Intensity of Growth**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Benchmark | Controls | Non Upper Middle Income | Non LAC | Positive Growth | Negative Growth |
| Employment-intensive Growth in Agriculture | 8.014*** | 8.900*** | 7.310*** | 6.467* | 8.859*** | 0.224 |
| | (3.32) | (4.01) | (4.45) | (1.95) | (4.31) | (0.02) |
| Employment-intensive Growth in Secondary Sector | -6.141*** | -5.705*** | -5.398*** | -159*** | -5.999*** | 2.784 |
| | (-4.86) | (-4.48) | (-3.53) | (-4.41) | (-5.34) | (0.54) |
| Employment-intensive Growth in Tertiary Sector | -2.404 | -3.111 | 0.450 | -5.324* | -0.863 | -18.76 |
| | (-1.28) | (-1.60) | (0.21) | (-1.84) | (-0.62) | (-1.58) |
| Change in Gini (%) | | 2.848*** | 1.661*** | 2.702*** | 2.179*** | 3.152 |
| | | (3.31) | (4.47) | (4.10) | (4.52) | (1.15) |
| Constant | 0.0693 | 0.0966 | -0.0217 | 0.120 | 0.0107 | 0.463* |
| | (1.05) | (1.44) | (-0.31) | (1.16) | (0.19) | (2.13) |
| Observations | 98 | 98 | 58 | 37 | 68 | 30 |
| Adjusted R-squared | 0.143 | 0.276 | 0.370 | 0.333 | 0.415 | 0.182 |

* p<.10, ** p<.05, *** p<.01. T-statistics in parentheses.

In summary, we find that aggregate employment and productivity-intensive growth are clearly associated with poverty, but the evidence suggests that their effects are equivalent. A similar result holds for the sectoral pattern of growth. What seems to matter most is the employment and productivity sectoral profile of growth. We find that employment-intensive growth in agriculture is correlated with rising poverty while employment-intensive growth in the secondary is correlated with reductions in poverty. On the other hand, productivity-intensive growth in agriculture is correlated with poverty reductions while productivity-intensive growth in the secondary and tertiary sectors has an ambiguous relation with poverty. The effects of the agricultural profile of growth are difficult to disentangle. The evidence also shows that there is some heterogeneity among countries, with upper middle income countries showing a different behavior from the rest. The correlation between growth profiles and poverty reduction also shows asymmetries between positive and negative growth spells, although our sample of negative growth spells is rather small.

The size of these effects is important: a 1 percent employment-intensive growth in agriculture raises the headcount poverty by around 6.5 percent (the headcount poverty goes from 45 percent to 48 percent) to 9 percent. A 1 percent employment-intensive growth in manufacturing decreases poverty by 5 percent to 7 percent. Productivity-intensive growth in agriculture reduces poverty by 4 percent to 9 percent.

**Table 7: Poverty Changes and the Sectoral Productivity Intensity of Growth**

| | (1) Benchmark | (2) Controls | (3) Non Upper Middle Income | (4) Non LAC | (5) Positive Growth | (6) Negative Growth |
|---|---|---|---|---|---|---|
| Productivity-intensive Growth in Agriculture | -7.227*** | -7.131*** | -4.141** | -9.452** | -7.112*** | -9.590 |
| | (-3.00) | (-3.45) | (-2.78) | (-2.64) | (-3.88) | (-0.88) |
| Productivity-intensive Growth in Secondary Sector | 0.596 | 0.813 | 3.398* | 3.624 | 5.081** | 1.328 |
| | (0.33) | (0.53) | (1.82) | (0.90) | (2.69) | (0.34) |
| Productivity-intensive Growth in Tertiary Sector | -0.726 | -1.149 | -1.156 | -0.643 | -1.324 | 4.769 |
| | (-0.72) | (-1.17) | (-1.04) | (-0.29) | (-0.97) | (0.68) |
| Change in Gini (%) | | 2.810*** | 1.887*** | 2.783*** | 2.003*** | 3.094 |
| | | (3.34) | (4.50) | (3.99) | (3.67) | (0.99) |
| Constant | 0.0277 | 0.0412 | -0.0493 | 0.0458 | -0.0894 | 0.340 |
| | (0.43) | (0.64) | (-0.88) | (0.31) | (-1.36) | (1.21) |
| Observations | 98 | 98 | 58 | 37 | 68 | 30 |
| Adjusted R-squared | 0.045 | 0.174 | 0.232 | 0.185 | 0.317 | 0.072 |

* p<.10, ** p<.05, *** p<.01. T-statistics in parentheses.

### *4.2 The Determinants of Growth Patterns*

In the previous section we found that there are important differences between countries in the type of growth experienced, and that these differences may be significant for the poverty impact of growth. It is thus important to find out whether the observed growth patterns are the result of the underlying labor market characteristics.

In this section we explore the determinants of manufacturing and secondary sector labor-intensive growth and agricultural productivity-intensive growth. In particular, we explore whether education, the share of workers in agriculture, labor market regulation, trade and some investment climate indicators are correlated with poverty reduction. To do this, we regress our measures of employment and productivity-intensive growth against the value of the variable at the beginning of the period (see Equation 6). The dependent variable is measured in percentage points of growth. The independent variables are measured in levels at the beginning of the spell. By using the level of the variable at the beginning of

the spell rather than the change, we hope to be able to better assess causality. We focus on labor-intensive growth in the manufacturing and secondary sectors and on agricultural productivity-intensive growth, since our previous findings suggest that these are the growth patterns that are positively correlated with poverty reduction. We thus test whether these growth patterns can be explained by the selected variables.

### 4.2.1 Regulation and Unionization

There is a vast literature that analyzes the effect of regulation on employment or on the unemployment rate (for reviews see Heckman and Pages, 2003; Arias et al. 2005; among others). Most of this literature concludes that labor regulation hinders employment creation and raises unemployment and that the impact of labor regulation on productivity growth has been underemphasized. Another strand of literature analyzes the effect of regulation on growth or on poverty. Lustig and McLeod (1997), for example, analyze the impact of minimum wages on poverty in developing countries, while Besley and Burgess (2004) find that pro-poor worker regulation is associated with lower output growth and higher urban poverty in India. The study on "Pro-Poor Growth in the 1990's" (World Bank, 2005), find that highly regulated labor markets limit the poor from participating in economic growth. The focus of these studies has been aggregate employment or productivity growth rather than the employment/productivity intensity of growth, and few of these studies consider sectoral differences. Moreover, factors other than labor regulation have received little attention. The exception is perhaps a paper by Revenga and Bentolila (1995), who find that for OECD countries the employment intensity of growth is affected by the share of agriculture in total output, firing costs, inter-union and inter-firm coordination and the percentage of employees in large firms.

To measure labor regulation we use two sets of variables: (i) those on hiring restrictions and labor costs, and (ii) those on unionization and strikes. The first group includes the monthly minimum wage in absolute value (U.S. dollars) and the minimum wage relative to the average manufacturing wage; the duration of maternity leave; the minimum annual paid leave after one year of work; the social security contributions paid by the worker and the employers as a fraction of salaries; and the severance pay after three years of employment in months of salary. As for unionization, we explored the effect of trade union membership as a percent of the labor force, the coverage of collective agreements as a percent of salaried employment, the number of strikes and lockouts per year, annual work days lost to strikes, and the number of workers involved in strikes and lockouts. We use data on labor regulation compiled by Rama and Artecona (2002) and Sulla, Scarpetta and Pierre (mimeo, World Bank).

**Table 8: Labor Costs and Employment-intensive Growth**

| | Manufacturing Employment-intensive Growth | | Secondary Sector Employment-intensive Growth | | Agricultural Productivity-intensive Growth | |
|---|---|---|---|---|---|---|
| Monthly Minimum Wage | -0.000177*** (-3.22) | | -0.000295*** (-3.02) | | 0.000129*** (3.92) | |
| Minimum Wage Relative to Average | | -0.0497** (-2.31) | | | | |
| Paid Annual Leave | | | | | | 0.000552** (2.89) |
| Severance Payment | | | | 0.0103** (3.08) | | |
| Constant | 0.0198** (2.83) | 0.0178** (2.84) | 0.0310** (2.50) | -0.0380** (-3.46) | -0.0215*** (-4.48) | -0.0165** (-2.84) |
| Observations | 42 | 31 | 42 | 17 | 42 | 15 |
| Adjusted R-squared | 0.201 | 0.155 | 0.158 | 0.059 | 0.182 | 0.099 |

* p<.10, ** p<.05, *** p<.01. T-statistics in parentheses.

Table 8 shows the results of those variables that were significantly correlated with the sectoral employment and productivity profile of growth.[23] The results suggest that employment-intensive growth in manufacturing is affected by minimum wages (both in absolute terms and relative to the average manufacturing wage) having a negative effect. Minimum wages also reduce secondary sector employment-intensive growth, while severance appears to have a positive effect. This last result is somewhat surprising. A possible explanation is that it may raise the supply of labor to this sector, or may reduce turnover during recessions. No other regulation variables considered had any explanatory power. Labor costs also appear to affect productivity-intensive growth in agriculture, although the signs of the coefficients are not straightforward to interpret. Minimum wages are significant in explaining agricultural productivity-intensive growth with a positive coefficient. A possible interpretation is that minimum wages and paid annual leave are binding mostly for non-agricultural firms, and thus higher minimum wages and better employment benefits make employment in the urban sector more attractive, so that workers are more willing to queue for an urban good job. This outflow from agriculture (into unemployment and bad jobs) raises output per worker in agriculture.

None of the unionization variables appear significant in explaining employment-intensive growth in manufacturing or the secondary sector. Instead, agricultural productivity growth is affected positively by strikes and lockouts, the number of workers participating

[23] Non-significant results are not reported for brevity.

in them, and the number of days lost as a result, although the size of the coefficient is small and has a low confidence level (5 percent) (results are not shown for brevity). The results of the impact of labor regulation on the pattern of growth which are presented here should be taken with reservation, as the sample size is very small.

### 4.2.2 Education and the Structure of Employment

Education has always been given a prominent role in explaining growth, and it seems intuitive that the availability of skills may determine the growth pattern. Education levels may affect employment-intensive growth by supplying (or not supplying) the skills required by the growth process. For example, low education levels may imply a supply of cheap labor. But, on the other hand, if education levels are too low compared to the levels needed by the process of industrialization (for example, if there is a large fraction of illiterate), employment growth in manufacturing may be hampered. On the other hand, in the dualist models of the labor market it has often been stressed that the size of the "residual" employment sector may affect growth in the "modern" sector of the economy by providing more "surplus labor" to feed into employment-intensive growth at a given wage. In this section we explore whether the initial level of education or the share of workers employed in agriculture are correlated with our measures of employment-intensive growth in manufacturing and the secondary sector and of productivity-intensive growth in agriculture. In particular, we look at the effect of the share of population with no schooling, the average level of education of the population age 25 and older, and the share of employment in the primary sector.

None of the variables explains manufacturing employment-intensive growth, while only the share of workers in agriculture explains employment-intensive growth in the secondary sector (Table 9). When analyzing the effect of education and the structure of the labor force on agricultural productivity-intensive growth, we find that no schooling is negatively and robustly correlated, while average schooling is positively and robustly correlated. In other words, education is important in fostering productivity growth in agriculture and thus alleviating poverty.

The lack of significance of the education variables in explaining employment-intensive growth in manufacturing and the secondary sector may respond to several factors. One possible explanation is that education may have ambiguous effects on fostering employment-intensive growth. On one hand, it may mean that low levels of education may signify cheap labor to feed into employment-intensive growth, but on the other hand, it means that the low skills and low productivity of the labor force may be a disincentive to labor demand. Both effects may cancel one another. On the other hand, a high initial share of workers in agriculture, may foster employment-intensive growth in the secondary sector by supplying cheap labor, without pushing wages up.

**Table 9: The Growth Pattern, Education and the Structure of Employment**

| | Secondary Sector Employment-intensive Growth | | Agricultural Productivity-intensive Growth | |
|---|---|---|---|---|
| Share of Workers in Agriculture | 0.0933** | | | |
| | (2.48) | | | |
| Share of Population with No Schooling | | | -0.000278** | |
| | | | (-2.60) | |
| Average | | -0.00275* | | 0.00187* |
| | | (-1.80) | | (1.97) |
| Constant | -0.0178*** | 0.0102 | 0.00164 | -0.0145** |
| | (-3.17) | (1.19) | (0.77) | (-2.38) |
| Observations | 105 | 88 | 88 | 88 |
| Adjusted R-squared | 0.091 | 0.009 | 0.074 | 0.034 |
| * p<.10, ** p<.05, *** p<.01. T-statistics in parentheses. | | | | |

### 4.2.3 Trade, the Regulatory Environment and the Investment Climate

Recent research into the determinants of growth has concentrated on "investment climate indicators" "competitiveness" and trade (see Dollar and Kraay, 2002; Dollar et al., 2003; and Kaufman et al., 1999). The general idea is that a poorly operating regulatory environment, corruption, excessive red tape, poor protection of property rights, macroeconomic instability and uncertainty and poor governance diminish returns to investment and thus hamper growth. Equally important has been the role of trade in promoting broad-based growth, as trade can affect markets for land and labor, which are the most abundant factors among the poor, as well as the prices of products produced by the poor (see Winters, 2000). In this section we extend this literature by analyzing whether the investment climate, the regulatory environment, and openness to trade affect the growth pattern.

The above-mentioned literature has benefited from recent efforts at collecting data to assess governance and the investment climate. Governance indicators have been collected by the World Bank since 1996, and investment climate indicators have been available since 2002. Unfortunately, few data points match our growth spells, and therefore we were unable to make use of this recent high quality data. However, the Heritage Foundation has been collecting data on "economic freedoms" since 1995 for a wide number of countries. Most of the measures are aimed at capturing government intervention in the business environment. The data contain measures for 10 economic freedoms and an overall score. Each index goes from 0 to 100, where 100 represents the

least government intervention or regulatory burden.[24] We regress our measures of employment-intensive growth in manufacturing and the secondary sector and of agricultural productivity-intensive growth against the overall score and the 10 indexes. Table 10 presents the results.

Most of the results are contrary to what could be expected. The overall score is significant only for employment-intensive growth in the secondary sector, with more "freedom" being damaging for employment growth. Business regulation affects mostly productivity-intensive growth in agriculture, with a negative effect. The results suggest that openness to trade as measured by import and export taxes limits employment-intensive growth in the secondary sector and in manufacturing. Macroeconomic stability and lack of price controls appear to promote employment-intensive growth in manufacturing but to hamper productivity growth in agriculture. Financial freedom is harmful to employment-intensive growth in manufacturing and the secondary sector, and the index of property rights is negatively correlated with agricultural productivity growth. Therefore, aside from monetary stability, the effects of a lower regulatory burden are contrary to the general wisdom, as they do not reduce poverty. The same results hold if each of these variables is regressed separately (rather than jointly) on our measures of employment and productivity growth.

In addition to the above-mentioned variables we use a more traditional measure of trade: the share of imports and exports in value added (openness). We also asses whether the situation of being landlocked, foreign direct investment, the terms of trade or the real effective exchange rate affect the growth pattern.[25] The measures come from Sinnott and Lopez (2003).

[24] The 10 freedoms measured are the following: Business Freedom measures the costs and the time it takes to open and close a business; the Trade Freedom index measures taxes on imports and exports; Fiscal Freedom measures the tax burden on individuals and corporations and as a percent of GDP; Freedom from Government measures expenditures as a percent of GDP and revenue from state-owned enterprises; Monetary Freedom measures price stability and price controls; Investment Freedom measures the regulatory bias against foreign direct investment; Financial Freedom measures government intervention in the financial system, including ownership and regulation; Property Freedom measures the ability and guaranties to accumulate private property; the Freedom from Corruption index measures the perception of government corruption; and Labor Freedom measures hiring and firing restrictions as well as non-wage labor costs (only available since 2007).

[25] Terms of trade are measured as the price index of exports over the price index of imports; the real effective exchange rate index accounts for the existence of distortions between the tradable and non-tradable sector and is defined at the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs.

**Table 10: Regulatory Environment, Investment Climate and the Growth Pattern**

| | Manufacturing Employment-intensive Growth | | Employment-intensive Growth in Secondary Sector | | Productivity-intensive Growth in Agriculture | |
|---|---|---|---|---|---|---|
| Overall Score | -0.000333 | | -0.00117* | | 0.000113 | |
| | (-1.27) | | (-2.00) | | (0.54) | |
| Business Regulation | | -0.000124 | | 0.000207 | | 0.000652** |
| | | (-0.85) | | (0.38) | | (2.13) |
| Trade | | -0.000447** | | -0.000731* | | 0.000329 |
| | | (-2.09) | | (-1.72) | | (1.59) |
| Fiscal | | 0.0000855 | | -0.000591 | | 0.000112 |
| | | (0.24) | | (-0.89) | | (0.38) |
| Government | | 0.0000945 | | 0.000357 | | 0.0000921 |
| | | (0.63) | | (1.40) | | (0.61) |
| Monetary | | 0.000177*** | | 0.000191 | | -0.000129* |
| | | (3.34) | | (1.45) | | (-1.89) |
| Investment | | 0.0000443 | | -0.000105 | | 0.000218 |
| | | (0.22) | | (-0.28) | | (0.93) |
| Financial | | -0.000247* | | -0.000559** | | -0.000213 |
| | | (-1.78) | | (-2.23) | | (-1.36) |
| Property Rights | | 0.000000891 | | -0.000671 | | -0.000587** |
| | | (0.00) | | (-1.57) | | (-2.63) |
| Corruption | | -0.0000427 | | 0.000182 | | 0.0000411 |
| | | (-0.42) | | (1.22) | | (0.52) |
| Constant | 0.0155 | 0.0175 | 0.0608* | 0.104* | -0.00914 | -0.0347 |
| | (0.99) | (0.51) | (1.73) | (1.99) | (-0.71) | (-1.36) |
| Observations | 67 | 67 | 67 | 67 | 67 | 67 |
| Adjusted R-squared | 0.017 | 0.093 | 0.092 | 0.251 | -0.011 | 0.102 |

* p<.10, ** p<.05, *** p<.01. T-statistics in parentheses.

Table 11 shows the results for the employment intensity of growth in the manufacturing sector and in the secondary sector, as well as the productivity-intensive growth in agriculture. Given that the variables are likely to be correlated (e.g., being landlocked limits trade, as does an appreciated exchange rate), and therefore that it might not be possible to identify the effects in a joint regression, each variable was tested on its own and jointly. The evidence suggests that openness to trade is positively correlated with employment-intensive growth in manufacturing and the secondary sector, as is favorable terms of trade (the price of exports relative to the price of imports). As would be expected, overvalued exchange rate decreases employment-intensive growth, by making

exports less competitive and making capital (which is mostly imported in developing countries) cheaper relative to labor. The only variable that seems to affect agricultural productivity-intensive growth is terms of trade, with better terms of trade decreasing such productivity. It is not easy to speculate which is the mechanism at work in this case. A possible explanation is that the terms of trade are capturing a larger share of manufacturing exports, so that the higher profitability of manufacturing in relative terms may be a disincentive to agricultural investment. It is worth pointing out that the signs of the coefficients in the regression for employment-intensive growth are opposite to those for agricultural productivity-intensive growth, which suggests that in the short run trade policy might entail important trade-offs for this front. Finally, being landlocked reduces employment-intensive growth in manufacturing and the secondary sector and reduces agricultural productivity-intensive growth, although the coefficient is significant only in the joint regression, which covers a smaller sample.

**Table 11: Trade and the Employment Intensity of Growth in Manufacturing and the Secondary Sector**

| | Employment-intensive Growth in Manufacturing | | | | | | Employment-intensive Growth in the Secondary Sector | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Openness to Trade | 0.0137*** (2.99) | | | | | 0.00491 (0.32) | 0.0208** (2.58) | | | | | 0.0169 (0.79) |
| Terms of Trade | | 0.000799*** (3.38) | | | | 0.000511 (0.70) | | 0.000905 (1.35) | | | | 0.00129 (1.01) |
| Real Effective Exchange Rate | | | -0.000474** (-2.98) | | | -0.000205 (-0.47) | | | -0.00153** (-2.38) | | | -0.000827 (-0.77) |
| Foreign Direct Investment | | | | 0.000875 (0.76) | | 0.000180 (0.10) | | | | -0.00255 (-0.89) | | 0.00257 (0.56) |
| Landlocked | | | | | -0.00223 (-0.24) | 0.00963 (0.73) | | | | | -0.0353 (-1.32) | -0.106*** (-4.98) |
| Constant | -0.00946*** (-3.54) | -0.0843*** (-3.63) | 0.0444** (2.50) | -0.00828* (-1.82) | -0.00509* (-1.89) | -0.0419 (-0.37) | -0.0175*** (-3.53) | -0.101 (-1.54) | 0.146* (2.13) | 0.00102 (0.10) | -0.00738 (-1.55) | -0.0669 (-0.30) |
| Observations | 43 | 43 | 19 | 43 | 44 | 16 | 43 | 43 | 19 | 43 | 44 | 16 |
| Adjusted R-squared | 0.103 | 0.114 | 0.078 | -0.012 | -0.023 | -0.215 | 0.061 | 0.028 | 0.211 | 0.001 | 0.041 | 0.396 |

* p<.10, ** p<.05, *** p<.01. T-statistics in parentheses.

**Table 12: Trade and the Productivity Intensity of Growth**

| | Agricultural Productivity-intensive Growth | | | | | |
|---|---|---|---|---|---|---|
| Openness to Trade | -0.00214 | | | | | 0.000114 |
| | (-0.77) | | | | | (0.01) |
| Terms of Trade | | -0.000453** | | | | -0.0000282 |
| | | (-2.17) | | | | (-0.07) |
| Real Effective Exchange Rate | | | 0.000245 | | | 0.000272 |
| | | | (1.11) | | | (0.66) |
| Foreign Direct Investment | | | | -0.000296 | | 0.000592 |
| | | | | (-0.19) | | (0.21) |
| Landlocked | | | | | -0.0127 | -0.0621*** |
| | | | | | (-0.69) | (-5.16) |
| Constant | -0.00153 | 0.0423** | -0.0270 | -0.00142 | -0.00151 | -0.0259 |
| | (-0.65) | (2.10) | (-1.18) | (-0.26) | (-0.85) | (-0.33) |
| Observations | 43 | 43 | 19 | 43 | 44 | 16 |
| Adjusted R-squared | -0.020 | 0.035 | -0.032 | -0.022 | 0.023 | 0.357 |

* p<.10, ** p<.05, *** p<.01. T-statistics in parentheses

# 5 Conclusions

In this paper we analyzed the relationship between poverty and the employment and productivity profile of growth, both at the aggregate level and by sectors. We decomposed per capita value added growth among labor market components (employment, productivity and demographic changes) and empirically analyzed how each component affects poverty. We also explored the role of labor market characteristics, the structure of employment and the investment climate and trade in the observed growth pattern.

We complement the existing literature in several ways. First, we go beyond the sectoral pattern of growth or its overall employment intensity and we analyze the role of sectoral productivity and employment intensity in poverty alleviation. Second, we use a decomposition methodology to construct a measure of employment-intensive growth and an analogous measure of productivity-intensive growth. We believe this measure addresses some conceptual and empirical weaknesses of the more commonly used measure: the employment elasticity of growth. Third, our study includes a larger fraction of countries than previous studies. Fourth, we go beyond the correlation between poverty and the pattern of growth, and explore the correlation between economic policies and outcomes, and the observed growth pattern.

Using a sample of 106 growth spells covering 39 countries, we find that the sectoral growth pattern and the employment/productivity profile vary significantly among countries. In the aggregate, the employment intensity of growth does not seem to matter for poverty any more than the productivity intensity. But the sectoral pattern of employment generation and productivity growth is important. The results appear to suggest that employment-intensive growth in the secondary sector alleviates poverty. By contrast, more employment-intensive growth in agriculture tends to be correlated with increases in poverty while productivity-intensive growth in agriculture has a significant correlation with poverty reduction, although both measures are highly correlated so that it is difficult to asses whether productivity increases in agriculture are different from "moving workers out of agriculture."

Evidence for the link between employment-intensive growth and education, regulation, the investment climate and trade is less conclusive, as the available samples are rather small. There seems to be no clear correlation between schooling and employment-intensive growth in manufacturing or the secondary sector as a whole. As far as regulation is concerned, only minimum wages (negatively) and severance pay (positively) appear to be correlated with employment-intensive growth in manufacturing. Unionization does not seem to affect employment-intensive growth in the secondary sector or in manufacturing. However, education does seem to be positively correlated with agricultural productivity-intensive growth. Volumes of trade, favorable terms of trade and an undervalued currency promote employment-intensive growth in manufacturing, while a landlocked situation reduces it. Trade has differing impacts on the primary and secondary sectors, and thus policy on this front might entail important trade-offs.

The framework used in this paper is inscribed in the segmented labor markets tradition. Although we do not provide a formal model of segmentation that explains the mechanisms at work, we provide an intuitive description of the implications of labor market segmentation for the poverty/growth linkages. The results appear to support the hypothesis of labor market segmentation with good and bad sectors coexisting and movements from the latter to the former increasing welfare and reducing poverty. Through our assessment of sectors according to economic classification, our results suggest that agriculture may be a bad jobs sector, which is consistent with traditional dual economy models. However, results also point to heterogeneity between regions as to which sectors can be equated to the 'low earnings sectors', with non LAC countries apparently having an important share of bad jobs in the service sector.

The results imply that focusing on the overall employment elasticity of growth may not be an effective way to increase the poverty impact of growth. Therefore, it is important for policymakers to move beyond the aggregate figure of growth and its impact on employment and to place greater focus on the sectoral distribution of growth and its employment and productivity profile. Higher employment will reduce poverty only if it is concentrated in the good jobs sectors. On average, this appears to be the secondary sector (manufacturing, construction, mining and utilities). Focusing on the rising productivity of agriculture and moving workers out of the agricultural sector will also

alleviate poverty. More research into understanding the barriers faced by the poor in moving out of agriculture may prove fruitful for policymaking. The results also suggest that policies that address educational deficiencies in the rural sector and minimum wage regulation in the secondary sector may merit careful consideration. Trade volumes, terms of trade and the real effective exchange may deserve special attention in the short run, as important agriculture/non-agriculture trade-offs may arise.

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# Annex

## Formulas used for the Shapley Decomposition

To decompose changes in per capita value added we used Shapley decompositions. This section illustrates in a two sector case the formulas used to calculate the contribution of different factors to changes in per capita value added.

In the case of two sectors, per capita value added can be written as:

$$\frac{Y}{N} = \left( \frac{Y_1}{E_1}\frac{E_1}{A} + \frac{Y_2}{E_2}\frac{E_2}{A} \right) * \frac{A}{N}$$

**Equation A1**

or equivalently:

$$y = \left( \omega_1 e_1 + \omega_2 e_2 \right) * a$$

where $Y$ is value added, $E$ is employment, $A$ is the population of working age and $N$ is the total population. The ratio $\omega = Y/E$ corresponds to output per worker, $e = E/A$ corresponds to the share of the working age population employed and $a = A/N$ corresponds to the share of the population of working age--that is, the ratio of working age population to total population. The sub-index $s \in (1,2)$ stands for the sector of economic activity. Using the formula for Shapley values (see Shorrocks 1999, and Muller 2005 for discussion) we performed a stepwise Shapley decomposition of Equation A1 as described below.

**Step 1: Decomposing changes in per capita value added into demographic and non demographic components**

Let $z = Y/A$ denote the ratio of value added to population of working age, in other words:

$$\left( \frac{Y_1}{E_1}\frac{E_1}{A} + \frac{Y_2}{E_2}\frac{E_2}{A} \right) = \frac{Y}{A}$$

Equation A1 can then be written as: $y = z * a$. Using the Shapley approach, the contribution of $z$ to changes in $y$ -denote it by $\overline{z}$ - can be calculated as:

$$\overline{z} = 1/2\left( \left[ z_{t=2}a_{t=2} - z_{t=1}a_{t=1} \right] - \left[ z_{t=2}a_{t=1} - z_{t=1}a_{t=1} \right] \right) + 1/2\left( \left[ z_{t=2}a_{t=2} - z_{t=1}a_{t=1} \right] - \left[ z_{t=2}a_{t=2} - z_{t=1}a_{t=2} \right] \right)$$

**Equation A2**

The first term in round brackets in Equation A2 corresponds to the difference between the observed change in $y$ and the change under a hypothetical scenario in which $z$ had changed as observed but $a$ had stayed constant and equal to the observed value in t=1. The second term in round brackets corresponds to the difference between the observed change in $y$ and the change in $y$ under a hypothetical scenario in which $z$ had changed as observed but $a$ had stayed constant, but in this case equal to the observed value in $t$=2.

Analogously, the contribution of *a* to changes in *y*, denote it by $\overline{a}$ , would be calculated as:

$$\overline{a} = 1/2\left(\left[z_{t=2}a_{t=2} - z_{t=1}a_{t=1}\right] - \left[z_{t=1}a_{t=2} - z_{t=1}a_{t=1}\right]\right) + 1/2\left(\left[z_{t=2}a_{t=2} - z_{t=1}a_{t=1}\right] - \left[z_{t=2}a_{t=2} - z_{t=2}a_{t=1}\right]\right)$$

Letting $\Delta$ denote changes between *t=2* and *t=1*, it is easy to see that:

$$\overline{z} = \Delta z \frac{(a_1 + a_2)}{2} \quad and \quad \overline{a} = \Delta a \frac{(z_1 + z_2)}{2}$$

Moreover, it is easy to check that $\overline{a} + \overline{z} = \Delta y$ , so that the Shapley decomposition is additive.

**Step 2: Decomposing the value added per working age person, *z*, into sectoral contributions**

In the second step we decompose changes in value added per working age person $Y/A=z$, into the contribution of changes in value added per working person in sector 1 ($z_1=Y_1/A$) and the contribution of changes in value added per working age person of sector 2 ($z_2=Y_2/A$). In this case, because total sectoral value added per working person is just the sum of sectoral value added per working person in both sectors then:

$$\overline{z}_s^z = \Delta z_s \quad and \quad \Delta z = \overline{z}_1^z + \Delta \overline{z}_2^z$$

Where $\overline{z}_s^{\,z}$ denotes the contribution of changes in value added per working age person in sector *s* to the change in aggregate value added per working age person *z*. The superscript *z* makes it explicit that the contribution is to value added per working age person *z*, rather than to value added per capita *y*.

**Step 3: Decomposing the value added per working age person in sector *s*, into changes in employment and changes in productivity**

The next step is to decompose $Y_s/A=z_s$. Note that value added per working age person in sector *s* is just a product of two terms:

$$\frac{Y_s}{A} = \frac{Y_s}{E_s}\frac{E_s}{A}$$

With $E_s$ denoting the number of workers in sector *s*, and $Y_s$ denoting value added in sector *s*. Equivalently, the above equation can be written as $z_s = \omega_s * e_s$ , with $\omega_s=Y_s/E_s$ and $e_s=E_s/A$. Therefore, as in step 1, we can calculate the contribution of changes in employment ($\overline{e}_s^{\,z_s}$) to changes in value added per working age person in sector *s*, and also the contribution of changes in output per worker $\overline{\omega}_s^{z_s}$ to changes in value added per working age person in sector *s*:

$$\overline{\omega}_s^{z_s} = \Delta\omega_s \frac{\left(e_{s,t=1} + e_{s,t=2}\right)}{2} \quad and \quad \overline{e}_s^{z_s} = \Delta e_s \frac{\left(\omega_{s,t=1} + \omega_{s,t=2}\right)}{2}$$

Again in this case $\Delta z_s = \overline{e}_s^{z_s} + \overline{\omega}_s^{z_s}$ . Note again that the superscript makes explicit the fact that the corresponding terms denote contributions to $z_s$.

**Step 4: Calculating the contribution of sectoral changes in productivity and employment to changes in per capita value added, *y***

Once all of the above terms are calculated we proceed to calculate the contribution of sectoral value added, and sectoral employment and productivity, to changes in *per capita value added y* (which is our measure of growth). We do so in the following way:

The contribution of sector *s* to changes in *per capita value added* is computed as:

$$\overline{y}_s = \overline{z} * \frac{\overline{z}_s^{z_s}}{\Delta z}$$

In other words, it is the product of the amount of growth in *per capita value* that can be attributed to changes in value added per *working age person*, times the fraction of changes in value added per *working age person* that can be attributed to sector *s* (the lack of superscript makes explicit the fact that it is a contribution to growth).

The contribution of employment changes in sector *s*, to changes in *per capita value added* is computed as:

$$\overline{e}_s = \overline{y}_s * \frac{\overline{e}_s^{z_s}}{\Delta z_s}$$

Therefore, it is just the product of the amount of growth in per capita value added that can be attributed to sector *s*, times the share of growth in sector *s* that can be attributed to employment changes in the sector. In a similar way, the contribution of productivity changes in sector *s*, to changes in *per capita value added* is computed as:

$$\overline{\omega}_s = \overline{y}_s * \frac{\overline{\omega}_s^{z_s}}{\Delta z_s}$$

These terms, together with the contribution of demographic changes $\overline{a}$ calculated in the first step, completely profile growth in terms of demographic changes, sectoral growth, and sectoral employment and productivity.

## Sample and Descriptive Statistics

**Table A1: List of countries and spells**

| Country | Spell | Region | Income Level |
|---|---|---|---|
| Argentina | 96-98 | Latin America & Caribbean | Upper middle |
| Argentina | 98-01 | Latin America & Caribbean | Upper middle |
| Azerbaijan | 01-02 | Europe & Central Asia | Lower middle |
| Bangladesh | 83-85 | South Asia | Low |
| Bolivia | 97-99 | Latin America & Caribbean | Lower middle |
| Brazil | 02-03 | Latin America & Caribbean | Lower middle |
| Brazil | 81-84 | Latin America & Caribbean | Lower middle |
| Brazil | 84-85 | Latin America & Caribbean | Lower middle |
| Brazil | 85-87 | Latin America & Caribbean | Lower middle |
| Brazil | 87-89 | Latin America & Caribbean | Lower middle |
| Brazil | 89-90 | Latin America & Caribbean | Lower middle |
| Brazil | 92-93 | Latin America & Caribbean | Lower middle |
| Brazil | 93-95 | Latin America & Caribbean | Lower middle |

**Table A1: List of countries and spells (continued)**

| | | | |
|---|---|---|---|
| Brazil | 95-96 | Latin America & Caribbean | Lower middle |
| Brazil | 96-97 | Latin America & Caribbean | Lower middle |
| Brazil | 97-98 | Latin America & Caribbean | Lower middle |
| Brazil | 98-99 | Latin America & Caribbean | Lower middle |
| Brazil | 99-01 | Latin America & Caribbean | Lower middle |
| Chile | 87-89 | Latin America & Caribbean | Upper middle |
| Chile | 89-90 | Latin America & Caribbean | Upper middle |
| Chile | 90-92 | Latin America & Caribbean | Upper middle |
| Chile | 92-94 | Latin America & Caribbean | Upper middle |
| Chile | 96-98 | Latin America & Caribbean | Upper middle |
| Chile | 98-00 | Latin America & Caribbean | Upper middle |
| Colombia | 88-89 | Latin America & Caribbean | Lower middle |
| Colombia | 91-95 | Latin America & Caribbean | Lower middle |
| Colombia | 95-96 | Latin America & Caribbean | Lower middle |
| Colombia | 96-98 | Latin America & Caribbean | Lower middle |
| Colombia | 98-99 | Latin America & Caribbean | Lower middle |
| Colombia | 99-00 | Latin America & Caribbean | Lower middle |
| Costa Rica | 90-93 | Latin America & Caribbean | Upper middle |
| Costa Rica | 93-96 | Latin America & Caribbean | Upper middle |
| Costa Rica | 96-97 | Latin America & Caribbean | Upper middle |
| Costa Rica | 97-98 | Latin America & Caribbean | Upper middle |
| Croatia | 00-01 | Europe & Central Asia | Upper middle |
| Croatia | 98-99 | Europe & Central Asia | Upper middle |
| Croatia | 99-00 | Europe & Central Asia | Upper middle |
| Dominican Republic | 92-96 | Latin America & Caribbean | Lower middle |
| Ecuador | 94-98 | Latin America & Caribbean | Lower middle |
| Egypt | 90-95 | Middle East & North Africa | Lower middle |
| Egypt | 95-99 | Middle East & North Africa | Lower middle |
| El Salvador | 96-97 | Latin America & Caribbean | Lower middle |
| Georgia | 00-01 | Europe & Central Asia | Lower middle |
| Georgia | 01-02 | Europe & Central Asia | Lower middle |
| Georgia | 02-03 | Europe & Central Asia | Lower middle |
| Georgia | 98-99 | Europe & Central Asia | Lower middle |
| Georgia | 99-00 | Europe & Central Asia | Lower middle |
| Honduras | 96-98 | Latin America & Caribbean | Lower middle |
| Honduras | 98-99 | Latin America & Caribbean | Lower middle |
| Indonesia | 93-96 | East Asia & Pacific | Lower middle |
| Indonesia | 96-98 | East Asia & Pacific | Lower middle |
| Indonesia | 98-99 | East Asia & Pacific | Lower middle |
| Jamaica | 92-93 | Latin America & Caribbean | Lower middle |
| Jamaica | 93-96 | Latin America & Caribbean | Lower middle |
| Jamaica | 96-99 | Latin America & Caribbean | Lower middle |
| Jamaica | 99-00 | Latin America & Caribbean | Lower middle |
| Kazakhstan | 02-03 | Europe & Central Asia | Lower middle |
| Malaysia | 84-87 | East Asia & Pacific | Upper middle |
| Malaysia | 87-89 | East Asia & Pacific | Upper middle |
| Malaysia | 89-92 | East Asia & Pacific | Upper middle |
| Malaysia | 95-97 | East Asia & Pacific | Upper middle |
| Mexico | 00-02 | Latin America & Caribbean | Upper middle |

**Table A1: List of countries and spells (continued)**

| | | | |
|---|---|---|---|
| Mexico | 96-98 | Latin America & Caribbean | Upper middle |
| Mexico | 98-00 | Latin America & Caribbean | Upper middle |
| Mongolia | 95-98 | East Asia & Pacific | Low |
| Nicaragua | 93-98 | Latin America & Caribbean | Lower middle |
| Nicaragua | 98-01 | Latin America & Caribbean | Lower middle |
| Pakistan | 90-92 | South Asia | Low |
| Pakistan | 92-96 | South Asia | Low |
| Panama | 00-01 | Latin America & Caribbean | Upper middle |
| Panama | 01-02 | Latin America & Caribbean | Upper middle |
| Panama | 91-95 | Latin America & Caribbean | Upper middle |
| Panama | 95-96 | Latin America & Caribbean | Upper middle |
| Panama | 96-00 | Latin America & Caribbean | Upper middle |
| Peru | 00-01 | Latin America & Caribbean | Lower middle |
| Peru | 96-00 | Latin America & Caribbean | Lower middle |
| Republic of Moldova | 01-02 | Europe & Central Asia | Lower middle |
| Republic of Moldova | 02-03 | Europe & Central Asia | Lower middle |
| Republic of Moldova | 99-01 | Europe & Central Asia | Lower middle |
| Romania | 02-03 | Europe & Central Asia | Upper middle |
| Romania | 98-00 | Europe & Central Asia | Upper middle |
| Senegal | 91-94 | Sub-Saharan Africa | Low |
| Senegal | 94-01 | Sub-Saharan Africa | Low |
| TFYR Macedonia | 02-03 | Europe & Central Asia | Lower middle |
| Thailand | 98-99 | East Asia & Pacific | Lower middle |
| Thailand | 99-00 | East Asia & Pacific | Lower middle |
| Trinidad and Tobago | 88-92 | Latin America & Caribbean | Upper middle |
| Turkey | 00-02 | Europe & Central Asia | Upper middle |
| Turkey | 02-03 | Europe & Central Asia | Upper middle |
| Turkey | 94-00 | Europe & Central Asia | Upper middle |
| Venezuela | 81-87 | Latin America & Caribbean | Upper middle |
| Venezuela | 87-89 | Latin America & Caribbean | Upper middle |
| Venezuela | 89-93 | Latin America & Caribbean | Upper middle |
| Venezuela | 93-95 | Latin America & Caribbean | Upper middle |
| Venezuela | 95-96 | Latin America & Caribbean | Upper middle |
| Venezuela | 96-97 | Latin America & Caribbean | Upper middle |
| Venezuela | 97-98 | Latin America & Caribbean | Upper middle |
| Venezuela | 98-00 | Latin America & Caribbean | Upper middle |
| Vietnam | 02-04 | East Asia & Pacific | Low |
| Vietnam | 98-02 | East Asia & Pacific | Low |
| Zambia | 96-98 | Sub-Saharan Africa | Low |

**Table A2: Other Countries in the Sample That Have Some Outlier Observations**

| Country | Spell | Region | Income |
|---|---|---|---|
| Argentina | 01-02 | Latin America & Caribbean | Upper middle |
| Brazil | 01-02 | Latin America & Caribbean | Lower middle |
| Bulgaria | 97-01 | Europe & Central Asia | Lower middle |
| Bulgaria | 89-97 | Europe & Central Asia | Lower middle |
| Colombia | 80-88 | Latin America & Caribbean | Lower middle |
| El Salvador | 95-96 | Latin America & Caribbean | Lower middle |
| Ghana | 91-98 | Sub-Saharan Africa | Low |
| Honduras | 90-92 | Latin America & Caribbean | Lower middle |
| Kazakhstan | 01-02 | Europe & Central Asia | Lower middle |
| Madagascar | 99-01 | Sub-Saharan Africa | Low |
| Malaysia | 92-95 | East Asia & Pacific | Upper middle |
| Mongolia | 95-98 | East Asia & Pacific | Low |
| Peru | 90-96 | Latin America & Caribbean | Lower middle |
| Sri Lanka | 85-90 | South Asia | Lower middle |
| Thailand | 96-98 | East Asia & Pacific | Lower middle |

**Table A3: Correlation between Measures of Employment and Productivity-intensive Growth**

| | Employment-intensive Growth | | | Productivity-intensive Growth | | |
|---|---|---|---|---|---|---|
| | **Agriculture** | **Secondary Sector** | **Tertiary Sector** | **Agriculture** | **Secondary Sector** | **Tertiary Sector** |
| **Employment-intensive Growth Agriculture** | 1 | | | | | |
| **Employment-intensive Growth Secondary Sector** | 0.5247 | 1 | | | | |
| **Employment-intensive Growth Tertiary Sector** | 0.7629 | 0.6417 | 1 | | | |
| **Agriculture Productivity-intensive Growth** | -0.9064 | -0.5305 | -0.7173 | 1 | | |
| **Secondary Sector Productivity-intensive Growth** | -0.5159 | -0.4914 | -0.4957 | 0.4275 | 1 | |
| **Tertiary Sector Productivity-intensive Growth** | -0.6672 | -0.3713 | -0.7685 | 0.5468 | 0.4080 | 1 |