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Pro-Poor Growth: Explaining the Cross-Country Variation in the Growth Elasticity of Poverty

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Creating and sharing knowledge to help end poverty

Abstract

It is well established in the literature that, on average, economic growth is associated with reductions in income poverty. However, evidence suggests that some countries see a much faster decline in poverty with the same level of growth in income. The objective of this paper is to analyse the cross-country variation in the growth elasticity of poverty across a sample of developing countries during the period 1990 to 2000. In doing so, it first sets up a theoretical framework, which seeks to identify different policy variables as explanations. Subsequently, when applied to panel data econometric analysis for 52 low and middle income countries, we find that the level of initial inequality, credit available to the private sector, literacy, the extent of business regulations, and trade openness are important determinants of the growth elasticity of poverty.

1. Introduction

The link between growth in income and reduction in poverty is well established. However, evidence shows that some countries see a much faster decline in poverty with the same level of growth in income. Can this be explained by the nature of growth itself and by other policies and factors that allow the poor to benefit from growth? The objective of this paper is to analyse differences in growth elasticity of poverty across a sample of low and middle-income countries over time. For example, why does poverty decline in Brazil, despite low growth, but poverty increases in Argentina despite quite rapid growth in the 1990's? Why has the rate of poverty reduction in countries as different as China and Mauritania slowed down in the second half of the 1990's compared to the first half of the 1990's? How can India achieve a faster rate of poverty reduction with the same growth as in the 1990's through policies that will bring about more pro-poor growth? This paper uses both theory and empirics to identify a set of factors, which are likely to have a significant impact on the poverty reducing impact of growth – it seeks to explain pro-poor growth.

The scope of this study is limited to an analysis of 52 low and middle-income countries during the period from 1990 to 2000. The 1990's was a period in which the absolute number of poor people – as measured by those consuming below $ one per day – declined in absolute numbers. Importantly, however, this picture varied considerably across regions, with a sharp decline in the number of poor in China and East Asia more generally and an increase in the number of poor in Sub-Saharan Africa. It was also the first time that, measured over a decade, developing country growth exceeded that of the developed world, although only a third of the developing countries – albeit some of the largest ones like China, India and Indonesia - had growth rates well in excess of the developed country average growth in income. Second, the choice of time period reduces the task to manageable proportions by ensuring the availability of comparable and complete data for the given set of relevant variables. Similarly, the choice of countries is also determined by two factors. First, the sample includes every region of the developing world. Second, the choice of countries reflects the wide variety of socio-economic conditions in the developing world, with heterogeneity in economic structures, socio-economic characteristics and economic performance. This ensures some cross-county variation in the potential determinants of the growth elasticity of poverty.

The structure of the paper is as follows. Section two provides some arguments from the literature on the subject, which are selective rather than exhaustive in identifying the potential determinants of the growth elasticity of poverty. Section three sets out a theoretical framework, which provides the foundations for the econometric analysis to follow. Section four specifies the sources of data used and computations carried out. Section five sets out the econometric model. Section six reports the results of the econometric work. Section seven draws together the conclusions and suggests some policy implications.

2. Arguments from the literature: taxonomy

It is well established in the literature that on average, economic growth is associated with reductions in income poverty [Besley and Burgess (2000), Ravallion (2001), Klasen

(2003)]. Analytically, one can interpret this robust finding as an "income-effect" of growth, where the average income of the poor increases *pari passu* with growth. What is more interesting, however, is to explore the cross-country variation in the growth elasticity of poverty – how pro-poor is growth.

The growth elasticity of poverty is generally defined as the ratio of the percentage change in the poverty headcount ratio (PH) to the percentage change in the growth rate (EG).[1] Alternately, the growth elasticity of poverty can be interpreted as the poverty reducing impact of growth. Hence, the higher is the growth elasticity of poverty, the more "pro-poor" is economic growth. Empirical evidence suggests that there is considerable cross-country variance in the poverty-reducing impact of a given rate of growth [Chen and Ravallion (1997)]. It is therefore imperative to explain this variance in ascertaining why growth is more pro-poor in some economies relative to others and what policies or other structural factors explain these differences.

The traditional focus in the development literature has been on how economic growth leads to poverty reduction, as it increases per capita real income levels to increase the incomes of the poor. This is referred to as the 'trickle-down effect' of growth, which simply implies a vertical flow of income from the rich to the poor at a given rate [Anderson (1964)]. In this process, the benefits of economic growth are reaped first by the rich, and subsequently by the poor once the rich start spending their gains. In recent times, however, there has been a shift in focus in the poverty literature away from the 'trickle-down' concept of growth towards the idea of 'pro-poor growth' [Thornton *et al* (1978)]. Kakwani and Pernia (2000) define pro poor growth as "growth that enables the poor to actively participate in, and significantly benefit from, economic activity". More often than not, owing to inherent advantages enjoyed by the rich in terms of material and human capital, the growth process generally tends to benefit the rich proportionately more than the poor. Hence, a pro-poor growth strategy requires the removal of institutional and policy-induced biases against the poor, as well as the adoption of direct pro-poor policies.

In view of this, it becomes necessary to identify factors that can improve the impact of growth on poverty and influence the extent to which growth is poverty reducing or "pro-poor". While this is a vast set of factors, we can classify the main arguments from the literature using the following taxonomy. There is a particular study by Bourguingon (2004), which deserves special mention here. He argues that the growth elasticity of poverty is a function of the level of initial inequality, the change in the level of income inequality and the level of development of an economy (measured by the position of the poverty line relative to mean income).[2]

2.1 Inequalities

2.1.1 Income inequality

High income inequality is often highlighted in the literature as important in explaining why the same rate of economic growth may be less effective in reducing poverty in one country relative to other countries. Intuitively, in an economy where income inequality is

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[1] $\varepsilon = \dfrac{\Delta PH / PH}{\Delta EG / EG} = \dfrac{d \ln (PH)}{d \ln (EG)}$

[2] This conclusion has been reiterated by subsequent studies

persistently high, the poor will tend to obtain a smaller share of the gains from growth than in an economy where inequality is low.

This is best explained by the simple arithmetic of poverty, inequality and growth [Bourguignon (2004)]. A change in the poverty headcount index is decomposed into the effects of a proportional change in all incomes (growth effect) and a change in the distribution of relative incomes (distributional effect). Hence, if the adverse distributional effect is significant, this may dilute the poverty-reducing impact of the mean growth effect. Economic intuition is supported by cross-country empirical evidence, which suggests that higher income inequality is associated with a lower growth elasticity of poverty [Ravallion (1997)].

2.1.2 Wealth inequality

In addition to income inequality, wealth inequality may also impact upon the poverty reducing impact of growth. For instance, wealth inequality affects the poverty reducing impact of growth through credit market failures prevalent due to widespread information asymmetries. This is because in view of borrowing constraints, those with little inherited wealth are effectively locked out of market-driven growth prospects. In developing countries, where agriculture is the predominant means of livelihood, the distribution of land ownership is important in this context [Carter (2004), Datt and Ravallion (1996)].

2.2 Household-level variables

2.2.1 Education

The need to combine human resource development along with growth promoting policies to formulate an effective anti-poverty strategy is a prominent theme in the literature. Dreze and Sen (2002) highlight the instrumental role of education in enabling people to make use of economic opportunities created by the growth process. Intuitively, education, at a minimum literacy level, will considerably influence how well equipped the poor are to participate in skill-demanding non-agricultural, modern sector growth as well as in adopting modern agricultural techniques which will help raise agricultural productivity and help reduce poverty. Empirically, country studies for India and Brazil for example, reveal that poor educational outcomes reduce the poverty reducing impact of growth. In a particular empirical study on Brazil, Menezes-Filho *et al* (2004) highlight the importance of human capital in promoting pro-poor growth.

2.2.2 Credit constraints

Economic growth creates opportunities for investment in capital, which, in turn, creates income-earning opportunities for the poor. Importantly, however, with little inherited wealth, the poor are largely dependent on borrowing to make any productive investment. Widespread information asymmetries, however, lead to problems of adverse selection, moral hazard and contract enforcement, which, in turn, result in high lending rates of interest. Such a credit market imperfection coupled with the lack of any suitable collateral effectively excludes the poor from the formal credit market [Binswanger et al (1995)].

Hence, negligible asset endowments together with the inability to secure loans leave a large number of people in developing countries credit constrained and, therefore,

investment constrained. In other words, imperfect credit markets lead economic growth to bypass many people living below the poverty line. In a section of the literature, this situation is referred to as 'multiple equilibrium chronic poverty traps' [Carter (2004)]. i.e. given their skills and circumstances, individuals have the potential to be non-poor but lack sufficient assets to craft a pathway out of poverty. In this context, it is worth nothing that the emergence of microfinance as a source of credit is both efficient and equitable as it has enabled the poor to invest, thereby promoting growth and reducing poverty [Khandekar (2003)].

In addition, while considering firms rather than individuals, it is often seen that the limited credit available from private credit markets in developing countries is monopolised by well-connected business houses to the detriment of small and medium enterprises. The latter typically generate more employment for every unit of capital and thereby reduce poverty faster. The literature of financial depth and growth has been extensively reviewed by Rajan and Zingales (1998).

2.3 Macro-level variables

2.3.1 Trade Liberalisation

The existing literature does not directly address international trade as a potential determinant of the growth elasticity of poverty. Trade and economic growth are undoubtedly correlated. However, there are diverging views in the literature as to what the best trade policy is. i.e. whether import-substitution or increased openness is more appropriate for developing countries that are relatively uncompetitive in world markets. The advocates of import-substitution argue that increased openness has growth dampening effects in developing countries as domestic producers are unable to withstand foreign competition. In contrast, the advocates of trade liberalisation argue that increased openness has growth enhancing effects in developing countries as greater competition makes domestic producers more efficient.

The relationship between trade and inequality has been analysed both theoretically and empirically. In terms of theory, the basic Hecksher-Ohlin trade model shows that in a 2X2 model with capital and labour as the two variable factors, trade liberalisation increases the share of income of the relatively abundant factor, which is usually labour in developing countries, thereby reducing inequality. An alternative exposition of the conventional Hecksher-Ohlin model presented by Wood (1994), which considers skilled and unskilled labour as the two variable factors, reveals the same result. However, there are potential problems with the simplifying assumptions of the Hecksher-Ohlin model. First, land, a highly unequally distributed factor, and not unskilled labour may be the relatively abundant factor in many developing countries. And second, even if unskilled labour is the relatively abundant factor, the positive impact of trade on wages may be dampened by biases of technology transfer and missing markets.

Moreover, a section of the literature shows that the impact of greater openness will raise the share of income going to the more abundant factor of production depending upon the elasticities of consumption and production. If the elasticity of substitution with other factors is greater than one, then the share of the abundant factor, labour, will rise and openness will reduce inequality. If, however, the elasticity is less than one, the share of

income going to labour will fall, thereby increasing inequality [Edwards (1997) and Spilimbergo *et al* (1999)].

In the empirical literature, Dollar and Kraay (2001) argue that there is no systematic tendency for international trade to be associated with rising inequality, which might undermine its benefits for growth and poverty reduction. However, White and Anderson (2001) question this result as it does not test whether the effect depends on initial endowments. At the same time, there is a literature on the economies of Latin America which reveals that trade has been associated with rising wage inequality following trade liberalization [Hanson and Harrison (1999a, 1999b)]. Given such evidence, Winters et al (2004), in a careful review, conclude that the relationship between trade and poverty is inconclusive.

2.3.2 Institutions

In recent times, the development literature has highlighted the relevance of institutions for growth and poverty reduction. Defined by Douglas North (1990) as "the humanly devised constraints that shape human activity" or simply "rules of the game", institutions have been found to be a significant source of sustained economic growth in cross-country empirical research [Acemoglu, Johnson and Robinson (2001)]. It is worth noting the heterodox literature analysing the role of institutions in economic development emphasises that variables used to measure institutions in such cross-country empirical research must be viewed with caution. This is attributable to two reasons: definitional issues and the failure to distinguish the forms and functions of institutions [Chang (2007)].

Analytically, there are two main ways in which institutions can help create an environment that is conducive for economic growth and poverty reduction. First, good institutions can facilitate cooperation between private economic agents. Second, good institutions can restrain predatory governments. Hence, institutions - economic, political (good governance), cultural, social and legal (stable property rights) - can affect the incomes of people by influencing the incentives that both private and public agents face while making decisions of production and regulation respectively. For instance, good institutions, as defined above, may help create and sustain a healthy investment climate that promotes investment, which, in turn, creates jobs and raises incomes of the poor. In the real word, the lack of good institutions is often reflected in highly restrictive labour market regulations, poor laws for contract enforcement and policy uncertainty.

In sum, the above-mentioned class of variables analysed in the literature help explain why modest economic growth could translate into significant poverty reduction, or significant economic growth may translate only into modest poverty reduction.

3. Theoretical framework

As established in the literature, there are several factors that may affect the mapping of economic growth onto poverty. This implies that economic growth maybe more effective in reducing poverty in some countries relative to others. Clearly, we cannot hope to capture all these factors in a single model. However, we formulate a simple theoretical framework focusing on certain variables to help motivate an econometric model for analysing the large cross-country variation in the growth elasticity of poverty.

3.1 Framework

Consider an open economy with two alternate production technologies: A traditional sector with "production for subsistence" and a modern sector with "production for the market" or entrepreneurship. Assume the latter has superior technology.[3] Next, assume that each individual in the economy inherits some wealth or endowment, 'a_{it}'. Finally, assume that population size is normalised to one and that there is no population growth. Under subsistence, individuals simply use their labour endowment to produce output. In the modern sector, however, the production technology is more complex. It entails hiring wage labour and is defined further using the following assumptions, which do not abstract from reality in a major way.

(i) A non-convexity in the production technology used in the modern sector. Specifically, assume that a fixed cost or lumpy investment of 'k' units of physical capital is required to produce 'q' units of output. A possible interpretation to this fixed cost is that a potential entrepreneur requires $k > 0$ units of capital for training or buying machinery.

(ii) The second key assumption is that of imperfect credit markets. Individuals face borrowing constraints due to problems of adverse selection, moral hazard and enforcement. Such problems are rampant in credit markets of developing economies owing to widespread information asymmetries. Hence, without sufficient wealth or income (i.e. $a_{it} < k$), you are unlikely become an entrepreneur in the modern sector.

(iii) An additional fixed cost. Assume that the production technology used in the modern sector requires a fixed investment of 'h' units of human capital to produce 'q' units of output. A plausible interpretation of this assumption is than an individual must invest in a minimal amount of schooling in order to employ the modern technology.

(iv) An entrepreneur encounters several impediments in setting up a business due to government regulations. Greater government regulations imply longer time periods spent by individuals doing nothing productive. While not an accounting cost, such regulations add to the opportunity cost of setting up a business in the modern sector. Hence, they must be taken into account while calculating the net output/income earned by a potential entrepreneur in the modern sector. This is a realistic assumption given various labour regulations and other industrial regulations across several developing economies.

Now, given these technologies, individuals in an economy can be employed in one of three occupations: subsistence in the traditional sector, wage worker in the modern sector or an entrepreneur in the modern sector. Following from the assumptions, we can write down the income equations for individuals employed in three different occupations.

(a) Traditional Sector (Subsistence): $Y_{it}^{s} = \underline{q} + ra_{it}$ (1)
; where '$\underline{q}$' is subsistence output and 'a_{it}' is inherited wealth, which earns an interest 'r' in a bank.

(b) Modern Sector (Entrepreneur): $Y_{it}^{m} = q - rk - w - ph - sb + ra_{it}$ (2)
; where 'q' is gross output, 'k' is physical capital, L = 1 is labor as population is normalized to one, 'h' is human capital, 'b' captures extent of business regulations, 'r' is

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[3] $\alpha p < p$, where 'p' is productivity in the modern sector and 'α' < 1 is some arbitrary positive constant

the rental rate of capital, 'w' is the wage rate paid to hired labour, 'p' is the price of human capital, and 's' is an imputed per unit cost of facing business regulations.

(c) Modern Sector (Wage Worker): $Y_{it}^w = w - c + ra_{it}$ (3)
; where 'w' is an exogenously given wage and 'c' is the cost of migration to the formal sector as a wage worker. Assume that $c < a_{it}$. i.e. cost of migration to the formal sector as a wage worker is small and can be financed by inherited wealth.

For analytical simplicity, we assume that the subsistence technology is such that all individuals in the traditional sector are "poor" (i.e below the poverty line). Moreover, we assume static technology in the traditional sector, but the model can be made more complex by introducing the possibility of some technological advancement in the traditional sector as well. In contrast, no individual in the modern sector is "poor". This is attributable to two factors. First, the adoption of modern technology enables entrepreneurs in the modern sector to earn a return well above the minimum specified consumption level. And second, hired workers in the modern sector earn a wage 'w' (exogenously given) that places them above the poverty line.

Hence, in this model, the headcount index of poverty is simply the number of people who fail to gain employment in the modern sector. It is important to assert that this is an analytical abstraction. In reality, of course, the traditional sector will have some people above the poverty line and the modern sector will have some living below the poverty line.

3.2 Link between economic growth and poverty reduction

Now, let us establish the link between economic growth and poverty reduction in terms of the above-specified model. Following from our theoretical framework, economic growth will lead to poverty reduction if it enables people to move from the traditional sector to a job in the modern sector, whether as an entrepreneur or as a wage worker. Employment in the modern sector allows the poor from the traditional sector to earn a return that places their private consumption above the minimum specified level. Importantly, we argue that the growth elasticity of poverty is a function of the nature of employment created by the growth process. This can be explained as follows.

First, economic growth creates more potential investment opportunities in the modern sector by stimulating demand for a larger number of investment projects with high gross returns (i.e. more projects with a high 'q'). This provides individuals with a chance to move from the traditional sector to the modern sector. Such a "growth effect", however, within the contours of this model, depends upon a vector of structural variables, which includes the extent of credit constraints, business regulations and access to basic education.

Second, economic growth aids in poverty reduction irrespective of these structural parameters. This second "growth effect" is explained as follows. Entrepreneurs, who are already in the modern sector, require a greater amount of wage labour as an input in their production technology as they expand their businesses. This, in turn, implies that "poor" individuals, living in the traditional sector, can migrate to the modern sector and earn a wage of $w > \underline{q}$ by getting employed as workers in factories of different

entrepreneurs.[4] Importantly, the wage 'w' (exogenously given) that they receive as hired workers in the modern sector places them above the poverty line.

Importantly, the elasticity of poverty with respect to economic growth will depend to a large extent on the strength of the first "growth effect". The intuition underlying this assertion is fairly straightforward. While the second "growth effect" simply enables some poor people to migrate to the modern sector as wage labour, the first "growth effect" enables poor people to move to the modern sector as both wage labour and entrepreneurs. In other words, the first "growth effect" has multiplier effects. This is because if the vector of structural parameters is favourable, more people will be able to join the modern sector as entrepreneurs. This will not only allow these individuals to escape poverty, but will have a multiplier effect as more people will migrate to the modern sector to be employed as workers, enabling them to cross the poverty line as well.

Thus, whereas the second "growth effect" will only increase the number of workers in the modern sector, the first "growth effect" will increase both the number of workers and entrepreneurs in the modern sector. Hence, we can conclude that the growth elasticity of poverty will be a function of the vector of structural parameters.

i.e. $\dfrac{d \ln PH^5}{d \ln EG}$ = f (credit constraints, business regulations, human capital)

3.3 Extensions

3.3.1 Open Economy

Let us now augment the above conclusion by incorporating the open-economy facet of our theoretical setup. Many countries in the world have followed regimes of capital-intensive industrialisation, facilitated by quantitative restrictions on imports and artificially overvalued exchange rates. Such models of import-substitution aim at protecting "infant" domestic industries from import competition. Importantly, however, overvalued exchange rates discourage exports at the same time. Hence, exchange rates will affect the returns to investment for potential entrepreneurs in the modern sector, the direction of change being a function of the level of competitiveness of these potential entrepreneurs.

In terms of the model, greater trade openness, facilitated by market-determined exchange rates, may provide potential entrepreneurs with higher rates of return on their investment if they are competitive enough to export their goods to other countries. On the flipside, greater trade openness will increase import competition, which may render domestic industry (modern sector) to be unviable, if it is inefficient and uncompetitive. In addition to this competitiveness argument, the nature of the trade regime, reflected in exchange rates, will influence the prospects of modern sector employment, and hence the growth elasticity of poverty. For instance, greater openness to trade will increase modern sector employment by encouraging labour-intensive manufactured exports.

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[4] This implies that there no spatial poverty traps caused by high migration costs.

[5] $\dfrac{d \ln (PH)}{d \ln (EG)}$ = $\dfrac{\Delta PH / PH}{\Delta EG / EG}$ = growth elasticity of poverty

Similarly, greater openness to foreign direct investment is likely to increase employment in manufacturing.

In terms of the income equations, the following adjustment is needed to incorporate the open economy consideration.

Modern Sector (Entrepreneur): $Y_{it}^m = (1 + \tau) q - rk - w - ph - sb + ra_{it}$ (4)
; where 'τ' measures the impact of the exchange rate and trade regime on returns on investment in the modern sector
; τ > 0 if domestic industry in 'M' is competitive
  τ < 0 if domestic industry in 'M' is not competitive

Hence, given the setup of our model, exchange rates will have a bearing on the growth elasticity of poverty, as it will influence the number of people joining the modern sector as entrepreneurs. In fact, an expanding modern sector may further help reduce poverty by providing employment opportunities to a large number of poor, subsistence workers.

3.3.2 Implication of Credit Constraints Assumption

Next, let us incorporate an important implication of the credit constraints assumption, which we specified at the beginning of our framework. Importantly, this borrowing constraints assumption implies that the initial level of income inequality will influence the number of people who can enter the modern sector as entrepreneurs. This, in turn, means that income inequality will affect the growth elasticity of poverty.

The link between initial income inequality, credit constraints, growth and poverty is established as follows. A high level of initial income inequality implies the existence of many poor people in an economy, who are likely to be credit constrained. Formally, G(k) is an increasing function of income inequality where G(k) is a cumulative distribution function for individuals' assets.[6] In addition, the overall level of credit to the private sector is constrained by forced borrowing by the government to finance its deficit. In a credit constrained environment, employment generating investment is curtailed and poverty reduction is compromised. This inability to borrow will prevent several "poor" individuals from moving to the modern sector and acquiring the superior technology available, thereby diluting the poverty-reducing impact of growth.

Hence, we can finally conclude that the growth elasticity of poverty is a function of the following factors:

d ln PH   = f (credit constraints, business regulations, human capital, trade
d ln EG   liberalisation,   initial income inequality)

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[6] Cumulative distribution function captures people with $a_{it} \leq k$

4. Data

Our data cover the period 1990-2000 for 52 countries.[7] Within this time period, we consider three points in time: 1990, 1995 and 2000. Our choice of years is defined by the need for overlapping (common) survey years in different countries, from which we obtain estimates of poverty headcount ratios. Our choice of time period is also dictated by the lack of comprehensive data for less recent years, for many of the explanatory variables.

Our dependent variable is the poverty headcount index, measured by the number of people, as a percentage of the population, attaining below $one a day consumption levels. The data are taken from the World Bank's 'Povcalnet' database. Following the literature, economic growth is captured by increases in levels of per capita Gross Domestic Product (GDP) over time. i.e. in panel-data studies, increasing levels of per capita real GDP levels at successive points in time are indicative of economic growth. Data on levels of GDP are taken from the World Bank's GDF (Global Development Finance) and WDI (World Development Indicators) central database.

The other explanatory variables used in the regression model are the Gini coefficient, credit to the private sector as a percentage of GDP, the literacy rate for persons aged 15 and above, trade as a percentage of GDP, and an index of economic freedom. While credit to the private sector (as a percentage of GDP) is used to proxy for the extent of credit constraints, and the index of economic freedom is used to proxy for the extent of business regulation, the other variables are self-explanatory. The variable for regulation is taken from the Index of Economic Freedom created by the Heritage Foundation with a scale of 'one' for very low regulation to 'five' for very high regulation. Data for all the other variables are taken from the World Bank's GDF and WDI central database.

5. Econometric Model

In modelling the impact of economic growth on poverty reduction, the simplest starting point would be a regression of the poverty headcount ratio on per capita mean income [Besley and Burgess (2003)]. However, for analysing factors, which influence the growth elasticity of poverty, it is important to have a richer model.

We do this by including a vector of structural parameters in the econometric specification. Importantly, this vector of structural parameters is defined by our theoretical model, as opposed to simply including several possible variables from a long list of growth promoting or poverty-reducing actions. What is more, the vector of structural parameters enters multiplicatively with growth. i.e. to test for the determinants of the growth elasticity of poverty, we allow for multiplicative interactions between GDP per capita and a vector of structural parameters. Such a specification enables us to model the idea that a given rate of economic growth may have a differential impact on

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[7] Argentina, Bangladesh, Belarus, Bolivia, Brazil, Bulgaria, Chile, China, Columbia, Costa Rica, Cote d'Ivoire, Croatia, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Georgia, Ghana, Honduras, India, Indonesia, Iran, Jamaica, Kazakhstan, Kenya, Kyrgyz Republic, Latvia, Lithuania, Madagascar, Malaysia, Mauritania, Mexico, Moldova, Nicaragua, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Tunisia, Uganda, Ukraine, Uruguay, Uzbekistán, Venezuela, Zambia

the rate of poverty reduction, depending upon a set of relevant structural parameters. At the same time, it may be argued that these interactive terms may simply capture the direct effect of these structural variables on the poverty headcount ratio. Hence, we also estimate a specification where we allow for the vector of structural parameters to enter in additively with growth in order to control for these direct effects.

We estimate our panel data model by Feasible Generalized Least Squares (GLS), correcting for potential heteroscadasticity in the error structure. This estimator ensures robustness of our estimates as it produces consistent standard errors even if residuals are not identically distributed. In fact, in the presence of heteroscadasticity, generalised least squares renders more efficient estimates, relative to ordinary least squares [Wooldridge (2002)]. Moreover, we consider a fixed-effects formulation, where we allow for unobservable country-specific time-invariant factors, by including country fixed effects. This is potentially important for if the fixed effects are correlated with any explanatory variables in the model, their omission leads to an omitted variable bias. Moreover, to control for any exogenous shocks, we include time-specific country-invariant effects.

$$ph_{it} = \alpha_i + \beta_1\, gdppc_{it} + \beta_2\, gdppc_{it}{*}inigini_{it} + \beta_3\, gdppc_{it}{*}trade_{it} + \beta_4\, gdppc_{it}{*}cre_{it} + \beta_5\, gdppc_{it}{*}lit_{it} + \beta_6\, gdppc_{it}{*}reg_{it} + \beta_8\, inigini_{it} + \beta_9\, trade_{it} + \beta_{10}\, cre_{it} + \beta_{11}\, lit_{it} + \beta12\, reg_{it} + \eta_i + \mu_t + \varepsilon_{it}$$

; where ph_{it} is the poverty headcount ratio in country 'i' at time 't', $gdppc$ is real per capita GDP, $inigini$ is the initial gini coefficient, $trade$ is the trade to GDP ratio, cre is domestic credit to the private sector as a percentage of GDP, lit is the literacy rate for persons aged 15 and above, reg is an index of economic freedom, η_i are country-specific time-invariant effects, and μ_t is a time-specific dummy variables. Importantly, all variables are in natural logarithm terms. Hence, coefficients on the explanatory variables can be interpreted as elasticities.

A further methodological concern relates to the possible endogeneity of the explanatory variables in our econometric model. Simultaneity is likely, given the nature of regressors used. For instance, while economic growth is likely to affect poverty levels by increasing incomes of the poor, poverty itself may impede growth. According to the literature, the latter may be attributable to imperfect credit markets where collateral is required to secure loans. This implies that the poor are unable to undertake investment, which lowers the rate of economic growth. Instrumental variable estimation is the natural solution to the endogeneity problem. In practice, however, it is extremely difficult to find good instruments.

An alternative solution entails using lags of the explanatory variables, thereby ensuring that they are predetermined with respect to the dependent variable. What is more, economic growth is likely to impact upon poverty levels after a lag anyway. Given the dimensions of the panel, an average of the value of the variable over the past five years is computed and used as a regressor. We use an average to avoid randomness in the value of a given variable in any one of the previous five years. At the same time, such a five-year average retains valuable information contained in the annual data.

6. Results

6.1 Analysis

At the outset, it is important to assert that we are interested in analyzing the coefficients of the interactive terms in our model, for they indicate the importance of different structural variables in influencing the growth elasticity of poverty (see column two of appendix table one).

First and foremost, we find a positive coefficient on $gdppc_{it}*inigini_{it}$, which is statistically significant at the one per cent level. This implies that for a given rate of economic growth, higher initial income inequality results in a higher poverty headcount index. This finding is intuitively robust and follows from the theoretical framework. It is important to note that we tested the model with the initial Gini as opposed to the coterminous Gini. This is attributable to two reasons. First, the theoretical framework outlined. And second, on the logic that the nature of growth and its impact on poverty itself determines the path of change in the Gini.

Next, as expected, we find negative coefficients on $gdppc_{it}*cre_{it}$ and $gdppc_{it}*lit_{it}$. The signs on these coefficients conform to economic intuition, which, for a given rate of growth, predicts an inverse relationship between credit provided to the private sector and literacy on the one hand, and the incidence of poverty on the other. Importantly, coefficients on both $gdppc_{it}*lit_{it}$ and $gdppc_{it}*cred_{it}$ are statistically significant at the one per cent level. The regulation variable has a positive coefficient as predicted by the theoretical model. i.e. Higher regulation increases poverty by lowering the elasticity of growth on poverty. The coefficient is significant at the five per cent level of significance.

Interestingly, we find the coefficient on $gdppc_{it}* trade_{it}$ to be positive and statistically significant at the one per cent level of significance. This implies that for a given rate of growth, a higher degree of trade openness is associated with a higher poverty headcount index. In terms of our theoretical framework, this means that greater trade openness reduces gross returns as several entrepreneurs in the modern sector may be too inefficient to withstand import competition. This naturally, in turn, affects the number of entrepreneurs in the modern sector and hence the growth elasticity of poverty. Alternately, one can interpret this result to mean that trade liberalisation reduces real wages throughout an economy. Importantly, our finding should not be seen to imply that greater trade openness is necessarily poverty enhancing. In fact, the positive coefficient on $gdppc_{it}* trade_{it}$ together with a negative coefficient on $trade_{it},$ where the latter captures the direct effect of trade openness on poverty, highlights an interesting analytical interpretation; while greater trade openness helps to reduce poverty by increasing the long-run growth rate of an economy, it has adverse distributional effects once the growth effect is controlled for.

Incorporating year-specific effects in the regression model makes little difference to the results (see column three of appendix table 1). However, these time-specific effects and several country-specific effects are statistically significant. What is more, while we report the coefficients of the different structural parameters when they enter the model additively with growth, we do not discuss those (columns two and three of appendix table one). These variables measure the direct effect of the different structural

parameters poverty and, in themselves, convey no information about the growth elasticity of poverty.[8]

As a caveat, it is important to note that panel data analysis involving a cross-section of countries offers broad indications and conclusions, which may not applicable to every individual country included in the sample. This may be attributable to the following. First, concepts of poverty, inequality and other variables may vary across countries, thereby rendering data comparability a bit tenuous. Second, some aspects of the relationship between poverty, economic growth and other variables may be country specific. That said, analysing a large-country sample is important in identifying certain factors, which, on average, influence the impact of economic growth on poverty reduction.

6.2 Simulations

These results show that the elasticity of poverty with respect to growth can be explained by a model with literacy, freedom from regulation, credit to the private sector as a share of GDP, trade as a percentage of GDP and the initial level of inequality as explanatory variables (see column one of appendix table one).

The elasticity of poverty to growth is around -2 (the coefficient on the change in per capita income alone). This is the elasticity coming from a pure growth effect. But this elasticity can be enhanced by initial endowments and conscious policies. Differences in initial Gini, whose coefficient is around 1 and significant, provide further explanations of the differences in the elasticity of growth on poverty. Lower initial inequality will increase the elasticity and bring it closer to -3 or even larger for higher level of initial inequality (see Figure 1). In addition, more pro-poor policies such as reduced regulatory burden to start new business and more credit for the private sector, increased literacy and education and greater trade openness will further enhance the elasticity. Our model shows that a 5 percent reduction in regulation, a 5 percent improvement in literacy and a 5 percent improvement in credit provision increase the value of the income growth elasticity of poverty by approximately 1.85, 0.72 and 0.12 respectively. In contrast, greater trade openness reduces the growth elasticity of poverty by approximately 0.65. The combined impact of these policies could raise the value of the income growth elasticity of poverty to around -5, given initial mean inequality. With such large impact of key policy variables on the income growth elasticity of poverty it is easy to see why there exists such wide divergence in the elasticity across growth spells (Figure 1).

7. Policy Implications and Conclusions

The results show that the nature of growth and conscious policies to encourage pro-poor growth can be designed. More pro-poor growth is possible by changing the initial level of inequality. Land reform in China, Korea and Japan helped generate more poverty reduction and subsequently helped generate more pro-poor growth. But even if the initial

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[8] The coefficients on the different structural parameters when they enter the model additively with growth are unusually large. This may be attributable to multicollinearity, given the fact that model includes interactive terms along with their two component parts individually as explanatory variables.

level of inequality cannot be changed dramatically, by actions that typically follow a revolution or war pro-poor growth can be encouraged by conscious policy.

The results estimated in this paper point to the importance of education and literacy: improving literacy facilitates more pro-poor growth – because it increases the pool of people who can access better employment opportunities and because creates a larger pool of potential entrepreneurs who can set up business which uses modern technology. Increasing credit to the private sector by liberalising the financial system and reducing forced borrowing from government helps pro-poor growth. It allows more entrepreneurs greater access to start and expand modern sector business and create greater employment, which helps reduce poverty.

Interestingly, the results reveal that greater trade openness leads to a lower growth elasticity of poverty. This might at first seem counter-intuitive as one would expect greater trade openness to foster higher economic growth, which, in turn, would reduce the poverty headcount. Importantly, however, the finding captures the adverse distributional effect of greater trade openness once the growth effect is controlled for. In other words, while greater integration with world markets may increase the long-run growth rate of economy thereby reducing poverty in the long run, it may render several inefficient and uncompetitive entrepreneurs in the modern sector unemployed in the short to medium run. In terms of policy, while trade liberalisation will contribute to a decline in poverty by increasing long-term growth, governments must provide for a safety net in order to counter the adverse distributional impact of greater trade openness on individuals and hence on the growth elasticity of poverty.

Finally, excessive regulations reduce investments – especially in the small and medium enterprise sector and hinder pro-poor growth. Good regulation is clearly needed as lack of effective regulation can also create its own problems – such as that seen in financial crisis in many middle-income countries in East Asia, Russia and Latin America. But excessive regulation hinders investment in the modern sector and hurts the poor. Of course there are different facets of regulation which have not been explored in this paper – such as regulation to establish business, labour regulations and financial sector regulations which have different effects and channels through which they affect the growth of business activity.

The model estimated in this paper can help explain differences in the poverty impact of growth. In Vietnam, growth has been pro-poor due to improvements in literacy and reduced regulations. In both China and India, the same factors have played an important role in generating high growth with poverty reduction, although in both cases, poverty reduction would have been even faster had inequality not worsened thereby reducing the elasticity of poverty reduction from growth. Moreover, in both cases, trade liberalization helped generate growth but would have contributed to worsening inequality. In Latin America, more generally, not only has growth been low in the 1990's but high initial inequality reduces the elasticity of income growth to poverty. In Asia, on the other hand, not only was growth high but initial inequality was low as well.

Not so surprising is the fact that many of the policies that determine pro-poor growth determine sustainable growth itself. Growth can occur for some time through a resource boom or through non-tradable investment such as led by government activity – but such growth is not sustainable for too long and is not necessarily pro-poor. For lasting poverty

reduction more growth is needed but with the right policies on literacy and education, better regulation, and greater access to finance it can also be pro-poor.

Countries that can reduce initial inequality will reduce poverty. But if that requires measures like asset redistribution which are considered too radical, countries that reduce regulatory burden, improve literacy, increase access to finance and provide safety nets while liberalizing trade can create more growth and ensure that it is pro-poor. Pro-poor growth is not an accidental by product of the growth process – conscious policies can help create it.

Appendix

Table 1: Results of the Econometric Model

Dependent Variable→	Poverty Headcount Index	Poverty Headcount Index	Poverty Headcount Index
Explanatory Variables ↓	Feasible GLS (1)	Feasible GLS (2)	Feasible GLS (3)
Real GDP per capita (GDPPC)	-2.468 (0.217) [0.000]	-14.958 (3.291) [0.000]	-13.435 (3.705) [0.000]
GDPPC * Initial Gini coefficient	**0.926 (0.045) [0.000]**	**2.243 (0.570) [0.000]**	**1.735 (0.610) [0.004]**
GDPPC * credit to the private sector as a % of GDP	**-0.023 (0.019) [0.219]**	**-0.549 (0.104) [0.000]**	**-0.471 (0.117) [0.000]**
GDPPC * regulation	**0.371 (0.095) [0.000]**	**0.968 (0.433) [0.026]**	**1.153 (0.483) [0.017]**
GDPPC * adult literacy rate	**-0.144 (0.079) [0.068]**	**-2.092 (0.515) [0.000]**	**-2.134 (0.653) [0.001]**
GDPPC * trade as a % of GDP	**0.131 (0.355) [0.000]**	**0.630 (0.184) [0.001]**	**0.480 (0.211) [0.023]**
Initial Gini coefficient	No	Dropped due to collinearity	Dropped due to collinearity
credit to the private sector as a % of GDP	No	-4.424 (0.763) [0.000]	-3.841 (0.854) [0.000]
Regulation	No	-9.301 (3.257) [0.004]	-11.180 (3.656) [0.002]
adult literacy rate	No	-8.438 (3.409) [0.013]	-8.656 (4.009) [0.031]
trade as a % of GDP	No	-3.849 (1.280) [0.003]	-2.854 (1.457) [0.050]
Country-fixed effects	No	Yes	Yes
Time-specific effects	No	No	Yes

Source: See section 4 on Data

Note: The values in the curly brackets refer to the standard errors and those in the square brackets refer to the p-values. All variables are in natural logarithms. The number of observations used in the estimation is 156.

Figure 1: Simulations
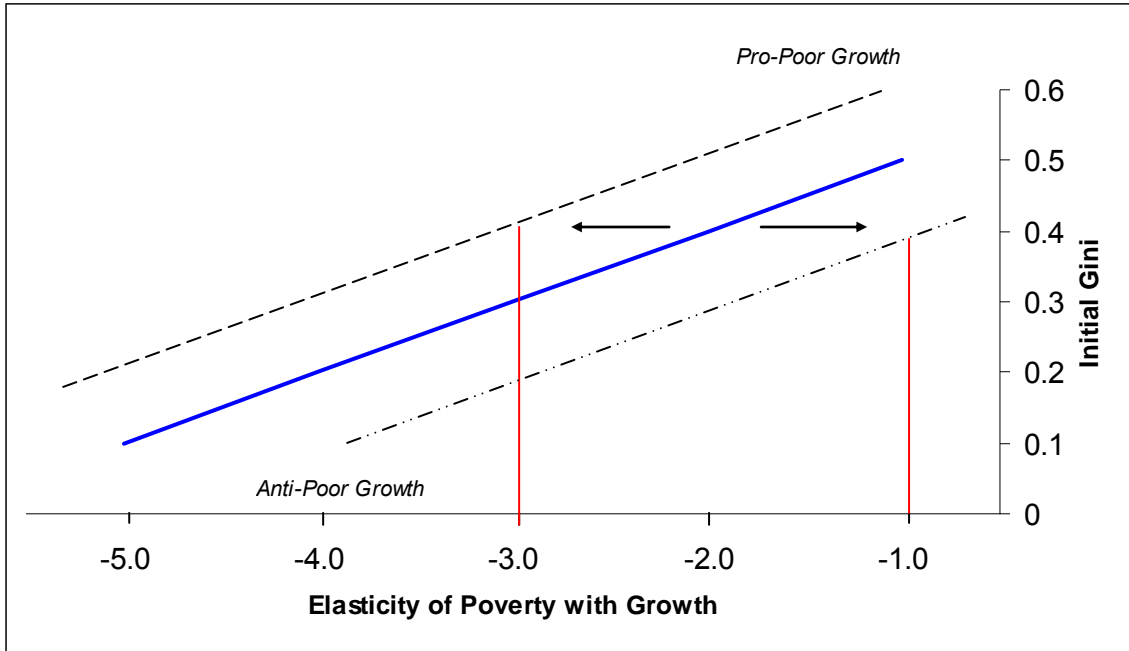
Source: Using coefficients from the regression results presented above

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