DOES GLOBALIZATION REDUCE POVERTY? SOME EMPIRICAL EVIDENCE FOR THE DEVELOPING COUNTRIES

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"…the satisfaction a person obtains from his income depends not on its absolute level but on its relation to those of others in the same community at the same time. […] If there is an increase in the level of income with no change in people's relative position, then nobody feels better off."

(Moses Abramovitz, 1979, p. 8)

Abstract

In this paper we address a key issue in the current debate on economic development: the effect of globalization on poverty. We review the empirical evidence on the relationship between globalization (broadly defined) and within-country poverty in the Developing Countries (DCs). To measure globalization we use, among others, standard indices of trade openness, financial openness and privatization. To measure poverty we use both indices of relative and absolute poverty averaged over five and ten years. The use of relative poverty indices enables inquiry into a different dimension of poverty and provides additional information with respect to previous research. Both descriptive statistics and econometric analysis are used to sketch a few stylized facts in a very complex framework of relationships.

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1. Introduction

Globalization and poverty are two of the main issues on today's political agenda. As Xavier Sala-i-Martin (2002a) recalls, one of the few statements on which the politician tends to agree with the common man is that in the last twenty years poverty and inequality have both increased.[1] Since the last twenty years are known as the *globalization years*, it is almost automatically inferred that globalization is *bad* because it raises poverty and inequality.

However, although politicians, political and social movements, international organizations and the media have been debating these issues for years, only recently has systematic economic research been conducted into the nature of the relationship between income distribution and globalization. This kind of research is necessary for proper understanding of the social and economic effects of trade openness and globalization in general, far beyond the assumptions of politicians and common men, but also beyond the claims made by the theory of comparative advantages – claims that, in this connection, are unable to provide a viable explanation for the complexity of contemporary international figures.

Unfortunately, we still know very little about globalization, and for several reasons which can be summarized as follows: (i) globalization, inequality and poverty all suffer from severe measurement and definition shortcomings. Empirical analysis is therefore a minefield in which it is easy to lose one's bearings; (ii) globalization (actually, *this* kind of globalization) is a quite recent phenomenon spanning the last twenty years, or less, of economic development; (iii) *a priori* assumptions and ideological factors typify the discussion on globalization, and they often give rise to biased interpretations.

Nevertheless, these shortcomings exist, and they hamper independent research. The use of some poverty definitions, measures and sources of data rather than others can yield different results and entail divergent policy implications. The construction of a reliable and independent database on poverty open to different approaches (as the UNU-WIDER database is for income distribution) should be one of the main goals on the poverty research agenda. This paper presents and uses a provisional framework for such a database.

Throughout the paper we tend to focus on the within-country relationship between openness (to trade and, more in general, to globalization) and domestic poverty, leaving the analysis of cross-section comparisons of poverty and globalization and the study of the relationship between inequality and globalization to other research. The novelty of our approach resides in the following features: (i) we explicitly consider the link between openness and *relative* poverty, distinguishing the latter from both absolute poverty and inequality; (ii) we assess the robustness of the results to other poverty definitions, namely absolute poverty, from different sources; (iii) we extend the analysis to a multidimensional definition of globalization whereby it is not solely identified with openness to trade.

The paper follows the following sequence. Section 2 focuses on the debate on poverty and globalization measurement and definition. Section 3 critically reviews the findings of very recent literature on the poverty/globalization issue. Section 4 presents the data and the methodology

[1] As Sala-i-Martin recalls, the UNDP's Human Development Report (UNDP 1999) is the most frequently quoted and influential source of figures on trends in world-wide poverty and inequality.

used in the paper. Section 5 outlines the main results of our analysis, while Section 6 makes some concluding remarks.

2. What is poverty? What is globalization?

2.1 Poverty

Without entering the debate on the meaning of poverty,[2] for the purposes of the present paper it is sufficient to define as poor an individual unable to achieve minimal adequate *living standards*, whatever these may denote. In fact, the adequate living standard may include both the consumption of purchased goods and the imputed value of household's own production, or it may refer to the minimal income necessary to undertake such consumption or to the physical availability of goods and services, or it may relate to Amartya Sen's concept of *capabilities* (Sen, 1985).

Poverty is a multidimensional problem which results from a combination of economic, political and environmental factors, and which comprises several different aspects. Whilst conceptualizing poverty would be beyond the scope of this paper, we are particularly interested in the measurement of at least one of its several dimensions (nutrition, health, consumption, powerlessness, *and* income levels). Since income is easier to consider and to measure than most of the other dimensions, it is usually taken as a reliable proxy for determining the "adequate level of consumption" and therefore poverty, particularly for the purposes of international comparisons. Generalized poverty can be straightforwardly defined as "a situation in which a major part of the population lives at or below income levels sufficient to meet their basic needs" (UNCTAD, 2002, p.39).

More than twenty years ago, focusing on the relationship between growth and poverty in developing countries, Chenery *et al*. (1979) stressed that the extent of within-country poverty depends on two main factors: (i) the average level of income and (ii) the degree of inequality in its distribution. Since then, the large majority of studies dealing with poverty measurement have used mostly income levels and distribution as a measure of this phenomenon. In this regard, an important distinction must be drawn between *functional* and *personal* distribution of income, where the former denotes the distribution of income between labor and property-owners, and the latter denotes individual income.[3]

As pointed out by Winters (2000, p. 30), since the functional distribution of income differs markedly from the personal distribution of income,[4] the two measures should not be used as perfect substitutes in the analysis of poverty. In effect, the income of a given household is only indirectly linked to the returns to various factors of production, since it also depends on their

[2] We refer to the huge body of literature on the topic for an extensive discussion on poverty definition, meaning and measurement. See for example Ravallion (1994 and 1996) for a description of the methodological issues and Ravallion (2001) for a detailed bibliography.

[3] As far as the personal distribution of income is concerned, it can be expanded to include all monetary incomes of private households and adjusted for household size by an equivalence scale.

[4] The non-overlap among definitions of the functional and personal distribution of income is the core problem in this field of research, since theoretical discussion tends to be conducted in terms of factors of production (hence functional distribution) while inequality and poverty are determined by personal distribution, i.e., by the distribution of factors of production among income classes.

ownership, which is usually very difficult to ascertain. Moreover, no theory or strong evidence allows one to infer any particular link between the two types of distribution. We share this view, and in the next sections of the paper we shall focus solely on the personal distribution of income.

As already argued, poverty is computed on the basis of the number of individuals whose expenditure (or income) is below a conventional threshold, the *poverty line*. This threshold is defined *relative* if it is determined annually with respect to the population's average level of income, *absolute* if it is determined with respect to the monetary value of a bundle of necessary goods and services, updated every year to take account of the variation in prices and bundle composition. Both types of measure are normally used in statistical analysis and both have serious flaws.

With respect to absolute poverty, besides the difficulty of singling out a monetary value for a sufficiently representative bundle of goods of the poor, performing time-series and cross-section analysis is very difficult. The former requires a reliable procedure with which to update the bundle composition and its monetary value; the latter needs consistency if it is to compare poverty in different countries.[5] Internationally, there is growing consensus on defining as poor (and extremely poor) those individuals whose income (or expenditure) is less than 2 US dollars per day (1 US dollar per day), adjusted for Purchasing Power Parity (PPP) at 1985 constant prices (as originally introduced by Ravallion *et al.*, 1991). These poverty lines were re-computed by Chen and Ravallion (2001) using 1993 as base year, and set to 2.16 and 1.08 US dollar per day.[6] Central to this definition is the use of the PPP, which states that exchange rates between currencies are in equilibrium when their purchasing power is the same in each country. Although this correction substantially improves the comparability of data on poverty, there is evidence that it tends to underestimate the real extent of absolute poverty (Reddy and Pogge, 2002).

Another possibility is to use national poverty lines defined on the basis of the monetary value of a country's specific bundle of goods. This line is certainly more accurate in describing the real extent of poverty within a country, but it prompts the same objections as already made: namely the difficulty of upgrading the poverty line over time and, particularly, the difficulty of international comparison. As shown by Karshenas (2002), it is true that countries with higher GNP per capita tend to have higher poverty lines but, on the other hand, it is also true that the 1 and 2 USD/PPP lines are good proxies for national poverty lines in extremely poor and poor countries respectively.

Alternatively, or in addition, measures of relative poverty can also be computed. These define poverty in relation to a synthetic measure of the personal distribution of income, usually the median or the mean income. Eurostat, in its first analysis of poverty derived from the European Community Household Panel (ECHP), estimates the proportion of households, individuals and children living below a threshold of 50 per cent of the national average income. More recently, Eurostat has adopted 60 per cent of the median income as the poverty line. Although this measure overcomes problems of international and temporal comparability (every income is considered relatively to the national distribution), it has its own shortcomings: (i) it is an arbitrary and poor indicator of command over resources and (ii) it is linked to income

[5] It is important to stress that none of these definitions of poverty takes directly account of inequality within the household or command over non-market goods. This aspect is of particular importance in international comparisons.
[6] These computations are actually lower than the original 1985 poverty lines adjusted to correct inflation (which should be 2.70 and 1.35 in 1993). As Reddy and Pogge (2002) denounced, this gives rise to lower estimates of poverty numbers and underestimation of poverty in the 1990s.

inequality and therefore tends to overestimate poverty when income distributions are very unequal.[7]

However, although poverty and income inequality are usually mentioned together, they are very different concepts and retain different policy implications. While it can be unanimously agreed that either a growing proportion of the world population or a greater number of individuals living in extreme poverty is bad, it is less clear that income inequality represents a threat to economic development and that it is socially undesirable. In fact, as aptly pointed out by Sala-i-Martin (2002a), increases in inequality can arise from the worsening situation of the poor or from the improving situation of the rich. It can therefore be argued that excessive income equality is not good for the economy, as it tends to push down the incentives to invest in both physical and human capital. In this sense, income inequality is seen as the rate of return to investment. On the other hand, it can also be argued that excessive inequality creates social tensions and political instability. In this case, the poor see inequality as the rate of return to social and economic disruption. This view originated with Arthur Okun (1975), who identified the existence of a trade-off between equity and efficiency, showing that an increase in inequality is necessary to foster economic growth and raise living standards.[8]

While the definition and the methodology used to measure poverty are hedged about with caveats, no agreement exists on which poverty index should be used. Headcount Poverty Indices (*HPI*) are the most popular, easiest to understand and simplest to compute. They measure, as in equation [1], the percentage of the population falling below the poverty line.

[1] $HPI = P / N$

where P is the number of units with income (or consumption) below the poverty line z, and N is the total number of individuals. Although throughout this paper we shall rely mainly on HPI, these indices capture only one dimension of poverty within a country. A further dimension that should be taken into account is the depth of poverty, which, like the Gap Poverty Index (*GPI*) in equation [2], measures the average level of consumption of the poor with respect to the poverty line.

[2] $GPI = 1 - (y_p / z)$

where y_p is the average income (or consumption) of the poor and z is the poverty line.

A more complete picture of poverty is yielded by the Foster-Greer-Thorbecke (1984) family of indices (*FGT*) which simultaneously consider the percentage of the poor, their average consumption and the distribution of consumption among the poor. Clearly, the theoretical advantage of using such a complex index is restricted by the scant availability of microdata, which is a problem particularly severe in the case of most developing countries. Foster-Greer-Thorbecke follow Sen (1974) in measuring poverty as a normalized weighted sum of the income shortfalls of the poor. In their approach, deprivation depends on the distance between a poor household's actual income and the poverty line. Accordingly, poverty is measured as

[7] For a discussion on theoretical aspects of poverty measurement, definition and relationships with income inequality, see Winters (2000), and Saith (1981, 2002).

[8] Extensive research have been conducted in the 1990s on the relationship between inequality and growth, with sometimes contrasting results, starting from the pioneering articles of Persson and Tabellini (1994) and Alesina and Rodrik (1994). For a review see Figini (1999), and Aghion *et al*. (1999).

$$[3] FGT = \frac{1}{nz^2} \sum_{i=1}^{q} g_i^2$$

where g_i is the income shortfall of the i-th household, q is the number of poor households (with income not exceeding the poverty line z) and n is the total number of households.

The theoretical and philosophical debate on the meaning of poverty and its measurability is not this paper's core concern of, since it restricts itself to comparison among alternative definitions, measures, and sources of poverty. In this way its further intention is to make the robustness of results to poverty measurement an issue of debate as well. The seriousness of the problem of comparability of poverty data has been emphasized by Lanjouw and Lanjouw (2001), who argue that the magnitude of error introduced when comparing poverty rates derived from different definitions of consumption or income can be misleading, even when the various definitions appear to resemble each other and are accordingly treated as the same in practice.

In this respect, an interesting position is taken up by Reddy and Pogge (2002), who entirely mistrust World Bank estimates and published poverty data. They argue that the World Bank's poverty estimates are neither meaningful nor reliable, for three main reasons: (i) the use of an arbitrary international poverty line unrelated to any clear conception of what poverty is; (ii) the employment of misleading and inaccurate measures of purchasing power equivalence that creates difficulties for comparisons of poverty over time and internationally; (iii) incorrect extrapolation from limited data which masks the likely measurement errors. They conclude that the systematic distortions introduced with these procedures lead to understatement of the extent of global income poverty and to the incorrect inference that it has declined. While we agree in principle with most of Reddy and Pogge's, we are also aware that a more *secular* approach must be taken with these procedures.

Before proceeding with our analysis, it is worth noting that income indicators, as well as other official indicators (including consumption, unemployment, and labor force), are to a large extent erroneous, owing to the size of the shadow economy in each country. Regrettably, underground economic activity is an increasing fact of life in both developed and less developed countries, and it is likely to attract workers away from the official economy. Since the shadow economy includes unreported income from the production of legal goods and services, a significant consequence for poverty studies is that official poverty figures tend to systematically underestimate the real income of individuals in each income group. Whereas this only marginally affects relative poverty indicators, it may result in more severe biases when absolute poverty indicators are considered. According to the calculations by Schneider and Enste (2000), the size of the shadow economy is much larger in the developing and transition economies than it is among OECD countries. For example, its size as a percentage of GDP is around 70% in Thailand and The Philippines, between 68% and 76% in Nigeria and Egypt, between 40% and 60% in Guatemala, Mexico, Peru and Panama, between 28% and 43% in Belarus, Georgia and Ukraine. Conversely, only in a few OECD countries (Greece, Italy, Spain and Portugal) does it exceed 25%.

2.2 ***Globalization***

Although globalization is a central issue in international economics, the term has been in common usage only since the second half of the 1980s. It can be defined as a historical process

driven by: (i) technological factors, such as the development of computers and the Internet, which reduce the *distance* between people and between goods in terms of both space and time; (ii) political factors, namely the demise of the former communist bloc of countries, which meant the end of one of the two systems of production and allocation of resources historically determined: the centrally planned economy; (iii) economic factors, partially as a consequence of point (ii), which have led the "global world" to adopt free-market oriented economic policies and individual behaviors.

In short, 'globalization' defines the current phase of development of market economies and is characterized by:

(a) the increasing openness of countries to international trade. This aspect is usually considered globalization *tout-court*: first, because it is assumed to be the major factor of economic growth for Developing Countries (DCs); second, because of the strong increase in trade in the last few years;

(b) the increasing liberalization of markets, particularly through the elimination of barriers to trade in goods and services and the development of an integrated international financial market. While according to economic theory international trade can be considered a substitute for the mobility of factors, in practice it favors the mobility of both commodities and factors of production (particularly capital). Owing to evident differences in the transportability of factors, liberalization in factor markets is taking the form of *international* movements in the case of capital, and of *domestic* liberalization, through flexibility, in that of labor;

(c) the decreasing role of the state in the economy. This essentially means: (i) the introduction of pro-market legislation which, for example, reforms the labor market and creates independent competition authorities; (ii) privatization, not only through the sale of formerly publicly owned companies, but also through the reduction of the state's role in the production of merit goods like health and education; (iii) a less active fiscal and monetary policy, the former attained by the simultaneous reduction of taxes and public consumption, the aim being to reduce public debt and foster economic activity; (iv) the transfer of economic policy decisions to international or supranational bodies which do not have, completely or partially, democratic features.

In a developing country, globalization is expected to bring about significant changes in the structure of the national economy, from reliance on primary commodity production (either agricultural raw materials or fuel) to labor intensive manufacturing, mostly for export markets. It should also promote easier and sounder access to international resources and macroeconomic stability. This should result in improved economic performance, with rapid growth in output and employment and, as a consequence, a reduction of absolute poverty (Athukorala, 1998).

3. A review of the recent literature

Globalization has emerged over the last two decades, and it may either increase or reduce within-country poverty. As said, globalization is a multifaceted process - characterized by a wave of privatization in public utilities and other previously state-owned industries, reform of both domestic financial markets and taxation systems, and liberalization of labor markets - which has produced unprecedented acceleration in the flows of both international trade and Foreign

Direct Investment (FDI) (United Nations, 1999; Sala-i-Martin, 2002a and 2002b). Researchers have recently begun to analyze the direction and the significance of this relationship.

When reviewing the state of the art on the social effects of globalization, reference should be made to two different strands in the literature: one which relates growth to inequality and poverty, and one which relates trade to growth. Theoretical analyses and empirical evidence arise from the combination of arguments used in each area of research: if (i) growth is distribution neutral, as it is claimed, and (ii) trade enhances growth, then it can be argued that (iii) trade is beneficial for poverty. But the evidence, both theoretical and empirical, is much more complex than this: in what follows, a brief summary of the empirical literature is provided.

3.1 *Growth and poverty*

The trickle-down effect from growth to poverty reduction is based on the assumption that economic growth is distribution neutral or, if not, distribution improving. This is in contrast to the classical stylized facts theoretically consistent with Kuznets's (1955) theory of capital accumulation as an inverted-U shape between level of development and inequality. In recent years numerous theoretical and empirical studies have dealt with the argument of inequality to growth, growth to inequality and growth to poverty relationships developed.[9]

For our purposes, however, it is sufficient to test the validity of this assumption. This has been done, among others, by two recent papers. Ravallion (2001) uses World Bank data and computation methodology to argue that growth is inequality neutral, spreading equally to the whole distribution, thereby confirming that economic growth is the main engine of poverty reduction. The same position is taken up by Dollar and Kraay (2001a) who find a one-to-one effect of growth on the income of the poor, so that the income distribution remains stable and, sometimes, improves. As described in the next section, Dollar and Kraay ascribe this positive effect to trade, but their analysis has an important flaw in due to their definition of poverty. However, a similar conclusion concerning the distribution neutrality of growth has also been reached by UNCTAD (2002).

Finally, there is recent empirical evidence that, while there is high volatility of incomes between countries, the level of inequality within each country tends to remain quite stable (Sala-i-Martin, 2002a, Deininger and Squire 1996). In an era of sustained economic growth, this can be read in the light of the neutrality effect.

3.2 *Trade and poverty (through growth)*

As regards trade and growth, a broad strand of literature associates trade openness with more rapid growth.[10] Rodriguez and Rodrik (1999) have criticized this literature for its alleged lack of control for "other" economic policies and its use of largely unsatisfactory trade policy indicators. However, if the empirical evidence on the links between trade and growth is controversial, even more puzzling is the picture that emerges when the link between trade and poverty is analyzed.

[9] For a summary, see Bigsten and Levin (2001).
[10] See for example Edwards (1992) and Sachs and Warner (1995).

The standard argument with regard to trade and poverty is based on the Stolper-Samuelson theorem, according to which trade results in gains for labor (the primary asset of the poor) since it is the relatively abundant factor in most low-income countries. In this analytical framework one can alternatively assume that there are two types of workers, high-skilled and low-skilled, with the latter being the relatively abundant factor of production in DCs. Openness would benefit low-skilled labor intensive production, hence increasing demand and wages of low-skilled workers in developing countries; since low-skilled workers are the most likely to be in a situation of poverty, there would be a reduction in the number of poor and in inequality.[11] However, the restrictive assumptions upon which the theorem is built are not sufficient to provide a viable interpretation of the complexity of the real world, in which benefits and costs of trade are unevenly distributed between producers and consumers of exported and imported goods. Moreover, the adjustment to trade and to more investment may result in additional short and medium term costs for the poor. Accordingly, the beneficial impact of globalization on growth, and thence on poverty, would rely upon the assumption that income inequality decreases as a consequence of increased openness.

The allegedly beneficial effect of economic integration on poverty can be assumed to stem from Foreign Direct Investment (FDI) as well if, due to lower levels of wages, production of low-skilled labor intensive goods moved to the DCs. However, it is important to stress that, as shown by Feenstra and Hanson (1997), de-location could involve activities that are low-skilled labor intensive for the investing developed country but high-skilled labor intensive for the host developing country, hence overturning the effects of globalization on inequality and poverty.[12]

Another argument in favor of the beneficial effects of trade on poverty reduction is put forward by Bhagwati and Srinivasan (2002), who point out that if a country wants to maintain an export-led development strategy, that is, if a country wants to rely on free trade, it must maintain a framework of macroeconomic stability. Because stability implies low inflation, it is another channel through which trade affects the poor positively, since the poor tend to be hardest hit by high inflation.

Acemoglu and Ventura (2002) provide another theoretical argument in support of the view that international trade leads to a stable world income distribution (though reducing poverty) even in the absence of diminishing returns in production and technological spillovers. This is because specialization and trade introduce *de facto* diminishing returns to capital accumulation at the country level, whereas those at the world level remain constant. Accordingly, cross-country variation in economic policy, savings, and technology contribute to determining the world growth rate. The shape of the world income distribution is therefore affected by the degree of openness to international trade and the extent of specialization: in the steady-state, all countries grow at the same pace (due to the terms of trade effect) with different income levels determined by the use of different technologies. This model has two implications for our paper: first, international trade accelerates economic growth while keeping the inequality between countries

[11] It is however worth noting that, symmetrically, this process would lead to an increase in both inequality and poverty in developed countries.

[12] The ambiguity in determining the final effect of openness on inequality and poverty is well debated in the recent literature and stems from the complexity of factors to take into account, among which the existence of "cones of diversification" (Davis, 1996), three levels of skill (high, medium and low) as in Wood (1994), the skill-biased nature of technological change (Berman *et al*., 1994), and the skill-enhancing trade hypothesis (Robbins 1996, Zhu and Trefler, 2001). For a survey of the literature, see Vivarelli (2002).

constant: therefore overall poverty gains from openness. Second, no considerations can be drawn from this theory with regard to single country distributions and, therefore, to national poverty ratios.

Empirically, substantial progress in this field of research has been made possible by Dollar and Kraay (2001a and 2001b),[13] who classify countries into globalizers and non-globalizers according to their performance in raising their trade volumes in GDP; they then show that the former group has experienced higher growth rates during the period 1977-97. They also define as poor those individuals in the bottom fifth of the income distribution of a country and they econometrically test the relationship between growth in average incomes of the poor and growth in overall incomes, finding that the incomes of the poor rise proportionally with average incomes. However, they find that trade openness accelerates growth without leading to a sudden, one-time adjustment in real income. Rather, their empirical findings suggest that more economic integration (measured with a range of different indicators such as the presence of capital control, tariffs and membership of the WTO) does not have any systematic effect on domestic levels of inequality. They therefore conclude that growth is good for the poor.[14]

Ravallion (2001, p. 1813) deals with the same issue but takes a prudent position, pointing to the need for "more micro, country-specific, research on the factors determining why some poor people are able to take up the opportunities afforded by an expanding economy (...) while others are not". A similar conclusion is reached by the CEPR (2002, p. 67) report to the European Commission Group of Policy advisors, which stresses that "there is no strong evidence that globalization-related phenomena observed during the last two decades or so have contributed to increasing within-country inequality".

Dollar and Kraay's results differ from those obtained by previous empirical studies, such as those by Barro (1999), Spilimbergo *et al.* (1999), Rodriguez and Rodrik (1999). This is due to the more sophisticated econometric techniques used, although some authors claim that Dollar and Kraay's papers have weaknesses and flaws. A summary of the most pertinent criticisms of these papers can be found in Rodrik (2000), who does not agree with Dollar and Kraay's exogenous definition of globalizers based on the change in trade volumes and on reduction in average tariffs. This, Rodrik argues, is theoretically misleading since tariffs are a policy instrument, while the level of trade is not under the direct control of policy makers. On replicating Dollar and Kraay's analysis without making this arbitrary choice of globalizers, Rodrik finds no support for the hypothesis that globalizers do significantly better in terms of growth. In addition, Rodrik argues that Dollar and Kraay's computations contain other "technical" errors (the exclusion of some countries, and the use of different base years moving from one country to another) which also distort the results.

Another strong criticism that can be brought against Dollar and Kraay's papers concerns the measures used to assess poverty: no distinction is made between poverty and inequality, so that the two words are used with the same meaning in the text, with the consequence that poverty is measured with something that very closely resembles an inequality index, and not even one of

[13] For a critical view of these studies, cf. Rodrik (2000).

[14] With respect to developed countries, Mahler (2001) studies the effects of economic globalization on income inequality, finding little evidence of a systematic link between income distribution and three aspects of globalization (international trade, foreign direct investment and financial openness, the latter measured by an index developed by Quinn and Inclan, 1997).

the best. These shortcomings notwithstanding, Dollar and Kraay's papers provide an important benchmark for future research, since they are among the first in this field to make use of econometric techniques.

Finally, UNCTAD's recent report (2002, chapter 3) does not adopt a sophisticated econometric approach. Rather, it attempts to come up with some stylized facts about the links between poverty and trade. One of the report's main merits is that it takes a more realistic approach than most previous studies by focusing on changes in the trade structure, rather than simply on the trade figures. The overall conclusion of the report is that the current conventional wisdom that persistent poverty in DCs is due to their low level of trade integration is too simplistic. The *form* of trade integration is much more important than its *degree*. In particular, UNCTAD (2002) shows that completely different paths in poverty are exhibited by non-oil primary commodity exporters (in which poverty has increased) and by manufacturer exporters, which generally display a lower level of poverty. The former group of countries, however, is well integrated into the global economy in terms of trade over GDP ratios and it has already undertaken trade liberalization. But it is becoming increasingly marginalized in global trade flows and records low rates of economic growth and a rising incidence of poverty. UNCTAD's policy conclusion is that "the grip of doctrine of inadequate integration and liberalization on policy thinking is founded on the prioritization of the goal of global integration over the goal of national development" (UNCTAD, 2002, p.130).

The importance of the UNCTAD report also lies in the care with which it specifies conceptual weaknesses in the policy debate on the poverty/trade relationship. It complains in particular that expressions like 'outward orientation', 'openness', 'integration', which all have different meanings and implications for growth and poverty, are used interchangeably. It also criticizes the fact that trade integration of DCs relies on the exporting of a few products, so that these countries are made dependent on shifts in international demand. In addition, the report stresses that, although the trade over GDP ratio increases, trade for DCs increases less than does global trade, with the result that most DCs are marginalized. Finally, UNCTAD (2002) draws attention to the fact that international trade dynamics take place within a framework of complex structural changes in the domestic economy: the countries that grow faster are characterized by an increase in investment and savings as well as an increase in export over GDP ratios, indicating that they are undergoing a complex process of industrialization. The report concludes that what is important in poverty reduction is more economic growth rather than simple trade liberalization, and thus shares the view originally put forward as the so-called "Bhagwati hypothesis" of the early 1960s which held that growth is a major engine of poverty reduction.

One weakness in the UNCTAD (2002) report, however, is its lack of accurate econometric analysis and the presence of a clear sample bias that impairs the empirical results. In effect, the choice of analyzing only DCs defined on the basis of empirical evidence at the end of the observation period leads to an endogenous distinction being made among countries in relation to their economic performance.

Winters (2000) makes succinct although not conclusive comment on the topic by stating that "trade liberalization is generally found to increase economic opportunities for consumers and producers and to raise earnings for workers. On the other hand it is absurd to pretend that liberalization never pushes anyone into poverty, nor even that liberalization cannot increase the extent or the depth of poverty in some circumstances. […] One of the lessons of theory is that because the poor are so heterogeneous within a country and because poor countries differ so

much among themselves, it is not possible to devise universal formulae for managing liberalization" (Winters, 2000, p. 38). We thus return to the crux of the issue, namely the relationship between functional and personal distribution.

4. Data and methodology

We built our database and methodology mainly on some recently published influential studies: we took some of the data used from Sala-i-Martin (2002a) and Ravallion (2001); we borrowed some ideas for the econometric exercise from Dollar and Kraay (2001a and 2001b); we borrowed the care with which we analyzed the heterogeneity of experiences in trade and poverty dynamics from UNCTAD (2002). To these we added three important features: (i) we explicitly considered relative poverty to be an important concept of poverty; (ii) we broadened the definition of globalization, which is not simply considered as trade openness, by including various measures of financial integration, liberalization and privatization; (iii) we tested the robustness of empirical findings to different poverty and globalization definitions.

4.1 Measuring individual income and poverty

Empirical studies on poverty, which mainly perform international comparisons, have many problems in common: (i) the mixed use of different incomes (gross income, net income, expenditure), units (person, household, household per capita), and definitions over time and between countries in the original household surveys which are the basis for the computation of poverty indices; (ii) the procedure used to deflate nominal values for changes in the cost of living, since the consumer price index does not usually reflect spending behaviors of the poor; (iii) the methodology used to correct the purchasing power of different currencies in international comparisons; (iv) the distribution of underreporting in the surveys, which is likely to be greater for the rich, so that income inequalities and relative poverty are underestimated.

When analyzing between- and within-country poverty, one should bear in mind that poverty rates based on different indicators cannot be treated as fully comparable. For example, as shown by Lanjouw and Lanjouw (2001), Chen and Ravallion (2001), Deininger and Squire (1996), and Winters (2000): (i) PPP adjustments, although not the best solution, should be used to correct for varying costs of living across countries, within countries and over time; (ii) when studying poverty in the DCs, what it means to be poor should be defined by standards more typical of such countries than of developed ones; (iii) non-wage income and taxation should be adequately treated when conducting country-level analyses; (iv) the effects of trade liberalization on factor prices may either increase or reduce poverty. For example, if trade liberalization boosts the demand for labor-intensive products, thereby determining an increase in either wages or employment, one may expect to observe a reduction in poverty rates only if the poor are strongly represented in the type of labor for which demand has risen.

Here we measure poverty according to alternative definitions and sources. In particular, besides measures of absolute poverty, we make extensive use of indices of relative poverty computed as the number of income recipients (or expenditure units) whose incomes are below

50% (or 40%) of the mean income.[15] As said, these measures of relative poverty have been criticized on the ground that they are merely measures of income inequality. This is true only in part, since these indices would not pass any of the tests of goodness which usually apply to inequality indices, such as Lorenz consistency. Besides, since Duesenberry (1949), the "relative income hypothesis" has shown that individuals look upward when making comparisons, with the consequence that "raising everybody's income does not increase everybody's happiness, because in comparison to others income has not improved" (Frey and Stutzer, 2002, p. 411).

On one hand, the extent of relative poverty depends crucially on the shape of the distribution of income; on the other, it is also true that the assessment of poverty must consider social and psychological dimensions linked to the type of inequality and to the social position or social exclusion of the poor, which are better grasped by the concept of relative poverty. Moreover, the use of relative poverty allows some measurability and comparability problems to be overcome: (i) since all the incomes are normalized, no exchange rates have to be applied; (ii) the problem of updating the poverty line does not apply because it is fixed as a percentage of the mean income.[16]

Ravallion suggests taking a mixed approach which assesses the extent of poverty by taking the maximum between the measures of absolute and relative poverty, where in his case absolute poverty line is 1 USD/PPP per day and the relative poverty line is one third of mean expenditure. Clearly, such a methodology can also apply to different mix of poverty lines.

Our database is related to poverty in the developing world (including the whole world except OECD countries). It was constructed by adding information from different sources: (i) we used absolute poverty ratios for 54 countries taken from World Bank estimates (or other calculations on those data like UNCTAD, 2002)[17] and referring to the percentage (and number) of people living below the international poverty lines of 1 and 2 USD/PPP equivalent per day; (ii) we had a different estimate of previous figures from Sala-i-Martin (2002b) due to the different statistical procedure employed in computation of basic figures; we used this information for two reasons: one, Sala-i-Martin's paper will probably significantly influence the current debate on the social effects of globalization, and it was therefore important to use the same database; two, it provided a different and broader sample of countries with respect to previous studies; (iii) we had poverty ratios computed by national statistics offices using national poverty lines and collected by World Bank (World Bank, 2002)[18]; (iv) we had relative poverty

[15] To compute these measures we ran "povcal", the routine on selected distribution data (mainly from the UNU-WIDER database) created by S. Chen for the World Bank. Owing to the availability of grouped data only, we considered the mean income to be a more reliable definition of poverty lines than the median income.

[16] On the other hand we would stress that setting the poverty line at 50% of the mean income is arbitrary and that the perception of social exclusion may change over time (if changes in income distribution arise) and may differ across countries.

[17] Their figures differ mainly because World Bank bases its estimates on household surveys while UNCTAD does so on national accounts. This discrepancy has long been known in the literature, although no clear answer has been given to the question of which estimate provides a more accurate description of poverty. UNCTAD chooses national accounts poverty estimates because they are more closely correlated with some non monetary indicators of poverty (UNCTAD, 2002, p.47). If these estimates are correct, UNCTAD states that the incidence and depth of poverty in the very poorest countries have been underestimated by the World Bank (see also Karshenas, 2001).

[18] For updated figures, see http:\\www.worldbank.org\research\povmonitor.

ratios computed on UNU-WIDER distribution data using 40% and 50% of the mean income as poverty lines.[19]

4.2 Measuring globalization

A commonly used measure of the structural dimension of globalization is the degree of openness. In fact, the degree of openness of an economy is a concept that has received only scant attention from economic theorists. The relevant question in the case of this indicator is not only what a country exports or imports but also how much it exports and imports in relation to its GDP. Throughout this paper the ratio [E(Exports)+I(Imports)]/GDP will be used as an initial proxy for the openness of an economy.

Many problems surround this definition: in particular, trade flows are an imperfect proxy for trade policy and are affected by other dimensions such as the country's size and the distribution of assets. An important feature of openness is the presence or the absence of policy distortions or trade barriers. These include tariff rates or coverage ratios for non-tariff barriers. We therefore used other measures of globalization such as tariffs over trade or over GDP or, when available, indices of liberalization like the Economic Freedom Index. This dimension is important because it may be that, even though actual trade performances are dismal, highly attractive incentives to foster investment and trade in poor countries are implemented by a country; the extent of these incentives is certainly a better proxy for trade liberalization policies than actual performance (see for example Anwar, 2001 for Pakistan). Of course, problems arise when attempting to aggregate these trade barriers data into an overall index.

Other measures of openness have been used in the literature, for instance the Leamer (1988) and the Ramses (2002) indices. Moreover, we share UNCTAD's criticisms of trade openness indices: a country may display a higher trade over GDP ratio but this may occur in an environment where both trade and GDP grow at a slow rate. This implies that there is a marginalization effect. We measured this effect by introducing an index of marginalization as 1 - (E+I)/World(E+I) which weights the country's trade for total international trade (we also weight E+I over GDP and global GDP). Another interesting feature according to the UNCTAD report is the degree of export concentration, which it finds to be positively linked to poverty.

As said, globalization is not solely openness to international trade, although this is probably its most important feature. The liberalization of financial markets has brought about a huge increase in capital flows, particularly in the form of Foreign Direct Investment (FDI). Hence, another measure of globalization that we used was financial openness by considering gross or net inflows of FDI over GDP ratios or FDI over total capital formation. There is much debate on whether FDI can be used to interpret financial openness: on the one side, due to the diversity in the nature and the intensity of the alternative instruments that governments can use to limit capital movements across borders, a reliable measure of financial openness is difficult to find. FDI would capture only one side of the coin: in fact, this variable measures the long-term ability of a country to attract investment from abroad. On the other side, most skeptical views of the globalization process blame the liberalization of global financial markets, and the consequent increase in financial speculation, for their allegedly negative effects in terms of unemployment

[19] The absolute values and the deviations from mean value of the headcount poverty index for the poverty measures computed for those countries for which data are available can be requested from the authors upon request.

and poverty[20]. In this respect, FDI are highly correlated with short-term speculative capital movements and therefore might capture the negative effect of portfolio movements and short term speculation.

A third factor characterizing globalization is privatization. We measured also this aspect, by means of an index of privatization over GDP. Since the availability of this series for DCs is disappointing, we proxied the variation in public intervention by the change in public expenditure or in tax revenues, relative to GDP, over time. To disentangle the links of these two variables with poverty, one should take into account several issues: (i) social spending, which most likely affects poverty, is only one component of total public expenditure with which might have diverging trends; (ii) tax revenues changes might have different impacts on poverty according on how progressiveness is modified and whether or not these changes take place in a framework of macroeconomic stabilization policies. To control for this latter issue, since the process of globalization takes place for most countries within structural adjustment programs, it is important to deal with the complementary measures that may have been implemented to tackle both macroeconomic instability and the adverse social effects of adjustment and stabilization programs.[21]

4.3 Methodology

Although aware of the difficulties arising when one attempts to identify the links between the evolution of poverty and the phenomena related to globalization, in this paper we focus on trends in globalization growth and the within-country poverty relationship over the last three decades. We do so by testing whether a statistically significant relationship exists between some measures of globalization and poverty levels. As already stated, our main purpose was to estimate the evolution of within-country poverty and the relationship between the dynamics of the share and the absolute number of the population below the 1 USD/PPP (and 2USD/PPP) equivalent annual income level and the dynamics of the degree of openness and of other variables linked to globalization.

The main problem with an undertaking of this kind is the high heterogeneity among countries, which hampers the identification of stylized facts relative to the entire sample of countries. We therefore attempted to find some significant aggregations of countries in order to highlight different trends and behaviors of countries according to various attributes and characteristics. These included:

1) export specialization: exporters of oil, exporters of agricultural products (minerals, plantation crops, etc.), exporters of manufactured products (mostly labor intensive goods, including textiles);
2) debt: highly, middle, and low indebted countries (considering the external debt to GDP ratio);

[20] For example, the studies collected by Cornia and Lipumba (1999), show that, in the case of Africa, liberalization of financial markets has attracted large inflows of short-term speculative capital which induced large swings in the nominal and real exchange rates. A major consequence of such speculative movements is a lack of adequate incentives to potential private investors in the tradeable sector.

[21] Summary statistics for the measures used are available from the authors upon request.

3) region: Sub-Saharan Africa, East Asia, South Asia, Central Asia and Eastern Europe, Middle East and North Africa, Latin America;

4) institutional context: degree of democracy. This category was created according to the Gastil index;

5) structural adjustment: countries which have *or* have not adopted International Monetary Fund or World Bank structural adjustment programs, such as privatization schemes;[22]

6) religious diversity: pre-Reform Christians, Reform Christians, Islam, Tribal, remaining groups (Hinduism, Buddhism, Oriental);[23]

7) Urban / rural structure of the economy.

Using an approach that has proved highly promising in the field of cross-country studies, we started our analysis by focusing on the correlation between poverty dynamics in a selected group of countries and some of its hypothesized determinants.

In general, as aptly shown by Easterly (2001), empirical analysis of the determinants of economic growth can be misleading, since causality is especially difficult to establish in this field. The econometric analysis reported in the present paper was even more difficult than is usually the case because of the low number of countries for which we had complete and reliable data on relative poverty and because of the scattered observations available, which provided us with a high unbalanced and irregularly spaced panel. Following Dollar and Kraay (2001a and 2001b) we used several techniques to test whether different measures of globalization explain the change in poverty. The taxonomies of DCs introduced above were employed for the purposes of the econometric analysis in order to single out possible differences in the relevant coefficients determined by a country's belonging to one or another category.

5. Results

5.1 Poverty and globalization since the 1970s - the previous literature

Chen and Ravallion (2001) build a poverty database for 88 countries, for 1987 and 1998, using a methodology similar to ours but elaborating data to obtain internationally comparable poverty measures. They draw on national household surveys and transform the distribution of income into distributions of expenditure, normalized by household size. They use the international poverty line of 1 and 2 USD PPP upgraded to 1993, and when only one distribution

[22] For a summary of the lowest common denominator of policy advice addressed by IMF and WB, see Williamson (1990).

[23] The basis underlying this grouping procedure is the so called "Weber link" (Weber, 1905; cf. also Paldam, 2001), which identifies an indirect effect of the religion on economic development. According to this view, some religions - in particular certain strands of Protestantism, and Christian religions in general - place moral value on attitudes (ranging from honesty to disapproval of idleness and consumption) that are good for investment and growth. Recently, Guiso, Sapienza and Zingales (2002) have found further evidence that Christian religions are more positively associated with attitudes conducive to economic growth. However, these attitudes have been shown to be widespread in all regions where the growth process has started and among the initial waves of entrepreneurs, irrespective of which religion is dominant in the region. See also Deepak Lal (1998).

is available for the reported country, they assume that inequality remains the same during the period under observation. All these procedures with which to process distribution data in order to compute poverty indices are open to severe criticism (for example see Reddy and Pogge, 2002), but if the intention is to obtain sufficient information on poverty, one has to come up with some of the same alchemy. Chen and Ravallion's principal findings are reported in Table 1: the main figures show a reduction in global poverty in the 1990s. Table 3, also taken from Chen and Ravallion, considers a measure of poverty which takes account of both absolute and relative dimensions of poverty: the share of the poor is defined as those individuals who fall below either the absolute poverty line or the relative poverty line, the latter being one third of the average consumption of the country's population. The results are similar.

- Table 1 about here -

- Table 2 about here -

A different approach, based on national accounts rather than survey estimates to compute poverty indices and used by UNCTAD (2002) gives a worse picture; in particular, the figures are higher for the poorest countries (UNCTAD 2002, p.52): 81% of the population of DCs for which data are available live on less than 2USD/PPP equivalent per day, and 50% on less than 1 USD/PPP equivalent per day. The dynamics also show that poverty in DCs appears to be persistent and indeed growing; DCs have become the main locus for extreme poverty in the global economy.

By estimating the gaussian Kernel density function for the world income distribution and computing the absolute poverty lines of 1 and 2 USD/PPP, Sala-i-Martin (2002a and 2002b) finds that poverty is almost no longer a problem in the contemporary world (the 1USD/PPP poverty rate has decreased from 20% to 5% over the last twenty five years, according to the author). Also inequality has decreased, mainly due to the reduction in between-countries inequality, while within-country inequality has slightly grown. Although Sala-i-Martin (in particular 2002a) starts from a systematic critique of the UNDP figures on inequality trends (UNDP, 1999) and states that he wants to maintain an agnostic view, he clearly has s a prejudice in favor of globalization politics which pervades all of his study. This prejudice is unequivocally evident when Sala-i-Martin makes heroic assumptions about the imputation of distribution data for those countries that do not have consistent time series, or when he excludes the former Soviet Republics from his sample.[24]

With respect to global income distribution, Dollar (2001) finds that inequality rose between 1960 and 1975, declined to 1985 and then rose again, the main reason being the growing divergence within the developing world, that is, a process of polarization of the world incomes. Milanovic (2002) studies the variation in global inequality across countries - therefore not weighting for population - between 1988 and 1993, finding that relative incomes have increased for the top three deciles of the world distribution while it has deteriorated for the bottom seven.

[24] Sala-i-Martin also estimates that in 1998 the number of Mexicans living below the 1 USD/PPP poverty line was 18,000. One of the authors of the present paper spent some weeks travelling through south-east Mexico in that period and personally met many more poor people than Sala-i-Martin optimistically estimates! For these reasons, Sala-i-Martin's conclusions that "the success in reducing poverty is, therefore, clear" (2002b, p.30) and that "the dramatic and disturbing rise in income inequality during the globalization period is nowhere to be seen" (2002a, p.39) should be treated with caution and subjected to further tests.

5.2 Poverty and globalization at a glance

We start our empirical investigation with a descriptive analysis of individual countries and groups of countries. In particular, Table 3 contains, for 120 countries, some of the data and qualitative information which were employed in the econometric exercise[25].

- Table 3 about here -

A look at the absolute poverty/openness relationship is a helpful point of departure for the econometric analysis carried out in Section 5.3. The main evidence arising from comparison of the dynamics of absolute poverty from the 1970s to the end of the 1990s is very puzzling. Many countries (23 out of the 47 analyzed) exhibit a dramatic reduction in the proportion of their populations living below the 1 USD/PPP equivalent poverty line, and this is undoubtedly a significant achievement.

Regrettably, among the 24 countries that did not experience a significant reduction but rather an increase in the shares of their populations living on less than US $1 per day, 11 (including large countries like Nigeria) are in Sub-Saharan Africa, which proves to be the region most severely afflicted by poverty. However, no clear-cut information on this region is yielded by comparisons of the openness and the poverty measures: whereas in the case of Nigeria and Senegal the increase in the share of the population living on less than US $1 per day is associated with an increase in FDI and a reduction in the degree of openness, in the case of Kenya less FDI and less openness are associated with a reduction in poverty.

Conversely, striking improvements have occurred in the two largest countries in the world, China and India, where at the end of the 1990s the shares of the population below the 1 USD/PPP equivalent poverty line barely reached 3% and 1% respectively.

The case of the 2USD/PPP equivalent poverty line is different, with 32 countries out of 52 experiencing a more or less marked reduction in the share of poor. In this connection, special attention should be paid to the fact that, with the sole exception of Botswana[26] and South Africa, all Sub-Saharan Africa countries have more than 30% of their resident populations living on less than 2 US $ per day.

With regard to the measures of relative poverty, 20 out of 45 countries experienced, over the relevant period, a reduction in both the 40% and the 50% lines of the mean income headcount poverty index. Interestingly, 7 of the 11 former communist countries for which data are available record an increase in the proportion of the poor, always associated with an increase in FDI. In South America, between 1980 and 1998, Argentina experienced a marked growth in both measures of relative poverty, *vis-á-vis* an increase in FDI and in the degree of openness. Analysis of the deviations from mean value of the headcount poverty index with relative poverty lines 40% and 50% of mean income shows that this country is performing very badly, with a share of its population living in conditions of relative poverty much higher than is usually the case of least developed and developing countries. Conversely, if one looks at China and India one can show that in 1998 they displayed a negative sign for both measures of deviations, which means

[25] Descriptive figures on the absolute_relative poverty/openness relationship are available upon request.

[26] In fact, Botswana exhibits a contraction of the amount of FDI and a reduction of the degree of openness associated with a drastic reduction in poverty. In 1998, the share of population below the 2 USD/PPP equivalent poverty line was only 9%.

that not only have they done well in reducing the incidence of extreme poverty, but they are also not among the countries worst off as far as relative poverty is concerned.

5.3 Econometric analysis

Our data base was an unbalanced and irregularly spaced panel of countries. The number of countries and observations that could be used in the econometric analysis depended on the index of poverty that acted as dependent variable, on the proxies used to measure globalization and on the possible alternative specifications of the control variables included in the model. This left us with several econometric techniques as well as sensitivity tests to carry out. In what follows we provide a tentatively comprehensive, although succinct description of the main results attained. For both concepts of poverty (absolute and relative) we followed two different methodologies in dealing with our panel. Firstly, we ran model [4]

[4] $pov_{it} = \boldsymbol{b}_o + \boldsymbol{b}_1 TRADE_{it} + \boldsymbol{b}_2 FDI_{it} + \boldsymbol{b}_3 PUBLIC_{it} + x_{it}\boldsymbol{B} + \boldsymbol{u}_i + \boldsymbol{e}_{it}$

where the dependent variable is the poverty index in country i at time t. and where *TRADE*, *FDI*, *PUBLIC* are proxies for trade openness, financial openness and "role of the state" respectively. These proxies were measured by one of the variables listed, and for which definitions and descriptive statistics are presented in Table 3. Moreover, x is a vector of controls, which can be either time variant or country specific, $\boldsymbol{u}_i$ is the country specific residual and $\boldsymbol{e}_{it}$ is the usual error term with usual properties. Variables were all averaged over the period t, which is the five-year period surrounding 1970, 1975, 1980, 1985, 1990, 1995, 1998.[27] Results are presented under heading 5.3.1.

Since our main aim was to explain the variation of poverty *within* countries, we then focused on differential equations by running model [5] and using linear regression techniques.

[5] $DPOV_{i(t,\,t-1)} = \boldsymbol{b}_o + \boldsymbol{b}_1 DTRADE_{i(t,\,t-1)} + \boldsymbol{b}_2 DFDI_{i(t,\,t-1)} + \boldsymbol{b}_3 DPUBLIC_{i(t,\,t-1)} + \boldsymbol{b}_3 POV_{i,t-1} + x_{it}\boldsymbol{B} + \boldsymbol{e}_{it}$

Therefore, the change in poverty in country i, reported between the period t and $t-1$, was assumed to depend on the change in the corresponding measures of trade openness, financial openness and role of the state, controlling for the initial dimension of poverty and for a series of other variables, both time invariant and time variant (in the latter case, the differences were taken as well). This model allowed us to focus on the change in poverty within countries, leaving between country change aside, although formally the model was still a cross-section.

5.3.1 The panel analysis

5.3.1.1 Absolute poverty

As previously stated, we ran the model on both absolute and relative poverty. With respect to absolute poverty, the only source of data that furnished us with a proper panel was Sala-i-Martin (2002a), which included a panel of 54 countries and full information on poverty for 1970,

[27] For example, the period 1980 was composed of years 1978, 1979, 1980, 1981, 1982. 1998 was composed of 1997, 1998 and, when available, 1999. We used five-year averages to avoid lost of information due to possible missing values and to reduce the size of the measurement error which, particularly in developing countries, can be relatively large.

1980, 1990 and 1998.[28] On the contrary, both UNCTAD and World Bank data provided at the best only two observations on poverty per country, which rendered the use of panel techniques difficult. However, we checked our results by running the model, when possible, also on UNCTAD and World Bank data. Correlation coefficients among some of the variables used in this paper are presented in Table 4.

- Table 4 about here -

Model [4] assumed the existence of country-specific effects. We used the Breusch and Pagan Lagrangian multiplier test to check whether the assumption of a country specific effect is more appropriate than the pooling of data. For all the specifications run, the test returned a high value of C^2, which allowed us to reject the null hypothesis of no random effects (the value of the statistics for the basic model presented in the first column of Table 5 is 26.13). It is well known that models like [4] can be estimated by using fixed effects (FE) or random effects (RE) techniques. The statistics of the Hausman test we obtained depended on the specification of the model run and we did not always get a value of the C^2 statistics low enough to allow rejection of the null hypothesis of no correlation between the country specific effect and other independent variables. Therefore, the choice of the RE technique as the preferred estimation of our model pivoted on the nature of the data we availed for: since our data did not represent the whole population of DCs but a random selection of countries depending upon the availability of data, RE was our preferred choice.[29] In Table 5 we summarize some of the most interesting results we obtained with respect to absolute poverty.

- Table 5 about here -

In column 1 of Table 5 the basic model is presented. The dependent variable is 1 USD/PPP poverty ratios excerpted by Sala-i-Martin data base. TRADE (a proxy for trade openness) was measured by the ratio of trade (import plus export) over GDP, FDI (as a rough proxy for financial openness) was measured by the net inflows of FDI over gross capital formation and PUBLIC (to embody the effect of the public sector in the economy) was measured by the total tax revenue over GDP. The main findings of our work with respect to the three main variables of the model can be outlined by looking at this specification. Both TRADE and PUBLIC have negative and significant signs, i.e. trade openness is associated with lower levels of poverty while a smaller size of the public sector is associated with higher levels of poverty. Roughly speaking, the first effect can be read as an argument in support of globalization, while the second as one against globalization. More subtle is the role played by FDI, which should capture the process of international integration in capital markets: the sign is positive although only rarely statistically significant in the specifications run.

The basic specification of the model in column 1 included a control for the level of development in the country (GDP per capita), which was obviously negatively linked to

[28] Limits of Sala-i-Martin database are presented in Section 4.

[29] Recent econometric literature has developed an impressive selection of alternative estimators to be used in panel data studies. Each of these estimators attempts to account in the best possible way for the complex pattern of heteroskedasticity and autocorrelation which is typical of pooled regressions. Indeed, the problems faced in this work were even more complex, because we dealt with a relatively small panel of unbalanced and irregularly spaced observations. To our aim, the use of alternative estimators affected the estimate of the coefficients but very rarely its sign and significance. When this happened, it was reported in the comment. However, we stress that the results we presented have to be interpreted in terms of *direction* of the relationships, not in terms of marginal effects.

poverty[30], and a set of dummy variables aimed at capturing geographic, cultural and historical differences besides differences concerning the production structures. The "geographic" implications were captured by a series of regional dummies for Latin America and Caribbean, North Africa and Middle East, Sub Saharian Africa, Eastern Europe and Central Asia, South and South East Asia; Set Latin America as base region, the only statistically significant dummy was the positive coefficient for Sub Saharian Africa, which was largely expected.

The specialization dummy was built by considering the most important export sector for each country among agricultural, manufacturing, and oil & other minerals; high poverty was found to be associated with specialization in agricultural exports, while lower poverty was significantly linked with export specialization in oil & other minerals and (not statistically) linked with manufacturing exports, thus confirming recent results by UNCTAD (2002) that the structure of trade is an important factor in determining the effect of globalization on poverty.

As suggested in footnote 29, several estimators are available in panel studies. In column 2 of Table 5 the Maximum Likelihood Estimator (MLE) was used instead of the GLS. Significant changes appeared neither in this case nor using other proposed estimators. Mahler (2001) suggests that for small samples it is advisable to use a Huber/White "sandwich" robust estimator that clusters observations by country. To our aim this estimator has some disadvantages because it mainly focuses on between-country variations. However, the estimation produced with this procedure is reported in column 3 of Table 5.

As extensively outlined in section 2 of this paper, globalization is a multidimensional concept that we reduce to trade openness, international integration of capital markets and reduction of the role played by the state in the economy. How to translate these concepts in economic variables to be used in an econometric exercise is matter of hot debate; while in the basic specification of column 1 we inserted the most intuitive and frequently used variables, it is clear that to measure and to estimate the whole process of internal liberalization and privatization is a cumbersome task. However, a sensitivity analysis can help us to shed some light on the topics under consideration. Column 4 of Table 5 considers one possible combination of the alternative available series to measure globalization: export over GDP to capture trade openness, net inflows of FDI over GDP to catch financial openness and central government expenditure as an index of the public sector;[31] in this as in other specifications the sign and the statistical significance of the coefficients remained the same: indeed the correlation between variables used to proxy the same concept was high (in Table 1 the correlation between most of the variables used in this work is reported), hence it could be expected that results did not differ too much.

However, some general considerations can be of concern: (i) when the variables used were measures of trade policy (as the value of export duties over total exports or total (import + export) taxes over international trade), the significance of TRADE diminished; therefore, it can be suggested that the effectiveness of trade openness, not policy measures aimed to increase openness, is the relevant factor affecting poverty; (ii) empirical results might be affected by the variation in the size and in the composition of the sample due to the incompleteness and the different coverage of the alternative measures we used; (iii) while the ratio of privatization over GDP to construct the PUBLIC variable was not available for a sufficient number of countries,

[30] Not surprisingly, growth and development turn out to be associated with lower poverty rates.

[31] Alternative indices used in this paper are the variables listed in Table 2. Results are available from the authors upon request.

alternative measures linked to the importance of public intervention provided consistent although not always significant estimates. In column 5 we added DEREG into the regression to control for the intervention of the state in terms of deregulation and liberalization in internal markets: the variable introduced was the fifth component (named regulation) of the Economic Freedom Index: although the size of the sample reduced, the inclusion of this variable did not affect the sign and the significance of the other coefficients; a high value of the index (thus indicating more deregulation and liberalization of domestic markets) is associated with low levels of poverty, although this link is seldom significant.

Sala-i-Martin database computes poverty ratios at 1 and 2 USD/PPP international poverty line. Therefore in columns 6 and 7 of Table 5 we replicated regressions run in columns 1 and 4 by replacing the 2 USD/PPP poverty ratio as dependent variable. Results tended to confirm previous findings although the coefficient of PUBLIC is rarely significant, though the sign is the same. This would suggest that public intervention is more important to alleviate extreme situations of poverty.

When combining time-series and cross-sectional data, it appears reasonable to assume that the error terms are heteroskedastic in the cross-section observations and autoregressive in the time-series. Such a model is run in column 8 of Table 5 where the dependent variable is the 1 USD/PPP poverty line. Previous findings are validated in terms of sign and significance of the coefficients of TRADE and PUBLIC, while the coefficient of FDI tended to be positive and also significant. The same happened for the 2 USD/PPP poverty line.

China and India are the two most populated countries in the world. Although in absolute terms their trends in poverty and globalization are more important, their weight in the sample is the same than any other country's; however, their inclusion or not in the study did not modify the results, as column 9 of Table 5, run excluding China and India from the sample, confirms.

Finally, our results might be biased by reverse causality problem; to check for endogeneity, we lagged all the independent variables of one period (five years). Results are presented in column 10 and 11 with 1 and 2 USD/PPP poverty lines as dependent variables respectively. While overall stability in the signs of the coefficients was found, the coefficient of the PUBLIC variable turned generally out not significant when the 2 USD/PPP was used as dependent variable and TRADE was generally not significant with the 1 USD/PPP measure of poverty. However, dropping the GDP per capita from the regression and including the index of deregulation DEREG, as in column 12, we gained significance in the two coefficients above mentioned. Such a pattern can depend on the small number of observations available (lagging of one period reduces considerably the sample size)[32] and from multicollinearity among variables; therefore these results have to be treated with care and submitted to further analysis.

We improved our robustness analysis by including in the model several other controls that might affect the extent of poverty and poverty trends. In columns 1 to 3 of Table 6 we augmented the model with indices of indebtedness, both public and external and with a control for the size of the country. Excessive internal and external debt can constrain the degree of attainable globalization and reduce the gains or increase the costs associated with specific economic policies. Public debt is measured by debt over GDP ratio; External debt is computed by dividing external debt over GDP.

[32] Hence the panel tended to capture prevalently the between-country effect, as is shown by the lower value of the within-R^2 of the regression.

Indeed, it is also important to control for country size both because small countries are inclined to be more open and because big countries generally have higher levels of inequality due to the existence of regional disparities, which are likely to be associated with higher poverty rates. SIZE is measured by population in column 1 and 2 and by density in column 3. A few considerations can be outlined: (i) although not always significant, coefficients for the main variables of the model kept the same sign. In particular the importance of FDI increased while the problem of correlation between TRADE and PUBLIC was now more evident, since the significance of their coefficients are negatively linked. Total population entered significantly in the regression with a negative sign, indicating, contrary to what was expected, that big countries have *ceteris paribus* lower levels of absolute poverty; density, on the other hand was not significant (see column 3). Both external and public debt entered significantly in the regression when also total population was included, not significantly when density was instead added. For space reasons we omit to publish results for the same kind of regressions run with the 2 USD/PPP poverty ratios as dependent variable, which held to similar results except that TRADE, and not PUBLIC, had significant coefficients. Finally, neither measures of democracy or political freedom enter significantly in the regressions.

A further control that can be done regards the effect that globalization exerts on the total number, not the ratios, of poor. In columns 4 to 6, the absolute number of poor was regressed on the main specification of the model, adding population as control. Two comments are needed: first, the only significant coefficient of globalization variables is TRADE, while PUBLIC looses all its significance; second, dropping the two biggest countries in the sample, China and India, the population size was not linked anymore with the number of poor. The inclusion of other controls, such as the importance of IMF structural adjustment programs, the rural structure of the economy and the religious group the country belong to, did not enter significantly in the regression.

As described in Section 4, poverty measures coming from different sources and survey methodologies have been collected. We used, in alternative to Sala-i-Martin data, World Bank's and UNCTAD's data on absolute poverty. Results are presented in column 7 to 10. Due to the low number of observations per country (two for three quarters of the sample, one for the others) we use robust OLS estimators and cluster by country; therefore the results have to be interpreted with care, prevalently representing cross-country variation. While the sign and the significance of PUBLIC was confirmed, even when alternative proxies were used, TRADE was not significant anymore. FDI was not significantly different from zero.

Signs and significance of the other controls remained the same. In table 6 some of the specifications run are presented: in column 7, the dependent variable was 1 USD/PPP poverty ratio coming from World Bank, in column 8 the dependent variable was 2 USD/PPP, in column 9 the dependent variable was 1 USD/PPP poverty gap. Finally, in column 10 UNCTAD's data were used. In this case the small number of observations per country adds to the limited size of the sample (18 countries with a total of 32 observations) so that results are probably not useful for economic interpretations.

- Table 6 about here -

5.3.1.2 Relative poverty

With respect to relative poverty, we made our own computations of headcount relative poverty ratios, using 40% and 50% of the mean income as poverty lines. We had 166 observations relative to 69 countries available for the econometric work. Within countries we had an average of 2.4 observations, spanning the period from 1970 to 1998. Our dataset, however, was unbalanced and irregularly spaced.

The basic specification of the model is presented in column 1 of Table 7. As in the previous section, we tested for the existence of country-specific effects by using the Breusch and Pagan multiplier test. For all the specifications run, the test returned a high value of C^2, which allowed us to reject the null hypothesis of no random effects; for column 1, the value of the statistics was 99.48. The Hausman test did return C^2 statistics of 1.10 which allows rejection of the null hypothesis of no correlation between the country specific effect and other independent variables. With respect to absolute poverty, the most important differences in the results are that: (i) trade did not enter significantly in the model; the sign of its coefficient, which was always insignificant, was not consistent across specifications, although in most of them the sign was positive. Such result, compared to the impact of TRADE on absolute poverty, has important policy implications; (ii) on the other hand, financial openness appeared to be an important factor apparently correlated with higher levels of relative poverty, although this result is not robust across specifications; (iii) with respect to public intervention, the tax ratio over the GDP was still significantly linked to poverty, although the relationship was certainly weaker than the link with absolute poverty. In column 2 of Table 7 we used a different estimator, the Maximum Likelihood estimator, which returned very similar results.

In this respect, it is important to point out that, contrary to what happens for absolute poverty, the substitution of other proxies for PUBLIC into the model changed the picture that can be drawn. In column 3 of Table 7 an alternative specification in which export over GDP, net FDI inflows over GDP and public expenditure over GDP were used to measure TRADE, FDI and PUBLIC respectively. While the sign and the significance of the first two coefficients remained basically the same, PUBLIC did not enter significantly in the regression anymore. This finding, too, may have interesting policy implications: it can be argued that social spending seems to be particularly important for maintaining low levels of absolute poverty, while in a context of relative poverty a concept more linked to redistribution seems to be relevant.

- Table 7 about here -

Another interesting difference can be observed with regard to regional dummies: with respect to Latin America, signs of the dummies' coefficients were all negative and significant, and this was consistent with the perception that *a)* relative poverty is experienced by most countries in Latin America, and *b)* this remains persistent over time although absolute poverty levels are on average a less stringent problem. With respect to specialization dummies, there was no evidence of effects driven by structural differences in exports.

All these findings highlight that the effect of globalization is weaker on relative poverty than on absolute poverty. This is confirmed by several other symptoms: (i) when the dependent variable was the percentage of individuals below the 40% of the mean income poverty line (column 4 of Table 7) only the measure of FDI remained significantly associated with poverty; (ii) the data might be affected by problems of heteroskedasticity, multicollinearity and endogeneity. In column 5 we corrected the model by assuming that disturbances were

heteroskedastic in the cross-section observations and autocorrelated in the time series: FDI was not anymore significant. In column 7 we corrected for endogeneity problems by lagging all the independent variables of one period: while FDI was still weakly significant, PUBLIC did not have any significant effect on relative poverty anymore; moreover, contrary to what happened in the case of absolute poverty, the inclusion of a measure of deregulation (column 8) decreased the significance of the other coefficients, particularly of FDI and PUBLIC: this can stem from multicollinearity problems; (iii) as in previous section, the exclusion of China and India from the sample (as in column 6 of Table 7) did not have any effect on the results of the econometric exercise.

In column 9 of Table 7 we checked whether the country characteristics in terms of size was linked to measures of poverty. It appeared that the country's population was negatively associated with relative poverty and its inclusion improved the estimate of the model. The same effect also emerged with the inclusion of density instead of the number of inhabitants. In column 10 we presented the results for one of the alternative specifications run on relative poverty: we added the total population size, a dummy to check for the inclusion in the sample of small islands, often with little economic importance, and a measure to test the effect of obtaining credit from IMF. In column 11, rather than a proxy of the IMF intervention, we added a measure of external indebtedness. Neither IMF nor external indebtedness seemed to be linked to relative poverty.

Our estimates worsened when we replaced the regional dummies with religion dummies, as we did in column 12, in which none of the religion dummies were significant. This contrasts with the implications of the "Weber link", supporting the more *politically correct* view that any religion may be associated with good economic attitudes conducive to economic growth or at least to less poverty. Other controls (democracy, political freedom, public debt) rarely entered significantly in the regression: the respective outputs are omitted for space reasons.

To conclude this part of the analysis, we have to recognize that the coefficients from econometric estimates provide information on both between and within panels dynamics. In the case of relative poverty, much more than in the case of absolute poverty, our model explained mostly between panels poverty (as the values of R^2 reported in Table 7 confirm[33]) and it is less useful for the purposes of analyzing and understanding the dynamics of within country poverty.

5.3.2 First differences regressions

5.3.2.1 Absolute poverty

Our main dataset of absolute poverty now included 162 first differences observations related to 54 countries. This model allowed to focus on within-country poverty dynamics, therefore avoiding the bias due to all the time invariant country-specific information. We included in the regression the initial poverty level (INPOV) since poverty rates are bounded indices with absolute increases likely to be associated with their initial level. Due to the fact that many missing values of some of the regressors did not allow us to include the whole sample in the regression, we faced a highly unbalanced and irregularly spaced sample whit about only two observations per country. Therefore we decided to run models in first differences by using robust OLS estimators, clustering by country and adding period dummies to distinguish changes in

[33] The *within* R^2 is always below 0.10, whereas the *between* R^2 is always above 0.60.

poverty in the 70s, in the 80s and in the 90s. We started by running the basic regression, which is reported in column 1 of Table 8. In this specification we used the change in trade over GDP ratio to measure TRADE change, the change in net inflows over GDP to measure FDI change, and the change in tax revenues over GDP to measure the change in the "size of the government".

This specification basically confirmed the findings of the panel analysis in both the sign and the significance of the coefficients of the main variables under investigation: Coefficients for TRADE, FDI and PUBLIC have respectively negative and significant, positive and insignificant, negative and weakly significant coefficients. However, the robustness of the results is much weaker: in some of the specifications TRADE was found not to be significant, as in column 3 in which we added regional dummies: it seems, therefore that the link between trade openness and poverty is heavily dependent on regional trends. Moreover, when a proxy for the deregulation of internal markets was added to the regression, its sign and significance suggests that deregulation is associated with lower levels of poverty. Coefficients of period dummies are significant and positive for both the 1980s and the 1990s with respect to the 1970s.

The results were only relatively consistent if the proxies used to measure the three main variables were changed. One of these variants is reported in column 4 of Table 8. In particular, we notice that both PUBLIC and initial poverty tended to be insignificant. In column 5 and 6 of Table 8 we run the model using the 2 USD/PPP poverty ratio as dependent variable: only TRADE remained statistically significant, and this result provides further support to the finding from the panel model estimates. Thus, trade openness seems to be undoubtedly associated with lower poverty levels While the use of Sala-i-Martin data allowed us to process a remarkable number of observations, World Bank's data left us with less than 20 countries for which it was possible to compute differences in poverty levels. Therefore, the OLS estimates presented in columns 7 and 8 have to taken with much caution. In particular we had to use a different proxy for PUBLIC, namely the central government expenditure over GDP ratio, rather than the ratio between tax revenues and GDP due to the lack of enough observations. However, the significance of TRADE's coefficient was confirmed.

- Table 8 about here -

In conclusion, the within-country analysis had less evident implications for policy. The same causal correlations seemed to exist but were hidden by a more complex heterogeneity structure of how globalization affects poverty among different group of countries.

5.3.2.2 Relative poverty

The final control we made concerns the model run in first differences using relative poverty as dependent variable. In this case the results were rather unsatisfactory. In this case the results were rather unsatisfactory. The estimated coefficients were never significant, with the sole exception of regional dummies and the initial level of poverty. In columns 9 to 12 of Table 8 some of the specifications run are presented: in columns 9 and 10 the difference in the 50% of the mean income poverty rate and in columns 11 and 12 the difference in the 40% of the mean income poverty rate act as dependent variables. In column 9 and 11 regional dummies were included together with period dummies; in columns 10 and 12 only period dummies were included. None of these and other specifications run showed satisfactory results; the models explained only less than 25% of poverty variation and half of this explanation was due to

regional differences, thus indicating that the complexity of changes in relative poverty has yet to be addressed efficiently.

However, some general considerations can already be drawn. First, relative poverty is more closely related to the inequality of income distribution than is absolute poverty. This implies that an explanation for relative poverty also resides in the factors internal to a country that are likely to influence income distribution, including the presence of minimum wage legislation and the tax burden on entrepreneurial activities. Other things being equal, the orientation of distribution policy may result in higher levels of relative poverty not necessarily related to the degree of openness of the country. Under such circumstances, improvements in the capabilities of those (entrepreneurs, etc.) in command of factors of production other than labor are more likely to occur.

Second, the early stages of industrialization are usually characterized by a polarization of income towards the tails of the distribution. This happens when economic growth induced by trade openness does not affect a segmented pool of the poor - such as those living in rural areas not linked with the areas in which growth is occurring - who are likely to immiserize further when "working tiny plots of land to produce farm products whose prices fall because of the larger farms implementing the Green Revolution" (Bhagwati and Srinivasan, 2002, p. 181). In this connection, it is worth recalling that high(er) income inequality pushes up the incentives to invest in both physical and human capital, which means that it is not necessarily bad for growth, although it might lead to social and political conflict. Not by chance, the increase in inequality experienced by India after 1991 resulted in a dramatic reduction of absolute poverty during the 1990s but also in a significant increase of relative poverty in the same period.

6. Concluding remarks

In this paper we addressed a key issue in the current debate on economic development: the effect of globalization on poverty. We reviewed the empirical evidence on the relationship between globalization (broadly defined) and within-country poverty in Developing Countries. To measure globalization we used, among others, standard indices of trade openness, financial openness and public intervention in the economy. To measure poverty we used both indices of relative and absolute poverty averaged over five and ten years. The use of relative poverty indices enabled inquiry into a different dimension of poverty and provided additional information with respect to previous research. Both descriptive statistics and econometric analysis were used to sketch a few stylized facts in a very complex framework of relationships.

A few concluding remarks can be outlined. First, although many caveats exist, trade openness and the “size of the government” seem to be associated with lower poverty levels. Conversely, financial openness, although not statistically robust, tends to be linked to more poverty.

Second, there is a substantial difference between absolute and relative poverty analysis. Trade openness tends not to significantly affect relative poverty, while financial openness tends to be linked with higher relative poverty. It has therefore to be emphasized that relative and absolute poverty are two separate concepts, with different meanings, measurement procedures, and theoretical links with globalization. In this respect, the link between FDI and relative poverty can be read in the context of Feenstra and Hanson's (1997) paper, while the Heckscher and Ohlin

idea could constitute the framework in which trade openness is found to benefit poverty. Clearly, the role played by government intervention in setting low levels of relative and, primarily, absolute poverty, has to be interpreted in terms of provision of the necessary goods and safety nets as well as the achievement of redistribution goals.

Such patterns derive from between-country as well as within-country dynamics, although the model tested in this paper prevalently captures between-country differences, especially as far as relative poverty is concerned. This can be deducted by the disappointing results from the model run in first differences, according to which, in particular, within-country change in relative poverty seems to have nothing to do with globalization.

Hopefully, this paper can provide some policy advice on how to read and interpret globalization: first, we find that no clear-cut conclusion can be inferred about the effects of globalization on poverty: the importance of a country's characteristics such as the geographical position and export specialization calls for more specific and country oriented approaches, both in terms of economic studies and policy recipes for development; second, globalization is a multidimensional concept and each of its dimensions have to be analyzed with care: it would be wrong to assert that openness is *per se* good for poverty without specifying whether we are talking about goods or capital; moreover, it would be wrong to advice for a reduction in the role of the state without separating the different tasks that the public sector has to comply: provision of public goods, income redistribution, implementation of pro-market policies, etc.

Finally, to our knowledge, the present work is one of the first attempts to overcome huge difficulties in the definition, measurement and assessment of globalization and poverty. Nevertheless, we are aware that this paper has plenty of flaws, including: (i) the use of a narrow definition of globalization, which is aimed at measuring the impact of the liberalizing economic reforms of the past two decades resulting from the process of intellectual convergence that underlies the policy recommendations of Washington-based institutions like the World Bank and the International Monetary Fund; (ii) the use of rough proxies to capture these aspects of globalization; (iii) the use of not fully reliable data on poverty; although, undeniably, it is very hard to assess the impact of anything on poverty if there is no agreement yet on how much poverty affects the world and how has it changed in the last decades. In the attempt to provide a scientific contribution to what is certainly one among the hottest current policy debates, our own agenda pushes in the following directions: 1) the collection of more reliable data on poverty and the development of more insightful proxies for globalization, and 2) the employment of more sophisticated econometric approaches.

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Table 1
Chen and Ravallion's (2001) estimates of the evolution of global absolute poverty

	1 USD/PPP per day at 1993 prices				2 USD/PPP per day at 1993 prices			
	Headcount Index (%)		Number of Poor (millions)		Headcount Index (%)		Number of Poor (millions)	
Region	1987	1998	1987	1998	1987	1998	1987	1998
East Asia	26.60	14.71	417.53	267.30	67.04	48.72	1052.32	885.29
East Asia (no China)	23.94	9.47	114.14	53.87	62.90	44.29	299.92	252.01
Eastern Europe and Central Asia	0.24	3.75	1.07	17.80	3.59	20.70	16.35	98.24
Latin America and Caribbean	15.33	12.13	63.66	60.86	35.54	31.72	147.56	159.14
Middle East and Northern Africa	4.30	2.11	9.31	6.03	30.03	29.85	65.09	85.28
South Asia	44.94	40.00	474.41	521.84	86.30	83.93	911.04	1094.95
Sub-Saharan Africa	46.61	48.05	217.22	301.32	76.52	77.95	356.64	488.82
Total	28.31	23.45	1183.19	1175.14	61.00	56.11	2549.01	2811.73
Total (no China)	28.51	25.56	879.81	961.71	58.22	57.90	1796.61	2178.44

Source: Chen and Ravallion (2001), p. 290, Table 2

Table 2
Chen and Ravallion's (2001) estimates of the evolution of global absolute and relative poverty

	Mean Poverty Line (USD/PPP)		Headcount Index			Number of Poor (millions)		
Region	1987	1998	1987	1998(a)	1998(b)	1987	1998(a)	1998(b)
East Asia	1.29	1.68	33.01	20.06	28.44	518.25	364.51	516.78
East Asia (no China)	1.92	3.02	45.06	26.66	45.00	214.86	157.09	256.30
Eastern Europe and Central Asia	2.71	2.49	7.54	24.63	15.23	34.35	116.89	72.28
Latin America and Caribbean	3.31	3.67	50.20	47.05	48.91	208.43	236.05	245.38
Middle East and Northern Africa	1.78	1.68	18.93	15.19	11.66	41.03	43.40	33.31
South Asia	1.08	1.13	45.20	40.23	40.59	477.21	524.84	529.54
Sub-Saharan Africa	1.33	1.36	51.09	51.17	51.79	238.10	320.89	324.78
Total	1.59	1.81	36.31	31.91	34.25	1517.37	1606.58	1722.07
Total (no China)	1.79	2.03	39.34	36.83	38.69	1213.98	1393.15	1461.59

Source: Chen and Ravallion (2001), p.296, Table 4. (a) = no change in the poverty line over time; (b) = poverty lines above 1.08 USD rise with mean

Table 3
Definition and descriptive statistics of the variables used in the regression analysis

Variable	Description	Mean	Std, Dev,	Min	Max
anp1b	Absolute number of poor below 1USD/PPP (Sala-i-Martin)	6880.50	24211.51	0	218300
anp2b	Absolute number of poor below 1USD/PPP (Sala-i-Martin)	20609.86	73717.04	0	608700
cge_gdp	General government final consumption expenditure as % of GDP (WDI)	14.42	6.34	1.25	46.30
debt_gdp	Central government debt, total as % of GDP (WDI)	49.19	47.60	0	452.72
debt2	Index of public indebtedness (own computation)	2.32	0.71	1	3
dem	Dummy variable equal to 1 if country average of pol_freed is less than or equal to 3.5 (own computation)	0.28	0.45	0	1
dem_per	Dummy variable equal to 1 if pol_freed in country and period is less than or equal to 3.5 (own computation)	0.35	0.48	0	1
ecfr_5	Index of regulations (fifth component of the Economic Freedom Index)	5.27	1.13	2.47	8.81
ecfr_ind	Economic Freedom Index	5.42	1.15	2.30	9.06
ed_gdp	Public spending on education, total as % of GNI (WDI)	4.04	1.81	0.39	11.69
edbt_gdp	External debt, total as % of GDP (WDI)	0.24	0.20	0.00	1.24
ei_worei	(Export+Import)/World(Export+Import) - Index of marginalization (own computation)	0.23	0.43	0.00	3.35
exp_gdp	Export of goods and services as % of GDP (WDI)	30.74	23.47	2.05	199.84
expd_exp	Export duties as % of exports (WDI)	3.21	6.21	0	48.65
g_gdp	Public expenditure, total as % of GDP (WDI)	25.11	11.58	0	80.68
gdppc	GDP per capita, constant 1995 US$ (WDI)	2099.39	3191.10	96.61	25878.57
gfdi_gdp	Gross foreign direct investment as % of GDP, PPP (WDI)	1.15	2.24	0	28.88
gpi1c	Gap Poverty Index, 1USD/PPP (World Bank)	8.68	10.45	0	39.50
gpi2c	Gap Poverty Index, 2 USD/PPP (World Bank)	20.81	17.26	0.10	62.20
hpi1a	Headcount poverty index, 1USD/PPP (UNCTAD)	47.08	25.09	2.20	86.80
hpi1b	Headcount poverty index, 1 USD/PPP (Sala-i-Martin)	17.90	19.44	0	73.20
hpi1c	Headcount poverty index, 1 USD/PPP (World Bank)	22.19	20.71	0	78.40
hpi2a	Headcount poverty index, 2 USD/PPP (UNCTAD)	81.22	12.65	54.30	97.10
hpi2b	Headcount poverty index, 2 USD/PPP (Sala-i-Martin)	37.50	25.71	0.10	93
hpi2c	Headcount poverty index, 2 USD/PPP (World Bank)	44.43	27.79	0.30	96
hpi40	Headcount poverty index, 40% of mean income (own computation)	16.81	11.62	0.06	45.81
hpi50	Headcount poverty index, 50% of mean income (own computation)	25.05	12.74	0.295	54.68
imp_gdp	Import of goods and services as % of GDP (WDI)	37.85	24.45	2.19	205.69
impd_imp	Import duties as % of imports (WDI)	13.23	8.48	0	44.92

Variable	Description	Mean	Std, Dev,	Min	Max
island	Dummy equal to 1 if country is small island (own computation)	0.07	0.26	0	1
nfdi_gdp	Foreign direct investment, net inflows as % of GDP (WDI)	1.60	2.67	-5.18	24.43
nfdi_i	Foreign direct investment, net inflows as % of gross capital formation (WDI)	6.84	9.98	-29.00	71.85
polfreed	Index of political freedom and civil rights (Gastil index)	4.32	1.64	1	7
pop	Population, total	34500000.00	127000000.00	83286	1250000000
priv_gdp	Privatization proceeds as % of GDP (WDI)	0.00	0.01	0	0.06
region	Region code (1=Latin America and Caribbean; 2=North Africa and Middle East; 3=Sub Saharian Africa; 4=Eastern Europe and Central Asia; 5=South and South-East Asia)	3.05	1.37	1	5
reldummy	Religious group code (1=Islam; 2=Pre-reform Christian; 3=Reform Christian; 4=Remaining group; 5=Tribal)	2.46	1.21	1	5
rpop_tot	Rural population as % of total population (WDI)	58.32	22.92	0	97.53
rural	Dummy equal to 1 if the average of country rpop_tot is above the sample average of rpop_tot (own computation)	0.52	0.50	0	1
spec	Index of export specialization (1=Agricoltural; 2=manufacturing; 3=Oil and other minerals) (own computation)	1.80	0.73	1	3
sqkm	Surface area in square km (WDI)	726497.10	1738073	620	17100000.00
tax_gdp	Tax revenue as % of GDP (WDI)	17.01	8.13	0	47.49
tit_tax	Taxes on international trade as % of current revenue (WDI)	22.59	16.62	0	76.90
tra_gdp	Trade as % of GDP (WDI)	68.60	46.15	4.23	405.53
w_ei_gdp	(Export+Import)/GDP)/ (World(Export+Import)/World GDP) - Index of marginalization (own computation)	38.62	5.74	26.70	46.19

Table 4
Correlations among some of the variables used in the regression analysis

	hpi1b	hpi2b	tra_gdp	exp_gdp	imp_gdp	expd_exp	impd_imp	nfdi_i	nfdi_gdp	tax_gdp	g_gdp	cge_gdp	ecfr_5	gdppc
hpi1b	1													
hpi2b	0,9193	1												
tra_gdp	-0,2003	-0,2924	1											
exp_gdp	-0,3306	-0,424	0,957	1										
imp_gdp	-0,0342	-0,1155	0,946	0,8113	1									
expd_exp	0,481	0,4365	-0,1149	-0,1981	-0,0102	1								
impd_imp	0,1468	0,2813	-0,2078	-0,1889	-0,2077	0,1103	1							
nfdi_i	-0,1194	-0,1775	0,2836	0,2735	0,266	-0,1424	-0,1989	1						
nfdi_gdp	-0,165	-0,2293	0,3832	0,3693	0,3596	-0,1534	-0,1917	0,9496	1					
tax_gdp	-0,3238	-0,3764	0,4977	0,5344	0,4058	-0,2902	-0,0414	0,03	0,0688	1				
g_gdp	0,0364	-0,0364	0,4417	0,3595	0,4885	-0,0095	-0,0562	-0,0284	0,0124	0,723	1			
cge_gdp	-0,0064	0	0,3402	0,3216	0,3262	-0,137	-0,0104	0,0183	0,0414	0,6013	0,599	1		
ecfr_5	-0,3135	-0,3202	0,3404	0,3504	0,2944	-0,1399	-0,1547	0,3206	0,3599	0,2521	0,0401	0,0721	1	
gdppc	-0,5437	-0,7173	0,1754	0,317	-0,0007	-0,2751	-0,2745	0,1326	0,153	0,5013	0,2144	0,1354	0,2713	1

Notes: description of these variables is in Table 3.

Table 5
Panel regressions: Absolute poverty

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TRADE	-0.12*** [-2.65]	-0.11*** [-2.66]	-0.07 [-1.31]	-0.15** [-2.17]	-0.13* [-1.68]	-0.22*** [-3.90]	-0.14*** [-3.48]	-0.05** [-2.33]	-0.12*** [-2.66]	-0.03 [-0.59]	-0.14*** [-2.60]	-0.17** [-2.50]
FDI	0.09 [1.51]	0.09 [1.46]	0.01 [0.18]	0.42* [1.78]	0.81** [2.01]	0.10 [1.17]	0.19** [2.45]	0.12*** [5.42]	0.10 [1.58]	0.46 [1.33]	-0.50 [1.05]	0.77 [0.10]
PUBLIC	-0.44** [-2.36]	-0.44** [-2.43]	-0.46* [-1.73]	-0.48*** [-2.65]	-0.63*** [-2.58]	-0.17 [-0.68]	-0.36 [-1.60]	-0.36*** [-5.10]	-0.45** [-2.44]	-0.33** [-1.98]	-0.26 [-1.20]	-0.70*** [-2.76]
DEREG					-1.29 [-1.08]							-0.15 [-0.09]
GDP_{PC}	-0.00*** [-2.94]	-0.00*** [-3.00]	-0.00*** [-3.05]	-0.00*** [-3.99]	-0.00*** [-3.67]	-0.01*** [-5.71]	-0.01*** [-7.69]	-0.00*** [-5.22]	-0.00*** [-2.91]	-0.00*** [-2.94]	-0.01*** [-5.97]	
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Specialization dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2 Within	0.33			0.19	0.18	0.38	0.30		0.33	0.05	0.14	0.12
R^2 Between	0.61			0.65	0.70	0.77	0.81		0.62	0.68	0.84	0.70
R^2 Overall	0.57		0.57	0.60	0.63	0.73	0.74		0.58	0.65	0.78	0.65
Wald χ^2	112	86 (LR)		124	114	206	264	167	111	90	221	97
No. observ	144	144	144	203	150	144	203	139	139	119	119	108
No. groups	52	52	52	54	48	52	54	47	50	49	49	45

Notes: in square brackets the value of *z* statistics; *, **, *** mean that the coefficients are statistically significant at the 90%, 95%, 99% respectively. The following variables, described in Table 3, were included in the regression: Column 1: hpi1b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc) Random effect GLS; column 2: hpi2b = f(tra_gdp, nfdi_i tax_gdp region, spec, gdppc) MLE; Column 3: hpi1b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc), OLS with cluster; Column 4: hpi1b = f(exp_gdp, nfdi_gdp, cge_gdp region, spec, gdppc), RE GLS; Column 5: hpi1b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, ecfr_5, gdppc) RE GLS; Column 6: hpi2b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc) RE GLS; Column 7: hpi2b = f(tra_gdp, nfdi_i, cge_gdp, region, spec, gdppc); Column 8: hpi2b = f(tra_gdp, nfdi_i, tax_gdp, region, spec,, gdppc) FGLS with heteroscedastic panels and autocorrelated time-series; Column 9: hpi1b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc) RE GLS without China and India; Column 10: hpi1b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc) RE GLS with lags of 1 period; Column 11: hpi2b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc) RE GLS with lags of 1 period; Column 12: hpi2b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc) OLS with cluster and lags of 1 period.

Table 6
Panel regressions: Absolute poverty (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
TRADE	-0.15*** [-2.69]	-0.07* [-1.64]	-0.02 [-0.49]	-98.04* [-1.90]	-211.79* [-1.80]	-77.27*** [-3.15]	-0.01 [-0.12]	-0.03 [-0.45]	0.01 [0.51]	-0.13 [-1.30]
FDI	0.08 [0.97]	0.12** [2.29]	0.15** [2.42]	13.07 [0.14]	12.69 [0.09]	35.66 [0.93]	0.05 [0.42]	-0.26* [-1.81]	0.08 [1.14]	1.23*** [5.22]
PUBLIC	-0.71** [-2.55]	-0.27 [-1.34]	-0.40** [-2.16]	17.73 [0.07]	309.40 [0.55]	-21.90 [-0.20]	-0.69*** [-2.65]	-1.07*** [-3.25]	-0.33** [-2.18]	2.98*** [3.47]
GDP_{PC}	-0.00* [-1.63]	-0.00** [-2.21]	-0.00*** [-3.67]	-0.88 [-0.78]	-2.65 [-1.05]	-0.57 [-0.99]	-0.00** [-2.40]	-0.01*** [-3.93]	-0.00* [-1.98]	-0.14*** [-3.59]
SIZE	-0.00** [-2.20]	-0.00* [-1.81]	-0.00 [-1.56]	0.00*** [6.46]	0.00*** 16.65]	0.00 [0.06]				
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Specialization dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Public debt	0.07** [2.02]									
External debt		10.40** [2.27]	7.61 [1.60]							
R^2 Within	0.42	0.20	0.14	0.17	0.65	0.08				
R^2 Between	0.63	0.63	0.66	0.91	0.98	0.35				
R^2 Overall	0.57	0.60	0.62	0.52	0.82	0.25	0.68	0.77	0.57	0.53
Wald χ^2	87	85	104	84	419	28	15 (F)	46 (F)	9 (F)	14 (F)
No. observ	90	112	156	144	143	139	95	101	95	32
No. groups	43	52	54	52	52	50	76	77	76	18

Notes: in square brackets the value of *z* statistics; *, **, *** mean that the coefficients are statistically significant at the 90%, 95%, 99% respectively. The following variables, described in Table 3, were included in the regression: Column 1: hpi1b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc, debt_gdp, pop) Random effect GLS; column 2: hpi2b = f(tra_gdp, nfdi_i tax_gdp region, spec, gdppc, edbt_gdp, pop) RE GLS; Column 3: hpi1b = f(tra_gdp, nfdi_i, cge_gdp, region, spec, gdppc, edbt_gdp, density), RE GLS; Column 4: anp1b = f(tra_gdp, nfdi_i, tax_gdp region, spec, gdppc, pop), RE GLS; Column 5: anp2b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc, pop) RE GLS; Column 6: anp1b = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc, pop) RE GLS without China and India; Column 7: hpi1c = f(tra_gdp, nfdi_i, cge_gdp, region, spec, gdppc) OLS with cluster; Column 8: hpi2c = f(tra_gdp, nfdi_i, cge_gdp, region, spec, gdppc) OLS with cluster; Column 9: gpi1c = f(tra_gdp, nfdi_i, cge_gdp, region, spec, gdppc) OLS with cluster; Column 10: hpi1a = f(tra_gdp, nfdi_i, cge_gdp, region, spec, gdppc) OLS with cluster.

Table 7
Panel regressions: Relative poverty

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TRADE	0.03 [1.28]	0.03 [1.35]	0.02 [0.48]	0.02 [1.14]	0.09 [0.90]	0.02 [1.05]	0.09 [0.40]	0.03 [1.40]	0.02 [0.82]	0.04 [1.11]	0.04 [1.37]	0.02 [0.63]
FDI	0.13* [1.80]	0.14* [1.87]	0.62** [1.98]	0.12* [1.82]	0.07 [0.89]	0.15* [1.95]	0.19* [1.67]	0.08 [0.87]	0.15** [2.04]	0.13* [1.67]	0.14* [1.78]	0.10 [1.30]
PUBLIC	-0.17* [-1.68]	0.17* [-1.79]	-0.05 [-0.69]	-0.09 [-0.95]	-0.12* [-1.88]	-0.18* [-1.83]	-0.12 [-1.11]	-0.14 [-1.39]	-0.18* [-1.87]	-0.24** [-2.01]	0.33** [-2.42]	-0.34*** [-3.10]
DEREG								0.37 [0.58]				
GDP_{PC}	-0.00 [-0.86]	-0.00 [-0.91]	-0.00 [-1.02]	-0.00 [-0.71]	-0.00 [-1.50]	-0.00 [-0.94]	-0.00 [-0.62]	-0.00 [-0.74]	-0.00 [-0.95]	-0.00 [-1.34]	-0.00 [-0.63]	0.00 [0.18]
SIZE									-0.00** [-2.07]	-0.00** [-1.99]		
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Specialization dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No small island											Yes	
External debt											7.62 [1.27]	
Adjustment										0.00 [1.37]		
R^2 Within	0.05		0.04	0.05		0.05	0.04	0.05	0.04	0.06	0.08	0.03
R^2 Between	0.70		0.68	0.67		0.71	0.61	0.72	0.72	0.74	0.71	0.37
R^2 Overall	0.63		0.62	0.61		0.65	0.57	0.63	0.66	0.70	0.64	0.29
Wald χ^2	113	71 (LR)	105	100	960	116	63	118	126	122	112	29
No. observ	134	134	133	134	122	128	117	123	134	120	115	134
No. groups	57	57	57	57	45	55	47	54	57	52	54	57

Notes: in square brackets the value of *z* statistics; *, **, *** mean that the coefficients are statistically significant at the 90%, 95%, 99% respectively. The following variables, described in Table 3, were included in the regression: Column 1: hpi50 = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc) Random effect GLS; column 2: hpi50 = f(tra_gdp, nfdi_i tax_gdp region, spec, gdppc) MLE; Column 3: hpi50 = f(exp_gdp, nfdi_gdp, g_gdp, region, spec, gdppc), RE GLS; Column 4: hpi50 = f(tra_gdp, nfdi_i, tax_gdp region, spec, gdppc), RE GLS; Column 5: hpi50 = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc) FGLS with heteroscedastic panels and autocorrelated time-series; Column 6: hpi50 = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc) RE GLS without China and India; Column 7: hpi50 = f(tra_gdp, nfdi_i, cge_gdp, region, spec, gdppc) with lags of one period; Column 8: hpi50 = f(tra_gdp, nfdi_i, tax_gdp, region, spec, ecfr_5, gdppc) RE GLS; Column 9: hpi50 = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc) RE GLS; Column 10: hpi50 = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc, imf, pop, rural) RE GLS; Column 11: hpi50 = f(tra_gdp, nfdi_i, tax_gdp, region, spec, gdppc, edbt_gdp) RE GLS; Column 12: hpi50 = f(tra_gdp, nfdi_i, tax_gdp, reldummy, spec, gdppc) RE GLS.

Table 8
First differences – absolute and relative poverty

	Absolute poverty								Relative poverty			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TRADE	-0.10** [-2.26]	-0.11** [-2.04]	-0.01 [-0.16]	-0.16** [-2.43]	-0.14** [-2.28]	-0.27*** [-3.52]	-0.32** [-2.75]	-0.44** [-2.61]	0.02 [0.66]	0.00 [0.05]	0.01 [0.50]	-0.00 [-0.23]
FDI	0.17 [0.56]	0.43 [0.71]	0.40 [0.64]	0.05 [0.91]	0.20 [0.66]	0.08 [1.19]	0.16 [0.39]	0.26 [0.92]	0.00 [0.05]	0.09 [1.01]	0.02 [0.17]	0.09 [1.07]
PUBLIC	-0.30* [-1.72]	-0.31* [-1.75]	-0.36** [-2.09]	-0.29 [-1.57]	-0.19 [0.73]	-0.35 [-1.52]	0.42 [0.65]	-0.42 [-0.61]	-0.17* [-1.67]	-0.10 [-0.81]	-0.17 [-1.61]	-0.10 [-0.73]
DEREG		-2.86** [-2.43]	-2.34** [-2.25]									
INPOV	-0.11* [-1.68]	-0.15* [-1.67]	-0.20** [-2.22]	-0.06 [-1.36]	-0.11** [-2.04]	-0.05 [-1.50]	-0.86*** [-5.23]	-0.37*** [-5.16]	-0.18** [-3.15]	-0.08** [-2.34]	-0.13** [-2.54]	-0.03 [-0.93]
Regional dummies			Yes				Yes		Yes		Yes	
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes
F test	3.48	2.90		3.97	5.00	4.70		13.69	3.55	2.53	3.49	1.80
R^2	0.21	0.26	0.45	0.15	0.17	0.15	0.89	0.63	0.24	0.12	0.25	0.10
No. observ.	92	81	81	152	92	152	19	19	77	77	77	77
No. Groups	47	41	41	55	47	55	19	19	45	45	45	45

Notes: in square brackets the value of *z* statistics; *, **, *** mean that the coefficients are statistically significant at the 90%, 95%, 99% respectively. Column 1: hpi1b = f(tra_gdp, nfdi_gdp, tax_gdp, hpi1b_1, period) OLS with cluster, regression in first differences; Column 2: hpi1b = f(tra_gdp, nfdi_gdp tax_gdp, ecfr_5, hpi1b_1, period) OLS with cluster, regression in first differences; Column 3: hpi1b = f(tra_gdp, nfdi_gdp, tax_gdp, ecfr_5, hpi1b_1, region, period) OLS with cluster, regression in first differences; Column 4: hpi1b = f(exp_gdp, nfdi_i, cge_gdp, hpi1b_1, period) OLS with cluster, regression in first differences; Column 5: hpi2b = f(tra_gdp, nfdi_gdp, tax_gdp, hpi2b_1, period) OLS with cluster, regression in first differences Column 6: hpi2b = f(exp_gdp, nfdi_i, cge_gdp, hpi2b_1, period) OLS regression in first differences; Column 7: hpi1c = f(tra_gdp, nfdi_gdp, tax_gdp, hpi1c_1, region) OLS regression in first differences; Column 8: hpi1c = f(tra_gdp, nfdi_gdp, cge_gdp, hpi1c_1) OLS regression in first differences; Column 9: hpi50 = f(tra_gdp, nfdi_gdp, tax_gdp, hpi50_1, gdppc, region, period) OLS with cluster, regression in first differences; Column 10: hpi50 = f(tra_gdp, nfdi_gdp, tax_gdp, hpi50_1, period) OLS with cluster, regression in first differences.