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Dualism, Poverty Exits and Growth Accelerations

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July 2017

Please cite this paper as: BERTHÉLEMY. J.C. (2017), "Dualism, Poverty Exits and Growth Accelerations", *AFD Research Papers Series*, n° 2017-50, July.

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ISSN 2492 - 2846

Dualism, Poverty Exits and Growth Accelerations

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Résumé

Nous proposons un modèle théorique simple pour étudier la dynamique d'une économie dans laquelle des individus sortent du piège de la pauvreté. Cette dynamique se caractérise par une accélération de la croissance et des inégalités temporairement croissantes. Nous fournissons des faits stylisés basés sur des données de distribution de revenus qui suggèrent que de nombreux épisodes d'accélération récents correspondent à nos prédictions théoriques. Bien que les sorties de pauvreté puissent résulter de la croissance du revenu, nous trouvons un certain nombre de cas de sorties de pauvreté autonomes. Ces sorties de pauvreté peuvent avoir deux causes différentes : des réformes réussies créant plus d'emplois pour les pauvres et des politiques de transfert en faveur des pauvres.

Mots-clés : croissance économique, pauvreté, réformes, annulation de dettes

Abstract

We propose a simple theoretical model to study the dynamics of an economy in which individuals move out of poverty trap. These dynamics are characterized by growth acceleration and temporarily growing inequalities. We provide stylized facts based on income distribution data that suggest that many recent acceleration episodes fit our theoretical predictions. Although poverty exits may result from income growth we find a number of cases of autonomous poverty exits. These poverty exits may have two different causes: successful reforms creating more job opportunities for the poor and successful pro-poor transfer policies.

Key words: Economic growth, poverty, policy reform, debt relief

JEL Classification: O11, I32, D31.

Original version: English

Accepted: July 2017

Introduction

Since the seminal paper of Lewis (1954) over sixty years ago, dualism has been a major subject in development economics. Gollin (2014) provides a good recent review of the post-Lewis literature on dualism. A central theme in this literature is understanding the extent to which dualism, which is commonly observed in developing countries, disappears naturally over time, as expected by Lewis, or whether it persists indefinitely.

The notion of the poverty trap provides a useful framework to study both the possible persistence of dualism and the dynamics leading to the escape from dualism. Essentially, an individual is trapped in poverty if she cannot escape her predicament in spite of her best efforts to do so. We propose to link this notion of a poverty trap to the analysis of dualism by assuming that those in the traditional sector are trapped in poverty whereas those in the modern sector are not; in this sense, escaping the poverty trap is associated with moving from the traditional sector to the modern sector.

This paper proposes a theoretical framework to study the growth dynamics of a dual economy that is consistent with the poverty trap hypothesis. Following the ideas suggested by Barrett and Swallow (2006) that poverty traps have a fractal character, income jumps observed at the individual level when individuals escape the poverty trap should have similar repercussions at the aggregate level. The theoretical model of escapes from the poverty trap (or "poverty exits") that we propose in this paper confirms this intuition as it predicts that poverty exits result in growth accelerations. In our theoretical framework, moreover, poverty exits would also distinctively affect the structure of income distribution: the poverty headcount might decline but income inequality would temporarily increase.

We associate this theoretical framework with stylized facts regarding growth accelerations. Hausmann et al. (2005) have shown not only that developing countries have experienced many growth acceleration episodes in recent decades but also that the attempts to find convincing explanations for such accelerations have failed to a large extent. Our model offers a possible explanation for some growth acceleration episodes.

In addition to contributing to the analysis of growth acceleration episodes, our theoretical framework provides an alternative approach to the typical discussion of the growth-inequality-poverty nexus. The mainstream literature considers that poverty reduction is a consequence of economic growth resulting from the so-called trickle-down effect, which is possibly mitigated by supposedly exogenous changes in income distribution. Conversely, our model puts poverty reduction at the beginning of a chain of causations: poverty trap exits may create a distinct acceleration in positive growth – as opposed to being a mere consequence of income growth – that also affects income distribution.

This paper is organized as follows. Section I provides a brief review of the related literature. In section II, we propose a theoretical framework in which poverty exits are analyzed as switches

from the traditional sector to the modern sector. Section III derives consequences for aggregate income and income inequality dynamics. In section IV, we update the growth acceleration list provided by Hausmann et al. (2005) and build a methodology to discuss such episodes in terms of the growth-poverty-inequality nexus. Section V reports the corresponding stylized facts observed in recent growth acceleration episodes, and provides tentative interpretations of the identified poverty exit episodes, and section VI concludes.

I. Literature review

Our starting point is Azariadis and Stachurski (2004), who define a poverty trap as "any self-reinforcing mechanism which causes poverty to persist". This notion of the poverty trap has been explored both theoretically and empirically. Some papers consider single-equilibrium as well as multiple-equilibrium poverty traps. As we are ultimately interested in transitions out of the poverty trap – poverty exits – we consider only poverty traps in a framework involving multiple equilibriums.

The term poverty trap is used in the literature at different levels of aggregation, from the individual or household microeconomic level to the macroeconomic or countrywide level. In this regard, we can refer interested readers to recent surveys of this literature in Barrett and Carter (2013), who consider mainly microeconomic aspects, and Kraay and McKenzie (2014), who also discuss the available evidence at the aggregate level.

Most microeconomic models of the poverty trap rely on particular assumptions regarding technology that are complemented by capital or labor market imperfections. A central assumption is that individuals choose between traditional subsistence activities and modern entrepreneurial activities that require a fixed investment. Moving out of the poverty trap would imply investing in modern tools of production, which is prevented by risk-aversion and imperfections in the capital market. Carter and Barrett (2006) investigate this possibility and define what they call a Micawber threshold separating situations in which individuals are too poor to accumulate assets that would help them invest in improved methods of production from situations in which such investment is feasible. In their research, Aghion and Bolton (1997) study the underlying capital market model, whereas Banerjee and Newman (1993) study the consequences on occupational choices (self-employment vs. contractual employment). Dasgupta and Ray (1986) introduce another possible cause of poverty traps that relies on the efficiency wage model. In their model, the poverty trap arises from the low employability of the poor, which locks them into unemployment and poverty. Other theories regarding the poverty trap are based on specific behavioral assumptions. For instance, Moav and Neeman (2012) propose a model in which the poor spend part of their income in conspicuous consumption as a means of improving their social status. Such conspicuous consumption prevents them from saving and helps keep them in poverty. In addition, the poverty trap can also be related to psychological mechanisms (Haushofer and Fehr, 2014).

Although these theoretical models of poverty traps have attracted substantial attention, a consensus can hardly be reached regarding the empirical relevance of such models, notably at the macroeconomic level. Kraay and McKenzie (2014) argue that many developing countries have experienced similar or more rapid growth than the US in recent decades, implying that they should at some point have crossed any poverty trap threshold. In particular, these authors consider that the growth accelerations observed by Hausmann et al. (2005) do not fit particularly well with the predictions from the poverty trap theories.

Hausmann et al. (2005) have a different view on this particular subject, as they admit that escapes from the poverty trap might be responsible for some of the observed growth accelerations: "There are a large number of models in which countries can be in different "states" and can switch from state to state responding to factors that determine their long run equilibrium. For instance, in models with "poverty traps" the relationship between policy variables and growth outcomes is not linear as a movement across a threshold can cause a switch from a "trap" state to a "growth state."

Nevertheless, Hausmann et al. (2005) did not empirically investigate the possibility that growth accelerations might correspond to transitions out of the poverty trap. Instead, they explored several other possible explanations of growth accelerations: external shocks, political changes and economic reforms. The common idea in these explanations is that exogenous shocks that modify the steady state of the economy will lead to a transitory growth acceleration, as long as the new steady state income level is higher than the initial income level. However, none of the mechanisms considered by Hausmann et al. (2005) is embedded in a poverty trap model, in which the change of the steady state would come from switching from a low equilibrium to a higher equilibrium in a theoretical framework that encapsulated multiple equilibriums.

Although Hausmann et al. (2005) find significant estimates that are consistent with their hypothesized mechanisms, the marginal effects of their explanatory variables on the probability of growth acceleration are very small, leaving such acceleration episodes mostly unexplained. They conclude their analysis as follows: "[W]e want to emphasize the limited success that our right-hand side variables collectively achieve in predicting major growth turnarounds. Although many of the explanatory variables are statistically significant, they explain very little of the growth pattern that the data reveal." Jong A Pin and de Haan (2011) reconsider the definition of accelerated growth episodes and find that economic liberalization reforms have more significant positive effects on the likelihood of acceleration than that found by Hausmann et al. (2005), whereas political regime changes do not have similar positive effects. However, these authors' model also leaves most acceleration unexplained, which is evidenced by the very low pseudo R-squared that they obtain. As a complement, Dovern and Nunnenkamp (2007) find that aid flows have significantly positive marginal effects on the probability of growth accelerations, but again this effect is small. Guillaumont and Wagner (2012) confirm their results and find that aid flows have a greater effect on the probability of acceleration when the economy is more vulnerable. This latter result might be consistent with a poverty trap model in which aid flows would help

recipient countries under some circumstances (or poor individuals in these recipient countries) move out of the poverty trap.

II. A theoretical model of poverty exits

Let us consider a population of N individuals, consisting of L poor individuals locked in low productivity equilibrium and $H=N-L$ individuals who have escaped this low equilibrium and who enjoy higher productivity and higher income. We abstract from demographic factors (N=constant) and concentrate our attention on the structure of this population. The overall structure corresponds to a typical dual economy in which dualism has disappeared when all individuals have escaped the low equilibrium and have high productivity jobs. Low productivity jobs are typically associated with traditional modes of production, whereas high productivity jobs correspond to modern modes of production.

The proportion of individuals in high productivity jobs is $h=H/N$. The average incomes of the low productivity and high productivity individuals are y_L and y_H, respectively. Incomes can deviate at each point of time from these averages due to temporary shocks. As a result of these shocks, individuals with low productivity jobs can move to high productivity jobs under certain circumstances. As a simplifying assumption, we assume that shocks incurred by individuals in high productivity jobs never pull them down to low productivity status.

In what follows, we illustrate the movements from low productivity jobs to high productivity jobs as a migration process, although these movements could also be conceived without the analogy of geographical migration. We assume that only part of the population can access high productivity jobs, for instance because of segregationist policies or social norms. They represent a proportion $\bar{h}$ of the total population. Hence a proportion $(\bar{h}-h)$ of the population is currently in a low productivity job but could potentially switch to a high productivity job, whereas a different proportion $(1-\bar{h})$ is locked into low productivity jobs. In addition, we assume that escaping the low productivity equilibrium involves a sunk cost, related to migration costs, for instance, or to the minimum capital required to adopt a modern mode of production. This sunk cost can be assumed only by individuals whose income is above a threshold level, θ, with $\theta > y_L$. Hence, shifting from low equilibrium to high equilibrium depends on a positive individual shock (push factor). It also depends on the availability of a job in the labor market for high productivity jobs (pull factor). The parameter θ separates individuals who are chronically poor from the non-chronically poor and we henceforth call this parameter the poverty line.

We call F the cumulative distribution function of shocks that affect low productivity individuals at each point in time. The proportion p of individuals in the total population who attempt at each point of time to migrate from a low productivity job to a high productivity job is:

$$p = (\bar{h}-h)(1-F(\theta-y_L)) \quad (1)$$

This proportion can be influenced by migration costs, risk aversion, financial market imperfections, and by migration and income transfer policies.

We assume a constant turnover rate in the market for modern jobs, called τ, such that the probability, □ *dt*, that an individual receives a productive job opportunity during a period of time, *dt*, is

$$\pi dt = \tau h dt \qquad \square\square\square$$

From these hypotheses, it follows that at any point of time, the instant variation of the proportion of individuals in high productivity jobs is

$$dh = p\pi dt = \alpha h\left(\bar{h} - h\right)dt \qquad (3)$$

where $\alpha = \tau(1 - F(\theta - y_L))$.

This differential equation corresponds to a dynamic process that follows a logistic curve, whose equation as a function of time t is:

$$h(t) = \frac{\bar{h}}{1+e^{-(\alpha t+\beta)}} \qquad (4)$$

where β is a constant parameter.

This model describes in a simple manner the dynamics of structural change from low productivity employment to high productivity employment, exhibiting a logistic curve shape that typically characterizes models of adoption of innovation since Griliches (1960). Here, the "innovation" that is adopted is merely switching from traditional activities to modern activities, which corresponds to the standard description of the dynamics of a dual economy evolving into a modern economy. As the next section shows, these dynamics correspond to growth acceleration.

III. Poverty exits and growth acceleration

Given this process *h(t)*, the dynamics of aggregate income per capita *y* can be defined by

$$y(t) = h(t)y_H + \left(1 - h(t)\right)y_L = y_L + (y_H - y_L)h(t) \qquad (5)$$

y moves from a lower bound y_L to a higher bound $\bar{y} = \bar{h}y_H + (1 - \bar{h})y_L$ and its growth rate is equal to:

$$g(t) = \frac{dy(t)}{y(t)dt} = \frac{\alpha(y(t)-y_L)(\bar{y}-y(t))}{(y_H-y_L)y(t)} \qquad (6)$$

These dynamics correspond to a growth acceleration from $y = y_L$, (where the growth rate is equal to zero), culminating when

$$\frac{dg(t)}{g(t)dt} = \frac{\alpha(y_L\bar{y} - y(t)^2)}{(y_H - y_L)y(t)} = 0 \quad (7)$$

that is, when $y(t) = \sqrt{y_L\bar{y}}$

followed by a growth deceleration leading to $y = \bar{y}$, where the growth rate tends again toward zero.

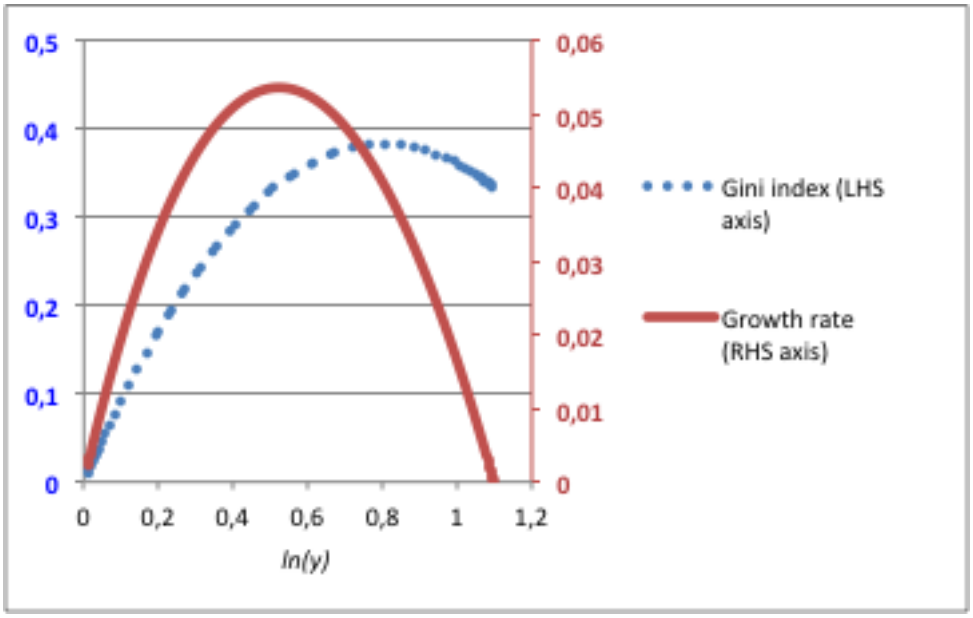
In addition, this process leads to rising, then possibly to declining, income inequality. The Gini index is equal to:

$$G(t) = \frac{h(t)(y_H - y(t))}{y(t)} = \frac{(y(t) - y_L)(y_H - y(t))}{y(t)(y_H - y_L)} \quad (8)$$

which reaches its maximum when $y(t) = \sqrt{y_L y_H}$

In the simplest case (defined as where there is no limit to the proportion of the population that could reach high productivity jobs, i.e., corresponding to $\bar{h} = 1$), the Gini index and the growth rate peak simultaneously. Otherwise, when $\bar{h} < 1$, income inequality declines only after the end of the growth peak. It might not ever decline if $\sqrt{y_L y_H} > \bar{y}$. Figure 1 illustrates these properties.

Figure 1: Simulation of the dynamics of income and income distribution



The dynamics described by our model can then be characterized by the following features:

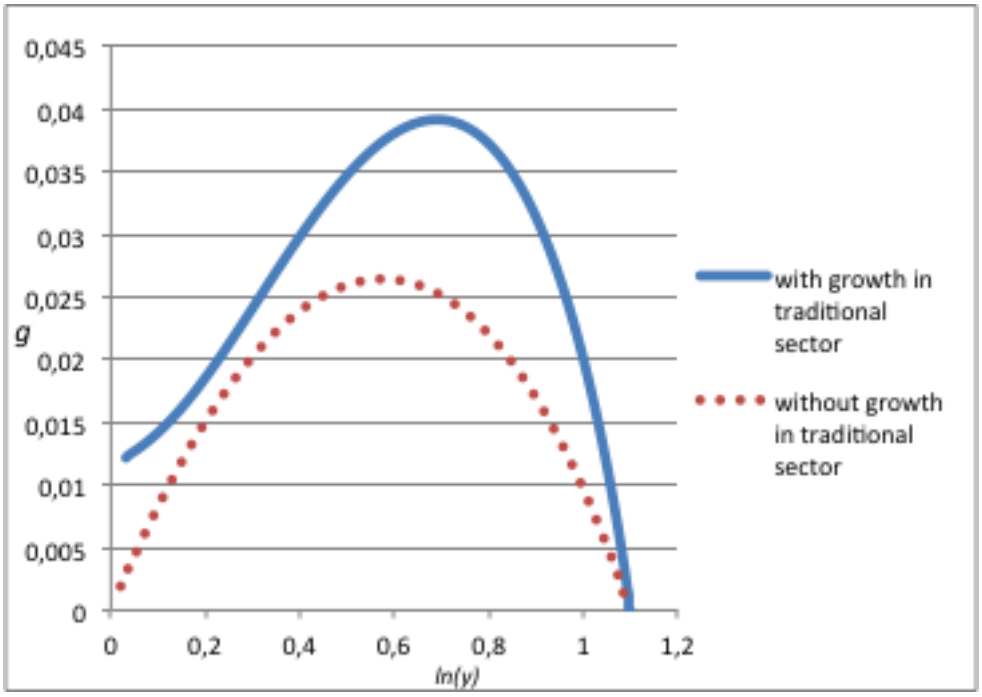
(i) positive growth,

(ii) poverty reduction, and

(iii) (at least for a while) increased inequalities.

In this framework, economic growth comes only from reducing poverty, i.e., an increase of *h*. The model can be easily modified to incorporate the possibility of exogenous sources of economic growth, which would be equivalent to technological progress in both the modern and traditional sectors, increasing y_H and y_L over time. Even if we do not expect actual technological improvements in the traditional sector, y_L can grow as a result of growth of y_H, through general equilibrium effects, e.g., through changes in the relative prices of basic consumer goods bought by workers in the traditional sector. In the case of increasing y_L, the parameter itself in equation (3) increases over time, which reinforces the accelerated growth in the economy through poverty exits that are triggered by such growth impulse. Figure 2 illustrates this with a simulation using a normal distribution of individual shocks (to compute $F(\theta - y_L)$). Incomes grow faster in the scenario with growth in the traditional sector than without it, but they converge to the same level.

Figure 2: Simulation with growth of income in the traditional sector



An interesting property of this model is that an infinitesimal but steady growth impulse in the traditional sector would eventually lead to growth acceleration, as there would always be a date t^* such that $F(\theta - y_L(t)) < 1$, and then $\Delta > 0$ for all dates t beyond t^*.

Whether poverty exits result from income growth in the traditional sector or occur independently of it is at bottom an empirical question. In the next sections on stylized facts, we will attempt to separate the poverty reduction led by income growth in the traditional sector from other sources of poverty reduction, which we will call "autonomous" poverty exits.

Such "autonomous" poverty exits may themselves be the result of a variety of causes. In our framework summarized in equation (3) they can result from positive income shocks enjoyed by poor individuals (e.g. through income transfers, increasing p), from reduced costs of migration from the traditional to the modern sector (e.g. through reduced entry barriers in the market for modern jobs, increasing p) or from increased probability of success of job search in the modern sector (e.g. through job creations in the modern sector, increasing Δ).

IV. Stylized facts: data and methodology

The first step of our search for stylized facts that would illustrate our theoretical model is to identify growth accelerations. We do so by applying the method proposed by Hausmann et al. (2005) to recent years. The criteria are as follows:

"We define the growth rate $g_{t,t+n}$ at time t over horizon n to be the least squares growth rate of GDP per capita (y) from t to $t+n$ defined implicitly by the following:

$$ln(y_{t+i}) = a + g_{t,t+n} * t,\ i = 0, \ldots, n.$$

The change in the growth rate at time t is simply the change in the growth over horizon n across that period:

$$\Delta g_{t,n} = g_{t,t+n} - g_{t-n,t}\ .$$

We identify growth accelerations by looking for rapid growth episodes that satisfy the following conditions.

(1) $g_{t,t+n} \geq 3.5$ ppa, growth is rapid,
(2) $\Delta g_{t,n} \geq 2.0$ ppa, growth accelerates,
(3) $y_{t+n} \geq \max\{y_i\}$, $i \leq t$, post-growth output exceeds pre-episode peak.

We set the relevant time horizon to be eight years (i.e., $n = 7$). The timing of the initiation of the growth acceleration is chosen by finding the year that maximizes the F-statistic of a spline regression with a break at the relevant year." (Hausmann et al., 2005)

We apply these criteria to data available in the Penn World Tables 9.0, which offers us the possibility to identify growth accelerations beyond the year 2000. We restrict our analysis to the years beyond 1980 and to non-OECD countries. In the few cases of multiple accelerations within this period of time, we treat them as single accelerations because in such cases (e.g., China) growth remains continuously above 3.5 ppa.[†]

Then, we use the estimates of income distribution for (as much as possible) the same time period that are available from the World Bank Povcalnet [‡]dataset to study the contribution of poverty exits to economic growth. This dataset provides information at different dates on the average income/consumption (y)[§] and both the poverty headcount ($1-h$) and the poverty gap for any poverty line (θ), from which we can infer the average income of individuals under the poverty line (y_L) and above the poverty line (y_H). Denoting $\gamma(t,\theta)$ as the poverty gap at time t for the poverty line θ we compute:

$$y_L(t,\theta) = \theta\left(1 - \frac{\gamma(t,\theta)}{1-h(t,\theta)}\right) \quad (9)$$

$$y_H(t,\theta) = \frac{y(t)-(1-h(t,\theta))y_L(t,\theta)}{h(t,\theta)} \quad (10)$$

The dataset provides time series for each country but with a variable time frequency. For each country, we choose the longest possible period of time that lay within the time interval of the acceleration episode identified using the definition from Hausmann et al. (2005).

After eliminating countries without data in the Povcalnet dataset, we obtain 41 episodes of growth acceleration for which we can evaluate the contribution of poverty exits to economic growth (Table A2). We eliminate two countries for which the Povcalnet estimates of income show a negative growth for the period from these 41 episodes.[**] We also eliminate eight countries whose income inequality – as measured by the Gini index computed in Povcalnet – does not increase for at least part of the period: such episodes are not consistent with our theoretical model of poverty trap escapes (our condition (iii) above is not met). Finally we have 31 episodes that we can consider as possibly consistent with poverty trap escapes (Table A2).

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† This choice to treat single and multiple accelerations episodes similarly is consistent with our analysis of poverty traps as long as we extend our model to multiple stages of modernization of the economy (e.g., from a poverty trap to a middle income trap).

‡ Source http://iresearch.worldbank.org/PovcalNet/index.htm?0

§ Data are available on consumption or on income, depending on the surveys used. When both occurrences exist for a given country, we have restricted our analysis to only consumption or income (based on which one has the highest number of observations over time).

** These two countries are Mali and Romania. Many reasons may explain divergences in growth evaluations between the Penn World Tables and the Povcalnet dataset, such as different concepts (GDP vs. Household income/consumption) and different dates of observation (for some countries the available period of observation is shorter than in the Penn World Tables), among others.

To evaluate the contribution of poverty exits, we must choose a poverty line. This poverty line may differ from one country to the next, as not all countries are at the same stage of development. For each country, at the initial year of our period of observation, we have computed the portion of the Gini index that can be explained by our framework describing income distribution as a dual structure, as expressed in equation (8). We then chose, for each country, the poverty line at which the contribution of the dual structure of income to the Gini index is the highest possible. For all countries considered, this contribution is above or equal to 70%, which suggests that describing income distribution as a dual structure is an acceptable approximation.

Once we have chosen □, we measure the contribution of poverty exits to aggregate growth. We begin from equation (5) in which we introduce the possibility of growth induced by changes in y_H and y_L alongside of the effects of reducing the poverty headcount *1-h*. Equation (5) is then re-written as follows:

$$y(t) = y_L(t,\theta) + \big(y_H(t,\theta) - y_L(t,\theta)\big)h(t,\theta) \tag{11}$$

The overall growth of *y(t)* can thus result both from exogenous growth impulses in the modern and traditional sectors and from poverty exits. A simple differentiation of equation (11) directly provides an accounting framework that describes how reducing the poverty headcount contributes to economic growth. More precisely, we can decompose the aggregate income growth between dates *t* and *t+1* as:

$$g(t) = \frac{y_H(t,\theta) - y_L(t,\theta)}{y(t)}\big(h(t+1,\theta) - h(t,\theta)\big)$$

$$+ g_H(t,\theta)h(t,\theta)\frac{y_H(t,\theta)}{y(t)}$$

$$+ g_L(t,\theta)\big(1 - h(t,\theta)\big)\frac{y_L(t,\theta)}{y(t)}$$

$$+ (h(t+1) - h(t,\theta))\frac{g_□(t,\theta)y_H(t,\theta) - g_L(t,\theta)y_L(t,\theta)}{y(t)} \tag{12}$$

where g_H and g_L are the observed growth rates of y_H and y_L between dates *t* and *t+1*, respectively.

$$g_L(t,\theta) = \frac{y_L(t+1,\theta) - y_L(t,\theta)}{y_L(t,\theta)} \tag{13}$$

$$g_H(t,\theta) = \frac{y_H(t+1,\theta) - y_H(t,\theta)}{y_H(t,\theta)} \tag{14}$$

The first term in equation (12) measures the contribution of poverty exits (denoted as $\Delta h(t,\theta)$ henceforth) to aggregate growth: the Δh individuals who are initially in traditional activity and escape the poverty trap by switching to modern activities during the period $[t, t+1]$ enjoy an income gain that is equal on average to the income gap between the poor and non-poor $y_H(t,\theta)-y_L(t,\theta)$ as a consequence. The second and third term measure the contribution of income growth in the modern sector and in the traditional sector, respectively. The fourth term is an interaction term that corresponds to the fact that households escaping poverty enjoy gains from income growth in the modern sector instead of in the traditional sector. By construction, this last term is a residual, which will typically be of small magnitude compared to the three other terms.

The first term provides us a means of measuring the direct contribution of poverty exits to aggregate economic growth, without accounting for its indirect effects resulting from the interaction term. We focus our analysis on this direct effect, which provides us a lower bound of the effects of the poverty exits, given that the fourth term is typically positive.††

However, in equation (12), part of the Δh poverty exits might be caused by the growth of incomes in the traditional sector. There is no straightforward way to tackle this issue given that the growth impulse in the traditional sector cannot be correctly inferred by the observed growth simply defined by equation (13) because for any given positive income growth impulse enjoyed by the traditional sector, the richest individuals at date t under the poverty line have a higher probability than the poorest individuals to move to the modern sector and escape poverty from t to $t+1$. As a consequence of this change of the base on which we compute the average income of individuals in the traditional sector for both years, $g_L(t,\theta)$ underestimates this growth rate, which should instead be computed using a constant base.

To generate a more accurate estimate, we assume that the growth rate of incomes of households below the poverty line is uniform. The underlying assumption is that all individuals in the traditional sector enjoy equally improved economic performance, which makes sense if such growth is due to the general equilibrium effects of technological progress emanating from the modern sector. Under this assumption, the actual rate of growth of incomes in the traditional sector, denoted as $\hat{g}_L(t,\theta)$, can be computed as the solution of equation (15):

$$\frac{y_L(t+1,\theta)}{y_L\left(t,\frac{\theta}{1+\hat{g}_L(t,\theta)}\right)} = 1+\hat{g}_L(t,\theta) \qquad (15)$$

The left-hand side in this equation measures the growth of the average income of households that would be below the poverty line $\theta/(1+\hat{g}_L(t,\theta))$ at time t and consequently remain below the poverty line θ at time $t+1$. Combined with equation (9), we obtain:

†† This is guaranteed as soon as g_H is not lower than g_L.

$$\frac{\gamma(t+1,\theta)}{1-h(t+1,\theta)} = \frac{\gamma(t,\frac{\theta}{1+\hat{g}_L(t,\theta)})}{1-h(t,\frac{\theta}{1+\hat{g}_L(t,\theta)})} \quad (16)$$

At date *t+1*, assuming that the income of households below the poverty line □□ has uniformly grown from date *t*, we search the corresponding growth rate $\hat{g}_L(t,\theta)$ by looking for the poverty line $\theta/(1+\hat{g}_L(\theta))$ that would lead to a ratio of poverty gap to poverty headcount at time *t* that is equal to the same ratio observed at time *t+1* for the poverty line θ.

Then, we conclude that only part of the poverty exits, measured by

$$\hat{\Delta}\big(h(t,\theta)\big) = h(t+1,\theta) - h\left(t,\frac{\theta}{1+\hat{g}_L(t)}\right) = \Delta\big(h(t,\theta)\big) - \left(h\left(t,\frac{\theta}{1+\hat{g}_L(t)}\right) - h(t,\theta)\right) \quad (17)$$

can be considered to be the extent of poverty exits that is "autonomous", i.e. independent of economic growth in the traditional sector. It is obviously lower than *Δ(h(t,θ))*. We refer to it as the autonomous poverty exit. Consistently, the effect of $\hat{\Delta}(h(t,\theta))$ on economic growth is measured by

$$\varepsilon(t,\theta) = \frac{y_H(t,\theta) - y_L\left(t,\frac{\theta}{1+\hat{g}_L(t)}\right)}{y(t)}\hat{\Delta}(h(t,\theta)) \quad (18)$$

V. Stylized facts: empirical results

We focus our analysis on the 31 acceleration episodes for which data are available in Povcalnet and whose data are consistent with our theoretical model, i.e., that show positive growth in average incomes, an initially growing Gini inequality index and a reduction of the poverty headcount. This reduction of the poverty headcount is on average close to 30 percentage points of the population and is particularly large in East Asia and in Eastern Europe, in which the total populations of several countries enjoy poverty exits of more than 50 percentage points (Table 1). These poverty exits account on average for 2.2 percentage points of aggregate income growth on an annualized basis, which can be compared with an average annualized income growth of 3.8 percentage points. The direct effect of poverty exits account for more than half of the total income growth in over two-thirds of the countries (23 out of 31).

Our final objective is to identify the possible causes of these poverty exits. In our analytical framework based on poverty traps, there may be three principal causes of these poverty exits. First, as explained in the previous section, some of the poverty exits may merely result from economic growth impulses in the traditional sector, possibly resulting from growth in the modern sector through general equilibrium effects (changes in the price system). Such growth impulses would mechanically lift some of the poor above the poverty line. Second, poverty exits may result from a pull factor: better opportunities offered to the poor in the modern sector job market may pull some of the poor out of the poverty trap. Such opportunities may either come from new job creations in the modern sector or result from a lowering of entry barriers faced by the poor in the

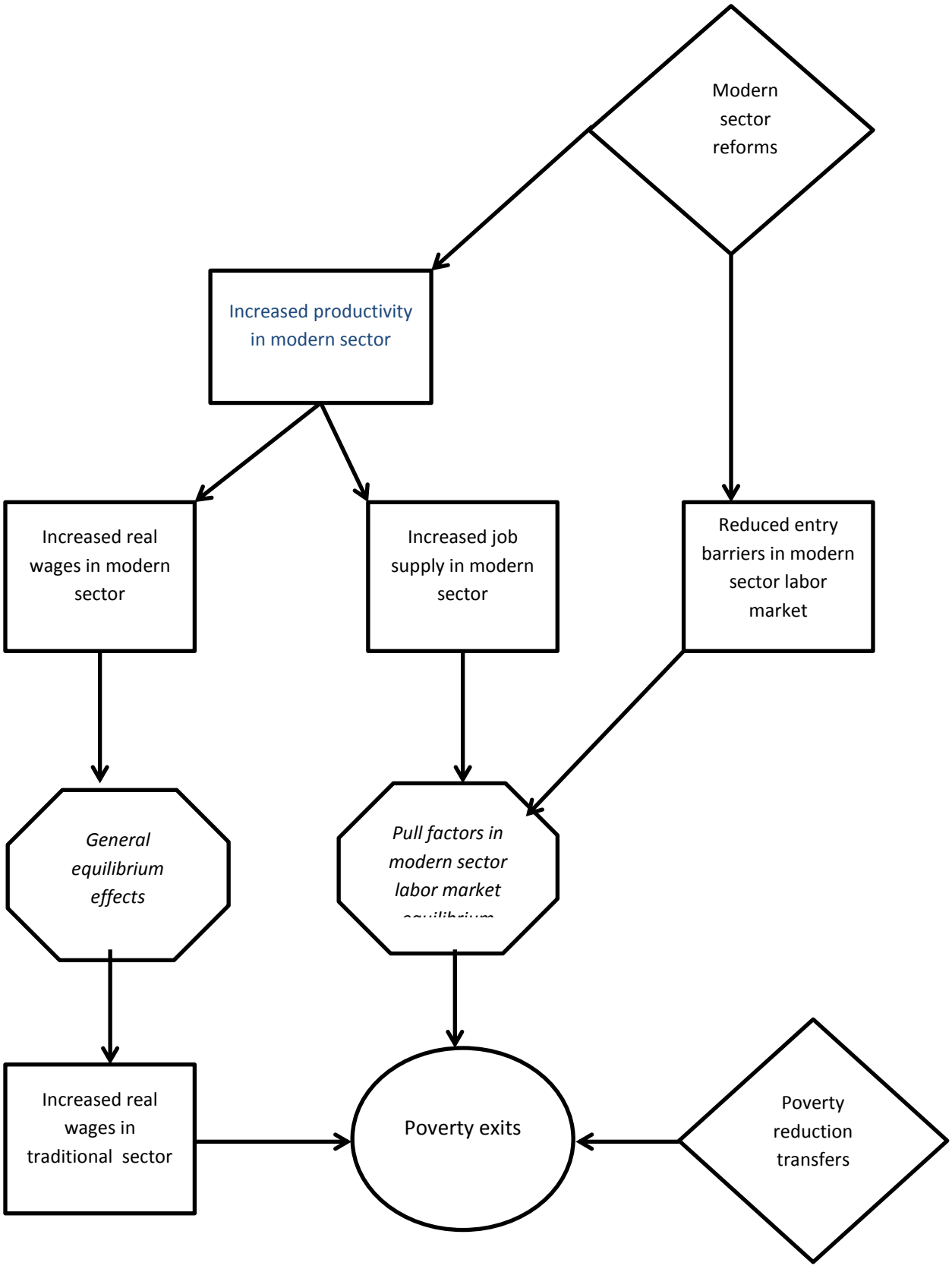
modern sector labor market; in both cases this pull factor would be related to successful reforms in the modern sector. Third, poverty exit may be the consequence of a pro-poor transfer policy, which would transfer income or other resources to the poor and then push some poor individuals above the poverty line. These channels are summarized in Figure 3.

Table 1: Poverty line, poverty exit during acceleration episodes and effect on growth

Country	poverty line (2011 PPP US$)	poverty exit (change in poverty headcount, % of total population)	Growth effect of poverty exit (annualized, %)	Annual growth, per capita (%)
Belarus	6.2	61.1	3.2	8.4
Bulgaria	12.1	21.6	1.3	1.5
Burkina Faso	1.4	31.6	5.5	6.7
Cambodia*	2.1	22.2	3.3	4.1
Chile	11.4	36.1	2.3	2.8
China	1.8	53.3	2.1	7.0
Colombia	7.7	28.4	4.2	5.3
Ecuador	6.9	26.0	2.5	3.7
Ethiopia	2.1	22.7	1.6	2.6
India	2.3	31.5	1.0	1.7
Indonesia	1.7	53.1	1.8	4.0
Jordan*	5.0	25.8	2.1	2.7
Lao PDR*	1.7	13.7	1.3	2.3
Latvia	8.1	44.3	1.6	4.3
Lithuania	5.1	61.4	2.7	7.4
Macedonia	7.9	11.9	0.9	4.3
Malawi	1.8	2.2	0.5	1.3
Mauritania	4.5	12.6	1.8	2.4
Mongolia	4.6	46.7	2.3	4.7
Mozambique	1.3	22.5	2.5	3.5
Nigeria	2.3	1.5	0.1	0.5
Pakistan	3.0	25.5	2.5	3.3
Panama	13.5	18.5	2.3	3.1
Peru	8.1	29.5	3.2	4.2
Philippines	3.6	19.3	2.0	3.8
Rwanda	1.8	17.5	2.8	4.3
South Africa	5.9	13.9	2.6	6.9
Sri Lanka	5.7	17.2	2.1	2.7
Thailand	5.7	54.9	2.6	4.0
Uruguay	19.1	13.5	0.7	1.0
Venezuela	10.2	7.5	1.4	1.6
Vietnam	2.5	59.2	2.8	6.2
Average		28.3	2.2	3.8

* 1995 PPP US$

Figure 3 : channels of poverty exits



Our method to evaluate traditional sector growth is based on searching a growth rate that would satisfy equation (16), based on the assumption of uniform income growth among all the poor (i.e. an unchanged distribution of income below the poverty line). For three countries (Belarus, Columbia, Panama), this method failed.

Theoretically, the ratio of the poverty gap over the poverty headcount tends to zero when the poverty line tends to zero (i.e., when the poverty line is equal to the income of the poorest individual, the poverty gap is by definition equal to zero). Moreover, it tends to infinity when the poverty line tends to infinity, as long as incomes are bounded. These properties should theoretically guarantee the existence – but not the uniqueness – of a solution; the uniqueness would be certain only if this ratio were monotonic. Empirically, we observe that this ratio is monotonic, which guarantees the existence and uniqueness of the solution to equation (16) for all countries but Belarus, Columbia and Panama. For the three latter countries the ratio is not monotonic, which is theoretically possible, but additionally it does not converge to zero for very low poverty lines, which is theoretically inconsistent. Unsurprisingly, the World Bank warns the users of Povcalnet that their data may not be accurate at the limits of the income distribution: "We would especially warn that estimates of the densities near the bottom and top tails of the distribution could be quite unreliable, and no attempt has been made by the Bank's staff to validate the tool for such purposes".[#] This warning may explain why we might observe data inconsistent with our theoretical expectations at the lower end of the income distribution. As a consequence, we are unable to find a solution to equation (16) for these three countries, which we thus drop from our analysis. We therefore restrict our analysis to the remaining 28 countries.

As reported in Table 2, we find that poverty exit may be entirely explained by income growth in the traditional sector for 12 countries. We may also include in this category Mongolia, whose poverty exit is almost entirely explainable by income growth in the traditional sector (only 0.1 percentage points of poverty reduction would not be explained by it). Conversely, for the remaining 16 countries, at least some of the poverty exits are not explained by income growth in the traditional sector. The numbers are lower than in Table 1, which is as expected, but nonetheless relatively large for 7 countries, in which growth in the traditional sector explains less than 50% of the total poverty exits (Bulgaria, Ethiopia, Lao PDR, and 4 countries, Latvia, Lithuania, Macedonia and Malawi with negative growth in the traditional sector, implying that their entire poverty reduction can be considered as independent of economic growth in the traditional sector).

[#] Source : http://iresearch.worldbank.org/PovcalNet/

Table 2: Evaluation of autonomous poverty exits

Country	Total poverty exits during acceleration episode (% of total population)	Autonomous poverty exits (% of total population)	Growth effect of autonomous poverty reduction (annualized, %)	Annual growth, per capita (%)
Countries with autonomous poverty exits				
Bulgaria	21.6	20.5	1.2	1.5
Burkina Faso	31.6	6.6	1.5	6.7
China	53.3	11.6	0.7	7.0
Ethiopia	22.7	14.5	1.1	2.6
Lao PDR	13.7	9.3	1.0	2.3
Latvia	44.3	44.3	1.6	4.3
Lithuania	61.4	61.4	2.7	7.4
Macedonia	11.9	11.9	0.9	4.3
Malawi	2.2	2.2	0.5	1.3
Mauritania	12.6	4.3	0.7	2.4
Mongolia	46.7	0.1	0.0	4.7
Mozambique	22.5	3.2	0.4	3.5
Philippines	19.3	5.6	0.7	3.8
Thailand	54.9	7.3	0.5	4.0
Uruguay	13.5	2.4	0.1	1.0
Vietnam	59.2	15.3	1.1	6.2
Average	30.2	13.8	0.9	3.9
Countries without autonomous poverty exits				
Cambodia	22.2	≤0	≤0	4.1
Chile	36.1	≤0	≤0	2.8
Ecuador	26.0	≤0	≤0	3.7
India	31.5	≤0	≤0	1.7
Indonesia	53.1	≤0	≤0	4.0
Jordan	25.8	≤0	≤0	2.7
Nigeria	1.5	≤0	≤0	0.5
Pakistan	25.5	≤0	≤0	3.3
Peru	29.5	≤0	≤0	4.2
Rwanda	17.5	≤0	≤0	4.3
South Africa	13.9	≤0	≤0	6.9
Venezuela	7.5	≤0	≤0	1.6
Average	24.2			3.3

In order to check the empirical validity of the assumption underlying our assessment of growth in the traditional sector, i.e. a uniform growth of incomes among the poor, we compute the Gini coefficient of the sub-sample of population below the poverty line at the start and end dates of our episodes. Results are reported in Annex Table 3, which shows a rather low and stable coefficient except for Uruguay. In the case of Uruguay income distribution in the sub-sample

below the poverty line has increased quite a lot, which may be due to our selection of a very high poverty line. As a consequence we eliminate Uruguay from our further analysis.

Autonomous poverty exits can in turn be considered as actually responsible for part of the growth performance. For the 15 countries with autonomous poverty exits, their effects on economic growth, computed under equation (18), is on average close to 1 percentage point of annualized growth. It is equal to or more than 1 percentage point for 7 countries (Bulgaria, Burkina Faso, Ethiopia, Lao PDR, Latvia, Lithuania, Vietnam).

Among these 15 countries, we finally attempt to identify those where poverty exit may be related to a push factor or to a pull factor.

The pull factor explanation is likely in transition countries, which have implemented broad pro-market reforms in the period of time following 1990, which corresponds to their growth acceleration: Bulgaria, Latvia, Lithuania and Macedonia in Eastern Europe and China, Lao PDR and Vietnam in East Asia. Successful market reforms may have created additional modern sector job opportunities in these countries. Braga de Macedo and Oliveira Martins (2008) suggest that the most successful reformers have been those who implemented complementary reforms, such as Bulgaria, Latvia and Lithuania.

Besides new job creations in the modern sector, labor market reforms (not considered in Braga de Macedo and Oliveira Martins, 2006) may have also facilitated access of the poor to these jobs. Conversely, in China, Lao PDR and Vietnam, the pull factor has possibly been tempered by the large size of rural population; poor living in rural areas would have to pay migration costs to the cities to escape poverty. Such costs create against the poor natural barriers to entry into the modern sector. In China restrictive internal migration policy (the "houkou" system), which regulates rural-urban migration, may have further reduced the magnitude of the pull factor.

The Philippines and Thailand, whose growth accelerations started earlier, in the 1980s, may be considered in the same group of countries where pro-market reforms have contributed to poverty exits. The vast literature of the East Asian miracle has pointed to breadth of reforms to explain their economic successes. Labor market reforms, in particular, have been considered as instrumental in the success of growth and poverty reduction in these countries (Quibria, 2002).

A few other transition economies and East Asian miracle countries in our dataset do not exhibit the same pattern of growth and poverty exits. In Cambodia and Indonesia, observed poverty reduction cannot be dissociated from the mere effect of income growth in the traditional sector; the absence of a visible pull factor may be also related to the large size of their rural population. Kazakhstan and Uzbekistan, and previously Malaysia, may have enjoyed similar patterns of poverty reduction, but we excluded them from our analysis because they registered continuously reduced income inequality during their acceleration period.

The remaining 5 countries in our sub-sample of countries with autonomous poverty exits are Burkina Faso, Ethiopia, Malawi, Mauritania and Mozambique. These countries share in common the fact that they have been early beneficiaries of the enhanced HIPC (Highly Indebted Poor Countries) in the early 1990s. This major initiative may have created in these countries the conditions of a push factor leading to poverty exits.

The IMF and World Bank introduced the HIPC initiative in 1996 to promote debt relief for HIPCs, notably by official creditors. The beneficiary governments were required to use the resources saved in poverty reducing expenditures, as programmed in a poverty reduction strategy paper (PRSP). Initially modest, the initiative was enhanced in 2000, and complemented by an additional Multilateral debt relief initiative (MDRI). As of today, 36 HIPCs have benefitted from the enhanced HIPC and MDRI initiatives, for a total debt relief à US$ 127 billion. The timeframe of implementation was organized in two steps: a decision point and a completion point. The decision point triggered significant interim debt service reduction, and was attained early by most countries, based on an acceptable macroeconomic policy framework and an interim PRSP. The completion point attainment required confirmation of the macroeconomic sustainability and production of a mutually agreed final PRSP. At this point, the debt stock was reduced. To a large extent, countries that attained early completion points were those with the best ability to produce a satisfactory PRSP, i.e. capacity to effectively transform the debt relief financial assistance into poverty reduction expenses. This is consistent with our observation of autonomous poverty exits in the early 2000s (between 2000 and 2004) in Burkina Faso, Ethiopia, Mauritania and Mozambique, which may have contributed to their growth acceleration. In Malawi, the completion point was attained only in 2006, but precisely its autonomous poverty exit is much smaller (2% of total population).

Wamboye and Tochkov (2016) found that the HIPC initiative had a positive effect on economic growth, particularly in countries that had registered moderate to rapid growth before the start of the initiative, which is the case of our four countries. Their growth acceleration started before the HIPC initiative implementation, but it was also strengthened by poverty reduction financed by debt relief. This is particularly the case in Burkina Faso and Mozambique, whose acceleration started in 1992, but whose poverty reduction was observed in povcalnet data principally after 1998 and 2002, respectively. Such observations of a mutual reinforcement of the growth impact of poverty exits and of independent sources of growth would be consistent with our numerical simulation in Figure 3, which shows that a small independent source of growth would magnify the growth impact of an acceleration induced by poverty exits.

Several other countries were early beneficiaries of the HIPC initiative but did not exhibit growth acceleration, as defined by Hausmann et al. (2005). However most of them had better growth performances after the HIPC initiative, as documented in Table 3. Among eight countries for which data were available in the Penn World Tables, six registered improved income per capita growth rates after 2000, but such improvements were not long and/or high enough to pass the Hausmann et al. (2005) test. The only countries with negative growth were Madagascar and Niger, which faced in the period serious governance difficulties. We performed the same poverty

exit calculations as in Table 2 for Bolivia, Tanzania and Uganda, for which data were available in povcalnet. All three countries exhibit some autonomous poverty exits. To some extent, this reinforces our conclusion that the enhanced HIPC initiative triggered, at least in well-prepared countries, autonomous poverty exits, with a positive impact on economic growth.

Table 3: Early HIPC initiative beneficiaries without growth acceleration

Country	Enhanced HIPC initiative dates		enhanced growth		annual growth, per capita	Povcalnet period of observation		Poverty exit (% of total population)	Autonomous poverty exit
	decision	completion	start	end		start	end	..	..
Benin	2000	2003	2000	2007	2,7	..	..	..	..
Bolivia	2000	2001	2001	2005	3,5	2001	2005	3,7	1,7
Ghana	2002	2004	2003	2011	4,3	..	..	..	..
Mali	2000	2003	2004	2008	3,2	..	..	..	..
Tanzania	2000	2001	2000	2008	5,7	2000	2007	40,0	2,3
Uganda	2000	2000	2000	2009	3,6	1999	2009	21,7	3,8
Guyana	2000	2003	..	..	..	..	..	..	..
Madagascar	2000	2004	..	..	≤0	..	..	..	..
Nicaragua	2000	2004	..	..	..			..	..
Niger	2000	2004	..	..	≤0			..	..

VI. Conclusion

In this paper, we have proposed a simple theoretical model that accounts for the possibility of poverty trap escapes. This model can help explain growth accelerations in developing and transition economies that have been observed repeatedly but that, so far, are only partially explained. More specifically, our model predictions are consistent with the observation of acceleration episodes in about two-thirds of cases in which poverty declines and income inequality increases simultaneously. We have proposed an accounting framework to evaluate the extent of poverty exits and their consequences for economic growth. In this framework, poverty exits account for a large proportion of observed economic growth during acceleration episodes. We admit that not all poverty exits can be understood to cause economic growth, given that independent sources of income growth within the traditional sector may explain a portion of the poverty exits.

We have proposed a means of isolating poverty exits that can be considered as autonomous in the sense that poverty is reduced beyond the mechanical effects of income growth in the traditional sector. Using this approach, we have identified a number of episodes of acceleration that would be partly caused by autonomous poverty exits. In such countries, close to 1 percentage point of annual growth can be considered as caused by autonomous poverty exits, on average. The possible causes of these autonomous poverty exits are diverse. For some of them, a successful reform process, leading to poverty exits associated with pull factors in the modern sector labor market, is a likely explanation. Deeper research would be necessary to disentangle in

these cases reforms leading to modern job creations from reforms reducing entry barriers in the modern sector labor market. For other countries, autonomous poverty exits could be related to the enhanced HIPC initiative. Admittedly, not all beneficiaries of this initiative have experienced growth acceleration and autonomous poverty exits. Further research would be necessary, possibly along the lines of Wamboye and Tochkov (2016) who found that HIPC countries with pre-HIPC initiative better performances enjoyed higher positive consequences of this initiative.

In the bulk of the empirical literature on the relation between economic growth and poverty, the core question has been to assess the influence of economic growth on poverty reduction, the former being considered as a causal factor of the latter, possibly modified by supposedly exogenous changes in income distribution. Following our approach, the causality is partly reversed: reductions in poverty that are triggered by the escape of part of the population from the poverty trap could contribute to growth acceleration. We show that this possible reverse causality merits further research. Admittedly, factors that would trigger poverty exits may have also a direct positive effect on economic growth, whose analysis was beyond the scope of this paper. This requires a detailed exploration of the channels through which policy initiatives may lead to poverty exits, and contribute to economic growth, as illustrated in Figure 3.

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Annexe

Table A1: Acceleration episodes

Country	Penn World		Povcalnet		Country	Penn World		Povcalnet	
	start	end	start	end		start	end	start	end
Albania	2002	2011	2002	2012	Malaysia	1998	2011	1997	2009
Bangladesh	2003	2011	2005	2010	Mali	2004	2011	2006	2009.8
Belarus	1998	2011	1998	2012	Mauritania	1998	2011	2000	2008
Bulgaria	1995	2011	1995	2012	Mongolia	1993	2011	1995	2012
Burkina Faso	1992	2002	1994.2	2003	Mozambiqu	1992	2011	1996.27	2008.6
Cambodia	1996	2011	2004	2011	Nepal	2004	2011	2003.25	2010.1
Chile	1986	2011	1987	2013	Nigeria	1993	2011	1992	2009.8
China	1990	2011	1990	2010	Pakistan	2000	2011	2001.5	2010.5
Colombia	2001	2011	2001	2013	Panama	1999	2011	1999	2013
Dominican	2003	2011	2003	2013	Peru	2000	2011	2000	2013
Ecuador	1997	2011	1998	2013	Philippines	1984	1998	1985	1997
Ethiopia	1999	2011	1999	2010.5	Romania	1996	2011	1998	2012
India	1982	2011	1983	2011.5	Rwanda	2000	2011	2000.38	2010.8
Indonesia	1987	2011	1987	2010	South	1999	2011	2000.75	2011
Jordan	1996	2011	1997	2010	Sri Lanka	2001	2011	2002	2012.5
Kazakhstan	1998	2011	2001	2013	Thailand	1986	2011	1988	2012
Lao PDR	2003	2011	2002.2	2012	Uruguay	1989	2011	1989	2013
Latvia	1993	2011	1993	2012	Uzbekistan	2000	2011	2000	2003
Lithuania	1993	2011	1993	2012	Venezuela	1998	2011	1998	2006
Macedonia	1995	2011	1998	2008	Vietnam	1989	2011	1992.71	2012
Malawi	2000	2011	2004.2	2010.2					

Table A2: Annual growth and Gini index in acceleration episodes

Country	Annual	Gini(%)			Country	Annual	Gini(%)		
		start	max	end			start	max	end
Albania	1.5	32.46	32.46	28.96	Malaysia	1.7	49.1	49.1	46.2
Bangladesh	1.4	33.22	33.22	32.12	Mali	-1.5	38.9	38.9	33.0
Belarus	8.4	30.67	31.31	26.01	Mauritania	2.4	39.0	40.1	37.4
Bulgaria	1.5	35.40	36.10	36.01	Mongolia	4.7	33.2	35.8	33.7
Burkina Faso	6.7	48.07	49.94	43.25	Mozambique	3.5	44.4	47.0	45.5
Cambodia	4.1	35.53	41.25	31.82	Nepal	4.1	43.2	43.2	32.7
Chile	2.8	56.21	57.25	50.45	Nigeria	0.5	44.9	51.9	42.9
China	7.0	32.43	42.63	42.06	Pakistan	3.3	30.5	32.6	29.5
Colombia	5.3	57.76	60.08	53.49	Panama	3.1	56.4	57.6	51.6
Dominican	0.7	52.09	52.09	47.07	Peru	4.2	50.7	54.0	44.7
Ecuador	3.7	49.66	58.60	47.29	Philippines	3.8	41.0	45.9	45.9
Ethiopia	2.6	29.98	33.17	33.17	Romania	-6.3	31.0	31.0	27.3
India	1.7	31.11	35.46	35.46	Rwanda	4.3	48.5	52.0	51.3
Indonesia	4.0	29.27	35.57	35.57	South Africa	6.9	57.7	64.7	63.3
Jordan	2.7	36.42	38.87	33.69	Sri Lanka	2.7	40.7	40.7	38.5
Kazakhstan	7.0	35.29	35.29	26.35	Thailand	4.0	43.8	47.8	39.2
Lao PDR	2.3	32.47	36.22	36.22	Uruguay	1.0	42.3	47.6	41.8
Latvia	4.3	26.99	39.40	35.48	Uzbekistan	1.0	36.1	36.1	35.2
Lithuania	7.4	33.64	37.06	35.15	Venezuela	1.6	49.8	52.3	46.9
Macedonia	4.3	28.13	44.05	44.05	Vietnam	6.2	35.6	42.6	38.7
Malawi	1.3	39.87	46.12	46.12					

Table A3: evolution of the Gini coefficient of the sub-sample below poverty line

country	start year	end year
Bulgaria	19%	22%
Burkina Faso	23%	18%
China	15%	20%
Ethiopia	15%	15%
Lao PDR	10%	10%
Mauritania	22%	20%
Mozambique	23%	21%
Philippines	20%	23%
Thailand	22%	11%
Uruguay	24%	76%
Vietnam	18%	12%

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