Demand-Side Constraints in Development: The Role of Market Size, Trade, and (In)Equality*

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Abstract

What is the pathway to development in a world marked by rising economic nationalism and less international integration? This paper answers this question within a framework that emphasizes the role of demand-side constraints on national development, which is identified with sustained poverty reduction. In this framework, development is linked to the adoption of an increasing returns to scale technology by imperfectly competitive firms that need to pay the fixed setup cost of switching to that technology. Sustained poverty reduction is measured as a continuous decline in the share of the population living below $1.90/day purchasing power parity in 2011 US dollars over a five year period. This outcome is affected in a statistically significant and economically meaningful way by domestic market size, which is measured as function of the income distribution, and international market size, which is measured as a function of legally-binding provisions to international trade agreements, including the General Agreement on Tariffs and Trade, the World Trade Organization and 279 preferential trade agreements. Counterfactual estimates suggest that, in the absence of international integration, the average resident of a low or lower-middle income country does not live in a market large enough to experience sustained poverty reduction. Domestic redistribution targeted towards generating a larger middle class can partially compensate for the lack of an international market.

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1 Introduction

Many of the success stories of economic development during the last century, for instance in East Asia (Stiglitz, 1996), coincided with growth in exports and trade surplus. As advances in technology threaten the comparative advantage o ered by cheap labor, and as interest in protectionism rises in advanced economies, it is not clear that this same export-led model will be relevant in the future. Lund et al. (2019) nd that the share of trade based on labor-cost arbitrage (de ned as exports from countries whose GDP per capita is one- fth or less than that of the importing country) has been declining in some value chains, especially in labor-intensive manufacturing where it dropped from 55 percent in 2005 to 43 percent in 2017. Such observations have led policy makers to ask: What is the pathway to development in a world with less international integration?

The literature has suggested many alternative theories of development. Rodrik, McMillan and Sepulveda (2013) provide a useful taxonomy, in which they distinguish between two main schools of thought: one based on theories of \structural transformation" and one based on \fundamentals". Theories of structural transformation are premised on the idea that in low-income countries, there is a \dual economy" with two sectors, one with high, and one with low productivity, and that development involves the transition from the low- to the high-productivity sector. In contrast, theories based on \fundamentals," (i.e., human capital, infrastructure, institutions) typically treat the economy as a single sector and emphasize the importance of long-run investments in fundamentals as prerequisite for development.

The present work takes Rodrik et al's taxonomy as a point of departure. However, rather than thinking of the two lines of inquiry as structural transformation versus fundamentals, we will think of them as theories emphasizing demand-side versus supply-side constraints in development. We consider the two approaches complementary; the evidence certainly provides support for the main ideas of both. However, we argue that for many countries, especially those with small market size, it is the demand-side constraints that are binding.

The importance of supply side constraints to development has been explored in a large literature. Banerjee and Du o (2005) provide an excellent overview in their Chapter for the 2005 Handbook of Economic Growth. Chief among the supply-side constraints they discuss are capital market imperfections. The recognition that such constraints are important has led to many important policy e orts to alleviate them (including our own work on human capital - see, for example, Angrist, Djankov, Goldberg and Patrinos (2021), Agarwal and Reed (forthcoming)). But the crucial premise underlying all these e orts is that the demand side of the economy will support supply-side e orts, and hence one does not need to worry about it; if policy makers invest in the \right" long-term

policies on the supply-side, the rest will take care of itself. If, for instance, countries invest in human capital, then there will be jobs for the more skilled labor force such investments will create.

Theories of structural transformation in contrast emphasize the demand side of the market. The basic structural transformation paradigm involves the transition from agriculture to manufacturing and then to services, whereas the development of the service sector is accompanied by urbanization. In this paradigm, demand drives growth. Openness and export-led industrialization play an important role in this process and ensure that market-size is not a constraint. Large countries (such as China or India) can rely on their domestic markets. Small countries can tap into the international market to increase their e ective market size. Exports to the lucrative markets of more advanced economies allow them to exploit economies of scale and obtain revenues that they then can use towards the all-important investments in fundamentals.

Of course, the reality is much more complex than this stylized description of theoretical paradigms as various papers and reviews of structural transformation theories have made clear (see for example the informative discussions in Gollin (2010, 2014); Gollin, Parente and Rogerson (2004); Herrendorf, Rogerson and Valentinyi (2014). However, to a rst-order approximation, the experience in East Asia (China, South Korea, Vietnam, Thailand) roughly conforms to the paradigm described above.

What is di erent today? Increasing automation, combined with a strong backlash against globalization and the rise of economic nationalism are making this export-led model of industrialization unlikely. As the old paradigm of structural transformation is coming under strain, demand-side constraints in development are becoming rst-order. This leads to the question posed in the opening paragraph: What is the vision for such countries?

One alternative often suggested in policy circles is the growth of services. However, services are a highly heterogeneous category - not all types of services are associated with the high productivity gains that go hand in hand with the growth of manufacturing. Gollin, Jedwab and Vollrath (2016) for instance, make a distinction between \production" and \consumption" services and show that only the rst are associated with productivity gains. In contrast, the growth of consumption services led to \urbanization without industrialization" | a phenomenon particularly salient in several African cities. Closely related is the \premature de-industrialization" of Africa (Rodrik, 2016). In a related vein of work, Fan, Peters and Zilibotti (2021) ask, this time focusing on India, whether growth in India has been service-led or service-biased and nd the answer to this question to be nuanced. In sum, there is little evidence to date that the service sector as a whole can served as the engine of growth for low- and lower-middle-income countries.

In the quest for a new \vision" for development, the following observation may be useful. India

grew fast in the last three decades, but its growth was not driven by manufacturing, and certainly not by exports. This leads to the hypothesis that a large domestic market size, like the one India enjoys thanks to its large population, may make it easier to develop. The reason is that a large domestic market allows countries to exploit economies of scale. But Nigeria, a country both large and rich in natural resources, provides a counterexample. Nigeria has experienced periods of fast growth, but no sustained development and no poverty reduction. There are of course many di erences between India and Nigeria, but one particular hypothesis that comes to mind in the comparison of the two countries is that development also requires a certain degree of \equality," so that a positive shock (e.g., through an increase in agricultural productivity or oil exports) can trickle down, generate demand, and jump-start the process of structural transformation. When the wealth of a nation is held in the hands of a few, this process never takes o . Note that in this story, a certain degree of equality is prerequisite for development.

While the above hypothesis may have some intuitive appeal, it is far from the point where it can serve as the basis of scienti c inquiry. Several questions come to mind: How do we operationalize this idea? What does \large market" mean in this context, i.e., how large does a market need to be for domestic economies of scale to be su cient? What is the meaning of \equality" here? How do we measure \development"? What is a small country supposed to do if it cannot rely on its domestic market and if trade is not an option? And many more...

To answer these questions and bring them to the data, one needs a conceptual framework. To this end, we consider a stylized model in the spirit of Dave Fultz's \dish-pan" model of global weather patterns, eloquently described in Paul Krugman's \The Fall and Rise of Development Economics" (Krugman, 1994). As Krugman notes, we know that the model is wrong | how could a model ever do justice to the complexity of the development process? Nevertheless, the stylized framework is useful in helping us to structure our thinking, cut away the extraneous in order to gain insight into the mechanisms through which a larger market size, domestic or international, can spur development, and answer the questions posed above.

Speci cally, we develop a model that emphasizes the role of demand-side constraints on national development, which we identify with sustained poverty reduction. We measure sustained poverty reduction as a continuous decline in the share of the population living on less than $1.90 PPP per day in 2011 US dollars, over a 5 year period. In this framework, development is linked to the adoption of an increasing returns to scale technology by imperfectly competitive rms, who need to pay the xed setup cost of switching to that technology. Poverty is reduced as adoption of the new technology sets o a structural transformation process that increases wages. The necessary

demand to overcome the fixed cost of technology adoption may come from either the domestic or the international market. Importantly, economies of scale can be achieved even in sectors serving primarily domestic demand (e.g., services); in such a case, the role of exports from the tradable sector is that they provide income that translates into additional demand for all sectors, including those that are non-tradable. Increased demand stemming from broad household ownership of firm profits is the key channel through which an equitable distribution of wealth and income improves labor productivity in the general equilibrium model we use to motivate our empirical analysis (Murphy, Shleifer and Vishny, 1989a).

The size of the international market is measured on the basis of a new database of the legally-binding provisions of international trade agreements, which include the General Agreement on Tariffs and Trade (GATT), the various agreements of the World Trade Organization (WTO), and 279 preferential trade agreements (PTAs) whose provisions are recorded by Hofmann, Osnago and Ruta (2017). These provisions primarily establish rights related to goods and services trade, but also relate to flows of capital, ideas, and labor, and together make up the legal architecture of the international economy. The size of a given country's integrated international market is calculated by summing the population and income of all other countries, where those countries are weighted by the number of economic integration provisions a country has signed with them. Though the relative per capita income of the integrated market declines rapidly with a country's national income in our sample, we find that its effect on sustained poverty reduction is positive, quantitatively large and statistically significant, suggesting international integration has provided a pathway for poor countries to eliminate poverty in the past. These results are highly relevant in light of the existing evidence that poverty declines more slowly among countries that are initially poor (Ravallion, 2012).

Setting the size of the integrated international market to zero in a counterfactual scenario allows us to isolate the effect of domestic market size alone on sustained poverty reduction, which quantifies the hope for development in a less integrated economy. The size of the domestic market is measured as a function of the income distribution, as summarized by the share of the population in the global middle class (defined based on Kharas (2017) to include those living on $11-110 PPP per day in 2011 US dollars). The use of an absolute, rather than relative, definition for the middle class reflects the assumption that the increasing returns technology is the same across countries. Like the size of the international market, the middle class share has a positive and significant effect on sustained poverty reduction.[1]

[1]Allowing for a large gap between the lower bound of the middle class ($11 PPP per day) and the upper bound of poverty ($1.90 PPP per day) ensures the relationship between the share of the population in these two states is not mechanical. Alternative definitions of the middle class have been studied by others. For instance, Birdsall,

Our empirical framework is inspired by the industrial organization literature, specifically Bresnahan and Reiss (1991), who develop a method to estimate entry thresholds based on the profit functions of firms facing increasing returns and entering imperfectly competitive markets. Their approach is especially useful in our setting because it does not require data on market prices to estimate variable profit and fixed cost parameters, which are required to calculate the break-even point. Using this approach, we estimate that the threshold market size for sustained poverty reduction is 405 million people, if the purchasing power of these people is below that of the global middle class.

In a scenario in which the size of the integrated international market is set to zero, as of 2011-15, the average resident of a low and lower-middle income country does not live in a market large enough to experience sustained poverty reduction. The primary reason for this is that the middle class in these countries is not yet large enough. In our preferred specification, for the average country in our sample, increasing the share of the population in the middle class by 10 percent is equivalent to increasing population by 72 million people. For countries with small population, equality therefore is disproportionately important. This suggests that, if international integration is indeed waning, to eliminate poverty policy-makers in poor countries must focus on equalizing the distribution of income, for instance through taxation or (as suggested by the model underlying this paper's analysis) redistribution of equity shares to the poor.

Methodologically, our work is related to a specific approach in the economic growth literature, in which researchers identify a set of countries that perform exceptionally well over some time period, and then compare them with the rest of the world. In the report of the Commission on Growth and Development, Spence et al. (2008) identify 13 economies that have sustained cumulative GDP growth of more than 7 percent annually for 25 years or more since 1950.[2] Werker (2012) studies all countries that achieved double-digit growth | above 10 percent annually | for 8 or more years, finding that almost two thirds of such periods are either recoveries from war or resource booms, typically those driven by oil. Hausmann, Pritchett and Rodrik (2005) identify periods of growth

Graham and Pettinato (2000) and Easterly (2001) define the middle class in each country relative to the national income distribution (i.e., respectively, 0.75-1.25 of median income; and the 20th and 80th percentile in consumption). Banerjee and Duflo (2008) and Ravallion (2009) examine alternative definitions which are fixed across countries, but may be considered suitable for different income levels (i.e., respectively, $2-4/day and $6-10/day; or a "developing world's middle class" with income above the median poverty line of developing countries and a "Western middle class," above the poverty line of the United States). The use of an absolute threshold anchored to advanced country living standards, as in this paper, is more common in the private sector, for instance among retailers considering whether to enter a market. For the argument that this approach is profit-maximizing, see the critical review of "bottom-of-the pyramid" retail strategies by Simanis (2012).

[2] These are Botswana; Brazil; China; Hong Kong SAR, China; Indonesia; Japan; the Republic of Korea; Malaysia; Malta; Oman; Singapore; Taiwan, China; and Thailand.

accelerations, by identifying all periods in which the change in growth rate is greater than or equal to 2 percentage points per annum, and then coding the successive 7 year period to equal one (and zero otherwise) if growth over that time was more than 3.5 percent per annum, and if income at the end was higher than the maximum of income during the period. They find that such accelerations are highly unpredictable. In all of these studies, the years over which growth is observed are allowed to vary, and the length of time studied is longer than five years. In contrast, our approach holds periods fixed in time, each comprising a disjoint five-year window (e.g., 1981-85, 86-90, etc.). This approach constrains us from selecting windows of time that paint a disproportionately positive or negative picture of performance in a specific country. It also means our predictions are relevant for the relatively shorter time horizon over which governments make decisions.

The paper proceeds as follows. In Section 2, we introduce our conceptual framework that guides the empirical strategy laid out in Section 3. In Section 4, we describe the variables we construct to bring the model to the data, namely sustained poverty reduction, the middle class share of the population, and the relative size of the integrated international market. Section 5 presents the results. Section 6 discusses our counterfactual estimates of market size in an economy without international integration. Section 7 concludes and offers some thoughts on policy implications.

1.1 Related Literature

In addition to the works just described, our analysis contributes to several distinct literatures. First, our focus on sustained poverty reduction is relevant to a literature on poverty dynamics, which have been studied in individual countries (Ferreira, Leite and Ravallion, 2010) and among households (Carter and Barrett, 2006; Baulch and Hoddinott, 2000). A key message of this literature is that households frequently move in and out of poverty, and it is much rarer to escape permanently than to escape for a few years (Shepherd and Diwakar, 2019). Looking across countries, more than half of the time countries have sustained poverty reduction at the aggregate level. The results also highlight the limited effect of the business cycle in advanced economies on poverty reduction in developing economies, at least during the 2006-10 and 2011-15 windows, which included the advanced economies' financial crisis and deceleration, and yet were among the best years for sustained poverty reduction.

Second, our paper contributes to a voluminous literature on inequality, poverty and growth. We find that a certain degree of equality and poverty reduction go hand in hand at low income levels, a result that is broadly consistent with Barro (2000, 2008), Keane and Prasad (2002), and Ostry, Berg and Tsangarides (2014). Our work in this regard is most closely related to Desai and Kharas

(2017) who emphasize the importance of the middle class in poverty reduction. While these authors use historical data since 1870 to explore the relationship between the middle class and poverty reduction, we focus on a more recent period that is characterized by growing global integration and use counterfactual simulations to quantify the role of the middle class in sustained poverty reduction.

Third, our study contributes to a literature on the e ects of trade policy on poverty (Autor, Dorn and Hanson, 2016; Topalova, 2010; Harrison, ed, 2007; Goldberg and Pavcnik, 2004; Winters, McCulloch and McKay, 2004). We introduce to this literature a novel measure of integrated international market size, which in our model predicts sustained poverty reduction. This measure complements and extends the data sets of Sachs and Warner (1995) and Wacziarg and Welch (2008), which identify the speci c years at which economies liberalize. By our treaty-based measure of liberalization, in which a country has access to some international market once it signs a trade agreement, many countries appear open in years when these other datasets consider them closed. Even though many countries are closed according to our measure in 1981, almost none are closed today, given almost complete membership in the WTO by UN member states. Despite this, there is large variation in the relative size of the integrated international market in many regions, driven for instance by China's entry into the WTO in 2001, which lowered the average income of WTO member states by approximately 18 percent.

Finally, while models of development with rm-level increasing returns assume supply-side constraints, such as capital market imperfections, to explain why countries remain poor (Banerjee and Du o, 2005), our framework does not rely on such assumptions. Our demand-side framework implies that the small size of the market itself may explain why countries remain poor. Further, this equilibrium is in our stylized framework unique. Support for the view that demand-side constraints may be binding comes from the empirical literature on the growth of small and medium-sized enterprises (Woodru , 2018). While a decade of research on supply-side interventions, for instance micro nance (Banerjee, Karlan and Zinman, 2015) and business training (McKenzie and Woodru , 2014), has found mostly disappointing e ects, a nascent literature nds that boosts to demand may be e ective in promoting productivity growth (Alfaro-Urena, Manelici and Vasquez, 2020; Atkin, Khandelwal and Osman, 2017; Ferraz, Finan and Szerman, 2015).

2 Conceptual Framework

We de ne \development" as sustained poverty reduction. While many indicators summarize a country's progress, poverty reduction is arguably the best indicator that a country is on track

to becoming what could be called an advanced economy. Poverty elimination is the rst of the World Bank's Twin Goals and the rst of the United Nation's Sustainable Development Goals. All advanced economies have eliminated extreme poverty. For practical purposes, the World Bank de nes extreme poverty elimination as occurring when the headcount of people living on $1.90 per day falls to less than 3 percent of the population, recognizing that some small pockets of poverty will always remain, even in advanced economies. According to the World Bank (2020), the extreme poverty headcount in the United States is 1.25 percent, in Japan, 0.22 percent, and in Germany, 0 percent.

Our focus on the transition between two dichotomous stages of development, one with extreme poverty and one without, follows in the tradition of W. Arthur Lewis and others. In this framework, the economy has two alternative production technologies, one with constant returns to scale and another with increasing returns to scale.[3] Development occurs when rms pay the xed setup costs of adopting the increasing returns technology, which causes labor productivity to rise. Even if the poor do not work in the rms that adopt the new technology, poverty falls because the common wage paid to all workers rises.

The main implication of this framework is that a *threshold market size* is required to achieve development | if there is not enough demand, a rm operating the increasing returns technology will not break even. Development is given by the threshold crossing model

$$D = \mathbb{1}(\quad > 0) \tag{1}$$

where is pro tability in the increasing returns sector.

The idea that international markets allow rms to achieve minimum e cient scale is well established in trade theory (Helpman and Krugman, 1985). In principle however, a large enough domestic market could also allow rms using the increasing return technology to break even. Murphy, Shleifer and Vishny (1989a) provide a model of exactly this phenomenon, with a speci c mechanism in which the e ects of a positive income shock, from either agricultural productivity or exports, depend on the initial shareholdings of individuals in society. Societies develop faster when shares in the rms are distributed more equitably across the population, raising the marginal propensity to consume out of the pro ts generated by the increasing returns sector. This model suggests that a large internal market may provide a path to development, even in the absence of trade. The middle class, which determines the size of this market, is the result of an initial wealth shock *and* an initial

[3] Banerjee and Duflo (2005) propose a similar model of development in which firms choose to upgrade to a new technology, and emphasize the role played by capital market imperfections in prohibiting the adoption of this technology.

relatively equitable distribution of firm ownership.[4] These ideas imply the threshold market size could be achieved through some combination of: (i) large population, (ii) an equitable distribution of income, the (iii) a large international market.

Norway, where oil exploration began in 1963 and was discovered in 1969, is an example of a country that perhaps grew more rapidly than other countries because of a more equitable initial distribution of income. In 1960, the country had per capita income of $23,167 in 2010 US dollars. In 2018, years after the discovery of oil, per capita income had quadrupled to $92,077. According to the Luxembourg Income Study, Norway had a relatively low Gini coefficient of 26.8 in 1979, the first year for which data are available, indicating a relatively equal distribution of income. In comparison, Mexico, which similarly had major oil discoveries in the 1970s, had a much higher Gini of 48.4 in 1984, indicating relatively higher inequality. Mexico had per capita income of $3,907 in 1960, which in 2018 had grown only 2.7 times to $10,403. In a different context, Keane and Prasad (2002) provide cross-country evidence from the transition economies in the 1990s showing that domestic redistribution that reduced inequality promoted growth. Of course, these examples are only suggestive.

3 Empirical Strategy

Bringing a highly stylized model to the data is particularly challenging. As noted earlier, we know that the model is \wrong." Accordingly, we do not attempt to test the model. Neither do we engage in a horse race between alternative hypotheses for development. Instead, our empirics are very much in the spirit of Leamer and Levinsohn (1995) who in their Chapter for the Handbook of International Economics encourage empirical researchers to \`estimate, not test." We estimate an empirical model inspired by the theoretical framework described in the previous section and use it to answer the questions we posed in the Introduction related to the role of domestic and international market size in development.

Before we present the empirical model in detail, a couple of conceptual remarks are in order. First, the theoretical model is static in nature, but makes statements about a state of transition (i.e., development that we identify with *sustained* poverty reduction). Accordingly, the appropriate empirical framework involves cross-sectional { in the present context cross-country { analysis, whereas the dependent variable captures a state of transition (i.e., sustained poverty reduction)[5].

[4]For clarity, we note that the equilibrium in this model is unique, and so this is not a setting with multiple equilibria, one with high development and one poverty trap equilibrium with low development, as in the authors' companion paper (Murphy, Shleifer and Vishny, 1989b). Kraay and McKenzie (2014) argue that there is limited empirical evidence for such poverty traps, especially on the scale that would affect an entire economy.

[5]Our focus is on the forces that set off the transition, i.e., the process of development, not on the final outcome.

Second, while returns to scale are a key element of the theoretical model, we do not attempt to measure them directly or test for their existence in our sample. Returns to scale have been empirically elusive (some of the reasons why empirical work may fail to nd evidence for them even when they exist go back to the Klette and Griliches (1996) critique of revenue-based production function estimation).[6] Instead, our approach presumes the existence of a returns to scale technology and develops an empirical model consistent with this premise.

Speci cally, our empirical strategy is based on the threshold crossing model of Equation 1 and utilizes cross-country panel data. The goal is to estimate a pro t function for the increasing returns sector, so that we may calculate the relative contribution of domestic and international market size to sustained poverty reduction. Bresnahan and Reiss (1991) propose a method to estimate the pro t function of a pro t maximizing rm when data on prices and quantities are unavailable. We adopt their approach to modeling the pro t function of the increasing returns to scale sector, while letting the dependent variable $D = D_{it}$ be an indicator that sustained poverty reduction is achieved in country i over the ve-year period indexed by t.

Suppose pro t of the increasing returns sector in country i at time t is given by:

$$_{it} = S(M_{it}; \ ) \quad V(Z_{it}; W_{it}; \ ) \quad F(W_{it}; \ ) + \ _{it} \tag{2}$$

where , and are parameters of the pro t function, M_{it} are observables capturing market size, Z_{it} and W_{it} are per-capita demand and cost shifters respectively, and the error term $_{it}$ captures unobservable factors a ecting pro ts. This speci cation corresponds to the functional form of Murphy, Shleifer and Vishny (1989a), in which expenditure of the middle class is multiplied by pro ts from either exports or agricultural productivity to determine the level of industrialization.

The function S summarizes the domestic and international market as determined by population, the income distribution, and international integration. We assume a linear function:

$$\begin{aligned} S(M_{it}; \ ) = M_{it} \ &= \text{population}_{it} + \ _1 \text{ middle class share of population}_{it} \\ &+ \ _2 \text{ relative population of integrated market}_{it} \\ &+ \ _3 \text{ relative income of integrated market}_{it}: \end{aligned} \tag{3}$$

Accordingly, we do not consider countries that are already "developed" during our sample period. Developed countries may look today very different from when they started to develop, and one would need to go back in history and analyze historical data in order to understand their paths.

[6]However, a recent literature has found indirect evidence for scale economies in several settings based on the response of production quantities to plausibly exogenous demand shocks (Costinot, Donaldson, Kyle and Williams, 2019; Bartelme, Costinot, Donaldson and Rodríguez-Clare, 2019).

All variables are predetermined in each of our data windows, as t refers to the first year of the five-year period. We set the coefficient of population in $S(M_{it};\ )$ equal to one because V contains a constant term. This normalization translates units of market demand into units of population, allowing for an easy interpretation of S. So that our quantitative estimate of market size is more easily interpretable in terms of people consuming less than the middle class, before estimation we subtract from population the number of people in the middle class.[7]

V stands for per-capita variable profits, which are modeled as a function of economic variables $X_{it} = [Z_{it}; W_{it}]$. We assume:

$$\begin{aligned} V &= X_{it} \\ &= {}_1 + {}_2 \text{ export growth}_{it\ 1} + {}_3 \text{ agricultural productivity growth}_{it\ 1} \end{aligned} \tag{4}$$

where t-1 refers to growth over the last five year period. The variables included in X_{it} account for differences in the variable per-capita profits of the increasing returns sector across countries. Finally, we include under \fixed costs" variables that capture both fixed production costs and fixed barriers to entry. We assume:

$$\begin{aligned} F &= W_i^L \\ &= {}_1 + {}_2 \text{ tropical climate}_{\ i} + {}_3 \text{ desert climate}_{\ i} + {}_4 \text{ distance to coast}_{\ i} + {}_5 \text{ ruggedness}_{\ i} + \\ &\quad {}_6 \text{ British legal origins}_{\ i} + {}_7 \text{ French legal origins}_i \end{aligned} \tag{5}$$

The variables in W_i^L include predetermined factors that likely affect start-up or entry costs. Bresnahan and Reiss (1991), who study non-tradable services, use the price of agricultural land to capture intermarket variation in land costs. A natural proxy for land costs across countries is climate, which may effect land prices through the regularity of rain, which may degrade real estate and slow construction and repairs. Our first two controls therefore are the percentage of land area with a tropical climate, and the percentage of land area with a desert climate. Of course, it is well known that tropical countries have had poor long term economic performance due either to geographic disadvantage (Sachs, 2001), or interaction with historical shocks, such as colonialism (Acemoglu, Johnson and Robinson, 2001). We therefore interpret our fixed cost variables as controls for long-run determinants of institutions or technology, rather than structural parameters. In alternative specifications, we also include distance to coast (Rappaport and Sachs,

[7] This decision does not substantially affect our estimate of λ.

2003) and ruggedness (Nunn and Puga, 2012), as well as dummies for the origins of legal institutions (La Porta, Lopez-de Silanes, Shleifer and Vishny, 1999). Socialist legal origins are the omitted category, so that the legal origins dummies are not co-linear with the constant.

The further assumption that $_{it}$ is normally distributed with mean zero, combined with the threshold condition in Equation (1), yields a probit model in which the probability of development, conditional on market size, demand and costs, is:

$$\Pr(D_{it} = 1) = \Pr(_{it} > 0) = \quad (_{it}) \tag{6}$$

where D_{it} is an indicator variable equal to 1, if there is sustained poverty reduction (our measure of development) in country i over period t, and zero otherwise, $_{it} = _{it} \quad _{it}$, and $( )$ is the normal cumulative distribution function. We estimate this model using maximum likelihood.

Estimated threshold market size is given by

$$\hat{S} = \frac{\overline{W}^{L} \hat{}}{\overline{\mathbf{X}} \hat{}} \tag{7}$$

where the overbar indicates sample averages and the circum ex indicates estimates from the probit model. By setting $S(M_{it}; \hat{}) = \hat{S}$, it is possible to determine which counterfactual combinations of M_{it} would be su cient for a country to achieve development.

4 Data and Measurement

We call henceforth our sample of 347 country- ve-year periods the sustained poverty reduction sample. It includes 93 countries, observed in 5-year periods from 1981-2015, where ve year periods range between 1981 to 2015: 81-85, 86-90, 91-95, 96-00, 01-05, 06-10, 11-15. This sample excludes advanced economies, or those with a poverty headcount below 3 percent for all years in the data. Advanced economies cannot provide any information about sustained poverty reduction, because poverty has been eliminated (following the World Bank de nition) for all years they are observed.

We construct three novel variables to estimate the empirical model. The rst of these is our outcome, a binary variable indicating whether a country experienced sustained extreme poverty reduction over a ve-year period. The second is a measure of relative international market size, according to legally-binding provisions to international trade agreements. The third is a measure of domestic market size, which we de ne as the share of national population in the global middle class. In this section, we explain how each of these variables was constructed, and establish some stylized facts about how they have varied over time.

Existing data sets are used to measure the components of variable pro t and xed costs. To calculate export growth, the rst determinant of variable pro t, we use the World Bank series of goods and service exports as a share of GDP.[8] For labor productivity growth in agriculture, the second determinant of variable pro t, we use the international agricultural productivity series of the United States Department of Agriculture's Economic Research Service (Fuglie et al., 2012). For geographic components of xed costs we use data from Nunn and Puga (2012): the share of land in tropical climate, the share of land in desert climate, average distance to ice-free coast and terrain ruggedness. For origins of legal system (i.e. English, French or socialist) we use data from La Porta, Lopez-de Silanes, Shleifer and Vishny (1999).

4.1 Sustained poverty reduction

The data used to construct our outcome variable, D_{it}, are from the World Bank (2020), which reports the national extreme poverty headcount, or the percent of population living below $1.90 PPP in 2011 US dollars, in years where household survey data are available. The headcount series for each country is transformed into a series of periods of sustained poverty reduction in the following four steps. First, for years where there is a missing headcount within a country, a linear trend is estimated between years, and used to interpolate the missing data. Second, the data are segmented into seven mutually exclusive 5-year periods. Third, for all years, we create an indicator for whether the headcount is lower relative to the previous year, referencing either the observed or interpolated value. Fourth, this indicator is used to create an indicator for sustained poverty reduction *throughout* the period. If interpolated and observed poverty has fallen in all years within the ve year period, we code the indicator equal to 1 for that period. If the poverty headcount is not declining in every year, we code the variable equal to 0. If an observed or interpolated headcount is not available in all ve years, the indicator is missing for that period.

To see how this works, consider the examples of Angola and Nigeria, two large high poverty countries. In Angola, the extreme poverty headcount is only observed twice, in 2000, at 32.3 percent and in 2008, at 30.1 percent Using the linear interpolation, we therefore only observe sustained poverty reduction in each year from 2001-2008. When data are segmented into periods, 01-05 is the only ve year period for which the change in headcount is observed. Therefore, this is the only period we are able to code for Angola: we code sustained poverty reduction equal to 1 in this period, because the linear trend is always negative, and set all other periods for Angola to

[8] For six countries, where this series is not available, we supplement with the IMF series of exports of goods, services and primary income, which matches closely the World Bank series in most cases. The countries for which we supplement data are Djibouti, Ethiopia, Fiji, the Islamic Republic of Iran, Lesotho and São Tomé and Príncipe.

missing. In Nigeria, the poverty head count is observed ve times, in 1985, 1992, 1996, 2003 and 2009. We are therefore able to code periods 1986-90, 91-95, 96-00 and 01-05. Over these periods, the country did experience reductions in the poverty rate, but we still code all periods as 0, because these reductions were not continuous over any of the four time periods. Speci cally, between 1996 and 2003 the poverty rate fell from 63.5 percent to 53.46 percent. However, because this decline is followed by a slight increase in the poverty rate to 53.47 percent in 2009, the period 01-05 is coded as 0, given the interpolated increase from 2003-05. Similarly, since the headcount in 1996 implied an increase in the poverty rate from 57.1 percent in 1992, the period 95-00 was also coded as 0, since the interpolated poverty trend is increasing in 1995. These examples highlight the challenges involved with measuring changes in poverty at the national level; statistical agencies may release numbers infrequently.

The construction of our poverty measure inevitably involves some judgment calls. We examine the robustness of our results to these judgment calls in three ways. First, we ask whether the patterns associated with our \sustained poverty reduction" measure pass the \smell test," in the sense that they are consistent with common wisdom. Figures 1a and 1b plot the paths of poverty reduction generated by our measure for select countries in two di erent regions, Asia and Africa, respectively. The di erences are striking. For countries, such as China, India, Indonesia and the Philippines, the graph shows a pattern of sustained poverty reduction over the last four decades. In contrast, such sustained progress is not evident in the graphs for Nigeria or Cote d'Ivoire. These patterns conform with common wisdom. Moreover, they are precisely the patterns our analysis aims to rationalize: why has the experience in Indonesia, for instance, has been so di erent from the experience in Nigeria?

Second, we subject our measure to robustness analysis, and report the results alongside the results using the baseline measure. Speci cally, we consider an alternative de nition of sustained poverty reduction that smooths out short term increases in the poverty rate. This alternative de nition is equal to the measure of sustained poverty reduction just described, but also is also equal to one if the poverty rate has fallen by at least 5 percent between the rst and last years of the ve-year window. This yields and additional 37 instances of sustained poverty reduction in the sample of 347 country ve-year windows. We also consider alternative ve-year windows, over which the evolution of poverty is examined, and repeat our empirical analysis.

Third, an additional challenge to measuring sustained poverty reduction is that the frequency of surveys may also introduce error in our measure. For instance, in periods with zero or one observations of the headcount, as is the case in all periods for Angola and Nigeria, it will be

impossible to see short (e.g., 1-2 year) increases in the headcount, because the increases will not carry over into following years. As a result, countries with more frequent household surveys may appear to have fewer instances of sustained poverty reduction, given greater observed volatility. In our results, we also present a speci cation estimated while dropping the 131 observations that have more than two years of data in the 5 year period, or 37 percent of the sample. These observations should be most a ected by short run volatility. We also consider an additional speci cation, which drops the observations derived from income surveys rather than consumption surveys. Though standard errors increase somewhat when we drop such a large portion of the data, our basic conclusions remain robust.

To summarize the main patterns in the poverty reduction data, Figure 2 displays the share of ve-year periods which achieved sustained extreme poverty reduction, over time across six regions. Notably, the share is above 50% for most years in most regions. This re ects the tremendous progress that has been made against extreme poverty in the last four decades. For instance, sustained poverty reduction occurs in 100 percent of countries in four periods in speci c regions: 85-90 and 06-10 in the Middle East and North Africa, and 06-11 and 11-15 in South Asia. Interestingly, the period of 06-10, which spans much of the recent crisis originating in the United States, does not seem to have been a particularly bad year for poverty reduction globally. This highlights a separation of cycles between advanced and developing economies. Two eras of poor performance stand out, 1981 to 1995 in Sub-Saharan Africa, and 1985 to 2005 in Latin America.

It is well known that Africa had poor performance during that period, but why was sustained poverty reduction in Latin America and the Caribbean so low? One answer may that in these regions, poverty surveys typically measure income and not consumption, which may introduce measurement error. Assuming households have either some savings or access to credit markets, one would expect income to be more volatile than consumption, as income shocks are smoothed over time. In Europe and Central Asia, for example, 54 percent of headcounts are derived from income rather than consumption surveys, and in Latin America and the Caribbean this number is 98 percent. In Sub-Saharan Africa however only 2 percent of headcounts are based on income surveys, and in the Middle East and North Africa none of the headcounts is.

There is a strong presumption in economics that labor productivity growth and poverty reduction go hand in hand. To test whether this relationship bears out in our data, Table 1 compares instances of sustained poverty reduction to instances of sustained growth in real GDP per capita, the latter of which is considered to occur when real GDP per capita does not contract at all during a period. To prevent higher frequency observations of GDP per capita from a ecting our results, we look only

at GDP per capita in the years in which the poverty headcount is also measured, and interpolate GDP per capita between years, as we have done for the headcount. What is apparent from Table 1 is that sustained GDP per capita growth does seem to be positively correlated with sustained poverty reduction, with 76 percent of instances of poverty reduction also having sustained GDP per capita growth, and only 24 percent not having it. More interestingly however, despite this positive relationship, there are still 82 periods, or 23 percent of the sample, which experience sustained GDP growth without sustained poverty reduction. Poverty reduction and GDP growth, while positively related, do not necessarily go hand in hand.

4.2 International market size

The second data set we develop is a database of the relative income and population of each country's international market, as de ned by signatures to trade agreements. We de ne each country's global market by summing up the populations and incomes of all other countries, with weights corresponding to the number of legally enforceable provisions of multilateral agreements between the country and all others. This measure has three main advantages for our analysis. First, it allows us to measure directly the e ect of international integration treaties, participation in which is a policy choice for the government. Other analyses of trade liberalization (Sachs and Warner, 1995; Wacziarg and Welch, 2008; Easterly, 2019) have typically focused on a mixture of policy decisions (e.g., liberalizing state monopolies in exporting sectors), and trade outcomes (e.g., abnormally low shares of trade to GDP). By focusing speci cally on the policy decision to integrate economically through trade agreements, we ensure our counterfactuals are tied to policies actually within government's control. Second, because we calculate market size in terms of GDP and population, these measures allow us to estimate directly the relative value of integrating with a richer versus a more populous market. Finally, our measures allow us to exploit variation in market size stemming from the entry of *other* countries into a trade agreement. A good example of this variation is what may be called the China shock to the WTO, shown in Figure 3. When China entered in 2001, GDP per-capita of WTO member states fell from above $11,000 to below $9,000, while population increased by more than 1 billion people. Below we describe in detail how we construct our relative size measures, and, provide an example of the variation we exploit in our estimation by tracing out the China shock to the WTO through the relative population and income of countries' international markets.

4.2.1 Legally enforceable core provisions of multilateral trade agreements

Our measure of market size is based on a measure of the *depth* of the trade agreements between a pair of countries, which is simply the number of provisions in agreements related to di erent domains of international trade (e.g., ows of goods, services, capital, labor and ideas). Our data on provisions come primarily from Hofmann, Osnago and Ruta (2017), who code the legal content of all provisions of all 279 regional trade agreements in force and noti ed to the World Trade Organization as of 2015. These authors build on the approach developed by Horn, Mavroidis and Sapir (2010) for preferential trade agreements involving the United States (US) and European Community (EC). We add to their work by coding provisions linked to three major international (rather than regional) trade agreements, the General Agreement on Tari s and Trade (GATT), the various agreements of the World Trade Organization (WTO), and the Government Procurement Agreement (GPA). Table 2 lists the 32 legal provisions in our data set, and shows that they fall into two broad groups, which together make up the legal architecture of the international economy.[9]

First, there are provisions establishing rights protecting the mobility of goods and services, labor, capital and ideas. Rights over trade in goods, for instance the right to receive the most favored nation tari , have been enforceable for some time, rst under the GATT Article I and then the WTO. Establishment of rights related to services trade remains limited to those areas covered under the General Agreement on Trade in Services (GATS), from which major sectors are excluded, such as maritime services. Provisions enforcing rights over labor and capital mobility are the rarest. Visa and asylum provisions for instance are only protected in regional trade agreements, such as the EC or the Economic Community of West African States (ECOWAS). Rights to free capital ows, such as prohibitions on local content requirements and protections of the right to repatriate pro ts, have only recently emerged under certain preferential trade agreements. Finally, some provisions enforce rights over the mobility of ideas, via intellectual property rights protection which is controversial, for instance in the pharmaceutical industry where losses in consumer welfare may be substantial (Chaudhuri, Goldberg and Jia, 2006).

Second, the agreements have additional provisions to protect the speci ed rights, by limiting government discretion to undo them. For instance, the Agreement on Subsidies and Countervailing Measures (ASCM) gives rights to the withdrawal of subsidies or the removal of their adverse e ects.

[9] We focus on what are called "core" provisions, those related directly to trade (Baldwin, 2008). Non-core provisions cover a wide variety of topics, for instance related to the enforcement of human rights, labor or environmental standards, as well anti-money laundering, consumer protection, and statistics cooperation. Our exclusion of non-core provisions has practical implications for measurement. Since we weight countries by the number of provisions, we do not want to overweight regional trade agreements, which include many more non-core provisions relative to the international agreements.

Countries also have the right, after an investigation, to charge \countervailing" duties on subsidized imports that are found to be hurting domestic producers. There is an argument that, particularly as regards provisions regarding the mobility of ideas, capital and services, trade agreements have become captured by rich-country business elites (Rodrik, 2018) and do not necessarily serve developing countries. Given this, we interpret any observed e ect of joining an agreement to be the net of potentially positive and potentially negative e ects.

One question is how our legally-determined measure of market integration compares with other measures of liberalization in the literature. Annex A lists, for 1981, 2001 and 2015, all economies which are considered closed by our measure, given that they have no signatures to any of the treaties in our database. Of current members of the United Nations that existed at the time, in 1981 we count 67 closed economies. Of these, only four, Botswana, Ecuador, Jordan and Thailand were classi ed as open at the time by Sachs and Warner (1995) and Wacziarg and Welch (2008). Their classi cations however are much more likely to classify countries as closed, even when they appear open in our sample. For example, Wacziarg and Welch (2008) consider China and India closed as of 2001, even though India had been a WTO member since 1995 and a member of GATT since 1948. China joined the WTO in that year. According to our treaty-based classi cation of openness, very few economies remained closed as of 2015, the three largest being Afghanistan, the Islamic Republic of Iran and the Democratic People's Republic of Korea, and the others being very small states, often with special customs arrangements (i.e., Monaco with France, or the Marshall Islands and Palau with the United States) that may obviate the need for multilateral agreements to obtain market integration. Afghanistan joined the WTO in July 2016.

4.2.2 Relative international market size

We use the pairwise provisions signed between countries to construct a country-speci c measure of the relative size of the international market. As our indicators of relative market size, we use both per-capita income, or per-capita GDP in current US dollars, and population. Formally, for each integrated market M and country i and year t, let

$$\begin{aligned} \text{income}_{it}^{M} &= \sum_{j} {}_{ijt}\,\text{income}_{jt} \\ \text{population}_{it}^{M} &= \sum_{j} {}_{ijt}\,\text{population}_{jt} \end{aligned} \tag{8}$$

where ${}_{ijt}$ equals the number of in force provisions signed between country i and j in year t, as a share of the maximum, 32. Using these statistics, we calculate the relative size of the integrated

market, in terms of population and income, for each country year:

$$\text{relative population of integrated market}_{it} = \text{population}^{M}_{it}/\text{population}_{it}$$
$$\text{relative income of integrated market}_{it} = \frac{\text{income}^{M}_{it}/\text{population}^{M}_{it}}{\text{income}_{it}/\text{population}_{it}}. \quad (9)$$

Figure 3 displays these variables, averaged in each year within regions where observations are weighted by the population of the country. The figure allows us to see how the relative size of the international integrated market in each region changes over time. Each line is a population weighted average of the relative market size, in that year. A number of observations stand out. First, Sub-Saharan Africa was an early integrator, with many of its largest economies joining GATT early on, for instance South Africa (June 13, 1948), Nigeria (November 18, 1960) and Kenya (February 5, 1964). Until 1995, when it was overtaken by Latin America and the Caribbean, it had the largest relative market size in terms of population. Second, South Asia and Sub-Saharan Africa have both integrated with richer countries. For instance, throughout the 1980s and 1990s, Africa experienced rapid growth in the market size to which it was linked, as more rich countries joined trade agreements such as GATT. Then, in 2001, when China enters the WTO, relative income falls. Countries in Sub-Saharan Africa no longer had simply open markets with rich buyers, but a rival in their income bracket. This change in countries' income-based international market size may have had important implications for development - a point also made in a recent paper by Atkin, Costinot and Fukui (2021), who argue that China's entry in world markets pushed many countries, especially in Africa, towards the bottom of the development ladder. Third, countries' own per-capita GDP and population growth affect the relative size of the market. This can be seen clearly in East Asia, where the relative market size in terms of GDP per capita declines over the 2000s, as China gets richer. It is also possible to see how the relative population of Sub-Saharan Africa's international market declines in the 2000s, as Africa's population grows faster than the rest of the world's.

4.3 Income distribution

Our measure of domestic market size depends on the income distribution. Consistent with the underlying conceptual framework, we identify \domestic market size" with the share of the population in the global middle class, a statistic which depends on both average income and equality. Assuming potential increasing returns to scale are constant across countries, we define the global middle class following Kharas (2010, 2017), who proposes bounds at $11-110/day PPP in 2011 US dollars of consumption, on the basis that the lower bound is the average of the national poverty lines in Portugal and Italy, and the upper bound is twice the median income in Luxembourg. That is, to be in the global middle class, one cannot be poor in the poorest rich countries, but cannot be

rich in the richest country. In what follows, we apply these bounds and estimate the share of the middle class as the headcount ratio for the upper bound minus the headcount ratio for the lower bound.

To measure equality, we use the Gini coefficient (G_{it}), a standard measure of (in)equality, also from the World Bank (2020), for consistency with our measure of sustained poverty reduction. For average income, we use data on real GDP per capita ($\overline{Y}_{it}$) from the Penn World Tables 9.1. GDP is preferred to income based on household surveys given the risk of top-coding, and the fact that we are interested in the middle and top of the distribution, especially in low and lower-middle income countries (Deaton, 2005; Ravallion, 2003). We make the parametric assumption that income within countries is distributed log-normally in order to combine our measures of equality and income to get a measure of the middle class. Pinkovskiy and Sala-i Martin (2009) show that the log-normal distribution provides a good fit to the income distribution in most countries, delivering distributions very similar to those obtained from kernel density estimates, and of superior fit to the gamma and Weibull distributions, two alternatives that also have two parameters.

Suppose individual daily income y is distributed according to $\ln(y) \sim N(\mu_{it}; \sigma^2_{it})$, so that:

$$\begin{aligned} \mu_{it} &= \ln(\overline{Y}_{it}/365) - \frac{\sigma^2_{it}}{2}; \\ \sigma_{it} &= \sqrt{2}\,\Phi^{-1}\left(\frac{G_{it}+1}{2}\right) \end{aligned} \tag{10}$$

where $\Phi^{-1}(\cdot)$ is the inverse normal cumulative distribution function. Aitchison and Brown (1957) first showed the link between the Gini and the parameters of the log-normal distribution, the properties of which are reviewed by Crow and Shimizu (1987).

Then

$$\text{middle class share of population}_{it} = \Phi\left(\frac{\ln(110) - \mu_{it}}{\sigma_{it}}\right) - \Phi\left(\frac{\ln(11) - \mu_{it}}{\sigma_{it}}\right). \tag{11}$$

It is often remarked that there is a trade-off between higher income and equality. We will show that if a government focuses on the middle class, it need not face such a trade-off.

Figure 5 shows country averages of the middle class share within four periods: 1981-90, 91-00, 00-10, 11-15. Two samples are shown, the sustained poverty reduction sample, which uses the World Bank (2020) Gini coefficients, and the rest of the world, which uses Gini coefficients from Milanovic (2013), selecting in each country the series with the most observations over time. The first pattern emerging from the figure is that, though income and middle class share of the population are highly correlated at low levels of income, there is a large dispersion of middle class shares within a large

band of income, between 8 and 10 log points, or approximately $3,000 to $22,000 dollars. This demonstrates that there are many levels of equality for a given level of income.

The second striking observation is the emergence over time, among rich countries, of a region of the distribution where the middle class is *declining* in income | a shrinking middle class. In the most recent period, several countries with income of more than $22,000, Ireland, the Netherlands, Norway, Switzerland, and Luxembourg, had a middle class that was less than 50 percent of the population. In Luxembourg, the middle class is just 13 percent of the population. Clearly the upper bound $110 is much less than twice the median income in Luxembourg, at least according to our estimate of the country's income distribution in the most recent decade. A di erence between our approach and that of Kharas (2010) is that he uses average household consumption in place of $\overline{Y}_{it}$, whereas we have used GDP per capita. The latter includes expenditure in the investment sector (i.e. construction, machinery and equipment), thus increasing average income and making our estimates of the middle class larger relative to his. As a result, we have not made an assumption about whether increasing returns are di erentially available in the investment or consumption sector. The use of national accounts in place of average income is most controversial when studying the lower tail of the income distribution (Pinkovskiy and Sala-i Martin, 2014).

5 Results

We begin by summarizing our data visually. Figure 6 shows the sample data for the market size variables, plotted against income per capita observed in the rst year of the ve-year period. Population, and relative population of the integrated market are widely distributed across income, with no clear relationship between them. Outliers in population, China and India, are visible, as well as outliers in terms of the relative population of the integrated market, such as Djbouti, which had an integrated market in 2011-15 of 2,930 times more people, relative to its own population. The Gambia is another outlier, with a relative market of 1,313 more people, and Botswana, with 1,218 more people.[10] While population and relative population of the integrated market appear evenly distributed across income levels, relative income of the international market is rapidly declining at lower levels of income before attening after 9 log points, or about $8,000 dollars in income. Turning to the middle class, there is substantial dispersion especially after 7 log points, or about $1,000 income. This emphasizes that though average income increases the share of the population in the middle class, the Gini coe cient still creates substantial dispersion. Finally, turning to the income

[10]Botsawna, Djbouti, and the Gambia are all members of the WTO. The Gambia joined GATT in 1965, and Botswana joined in 1987. Djibouti joined GATT in December 1994, just before joining the WTO.

boosts, it appears that agricultural productivity and export shocks are uniformly distributed across income.

Before estimating the parameters of the pro t function implied by our conceptual framework, we summarize how the variables in our dataset di er between periods of sustained poverty reduction and periods without sustained poverty reduction. Table 3 presents descriptive statistics for all variables, as well as T-tests for whether each of our sample variables is di erent between samples. Beginning with population, it is clear that periods of sustained poverty reduction occur in larger countries, with 50 million more people on average ($p = 0.016$). The middle class is also larger during periods of sustained poverty reduction ($p = 0.071$). These results provide some initial support for our hypothesis that domestic market size matters. Interestingly, however, we do not nd signi cant di erences in international market size, either as measured by relative income per capita ($p = 0.922$), or as measured by relative population ($p = 0.119$). This is surprising in the context of our framework, where international market size should a ect poverty reduction.

Turning to the income boosts, we nd that earlier export growth is signi cantly higher in instances of sustained poverty reduction, 8 percent on an annualized basis over the last 5 years, compared to 4 percent in periods without ($p = 0.0004$). It appears that, in these simple T-tests, the e ects of international markets on poverty are loaded on exports, rather than international market size. In our structural estimation of the pro t function, we will study their e ects when they are both included in the same model. Turning to agriculture, there is no signi cant di erence in agricultural productivity growth, which is 2 percent annually in both samples ($p = 0.266$). Finally, looking at the xed costs, tropical climate has a signi cant negative e ect on poverty reduction, with the average land share of tropical climate being 20 percentage points less in periods of sustained poverty reduction ($p = 0.00001$). Desert climate appears also to be a signi cant predictor ($p = 0.002$), as well as distance to ice free coast ($p = 0.036$), but not ruggedness ($p = 0.301$). For legal institutions, British legal institutions are signi cantly more frequent ($p = 0.001$) in periods of sustained poverty reduction, while French institutions are signi cantly less frequent ($p = 0.001$)relative to periods without sustained poverty reduction. These results are consistent with past research that has shown geographic and institutional factors to be strong predictors of outcomes related to development.

We now turn to our estimates of the threshold model, which are reported in Table 4. Each column of the table reports coe cient estimates of each parameter, as well as our estimate of $\hat{S}$, the threshold market size required for the increasing returns sector to break even. In each column, the market size and variable pro t components of the model are the same, but we allow for alternative de nitions of sustained poverty reduction and estimate the model on sub-samples of the data order

to explore how measurement of the outcome may a ect the model.

Column 1 reports a version of the model where xed costs are represented by a single constant parameter. This parameter is positive and statistically signi cant: $_1$ = 0:56 (s.e. = 0.04), or 560 million people, consistent with our premise of increasing returns to scale. In columns 2 through 6, we add additional geographic and institutional controls to the xed cost term. In column 2, the share of land in a tropical climate is positive and signi cant and the coe cient on the share of land in a desert climate is negative and signi cant, implying that tropical climate raises xed costs and desert climate lowers them. This is expected, given what is known about the growth experience of tropical countries. We also add distance to coast and ruggedness. Ruggedness is signi cant and positive, raising xed costs, and distance to coast is negative, and also signi cant. Finally, we add British legal origins, which have a large negative e ect on xed costs, reducing them relative to the omitted category, socialist legal origins. French legal origins also reduce xed costs, though by a lesser extent. Our estimate for threshold market size also increases 15 percent between columns 1 and 2, suggesting that geographic and institutional factors pose signi cant barriers to development.

We evaluate the t of these speci cations using the area under the receiver operating characteristic curve (AUC).[11] In column 1, AUC = 0.667, indicating the model has some predictive power relative to a random guess. Adding controls increases the statistic to 0.739. This is not perfect, but better than random guessing. It is notable, that though geographic and institutional controls improve the t, the improvement is small relative to the baseline model. For comparison, Kleinberg, Lakkaraju, Leskovec, Ludwig and Mullainathan (2017) develop a machine learning tool that can improve on a human judge's decisions to o er or deny bail in New York City; it has an AUC of 0.707. In our case, variables in the model have been selected by economic theory, rather than a machine.

We focus our discussion on column 2, our preferred speci cation which includes all of the geographic and institutional controls. In contrast with the univariate T-tests, this speci cation shows statistically signi cant e ects of both domestic and international market size on sustained poverty reduction. The coe cient on the size of the middle class as a share of the population is $_1$ = 0:72 (s.e. = 0.22), implying that moving from zero to 100 percent of the population in the middle class is equivalent of adding 540 million people to the population. Recall that variables are scaled, so that the results can be interpreted in terms of people with average income below that of those belonging

[11]The ROC curve reports the combination of false positives and true positives implied by the empirical model. The area under the curve can be interpreted as the percent of time the empirical model would classify an instance of sustained poverty reduction and an instance without sustained poverty reduction correctly, compared to a random guess, which would get it right 50 percent of the time.

to the middle class.

The effects of the international market size are also substantial, both when measured by relative population (in 1,000s of people), where $_2$ = 0.21 (s.e. = 0.04), and when measured by relative income per capita, $_3$ = 0.02 (s.e. = 0.0002). To understand the magnitude of these effects, consider the situation of Afghanistan, with a population of approximately 35 million. Suppose Afghanistan contemplates whether to integrate with one of its neighbors, either Pakistan, with population of 200 million, or the Islamic Republic of Iran, with population of 80 million. In terms of population, the Islamic Republic of Iran is 2.3 times larger, and Pakistan is 5.7 times larger than Afghanistan. According to the coefficient estimate, opening up to an integrated market of the same population adds the equivalent of 210,000 people to average market size. The multiple of this would be greater if the country integrated with Pakistan. However, the effect of relative income per capita on market size is more important than relative population in the model. According to our coefficient estimate, joining a market with the same relative income per capita, is equivalent to 20 million people on average in our sample. Pakistan, which has a 3 times greater income per capita than Afghanistan would be worth an additional 60 million additional people. However, the Islamic Republic of Iran has income per capita 10 times larger than Afghanistan, and so integration would yield the equivalent of 200 million more people. In this example, the Islamic Republic of Iran is a much more valuable market when one accounts for population and income. Though there are gains to having a large market in terms of population, the main incremental value comes from trading partners' purchasing power. This suggests that so called \South-South" integration between countries of similar incomes will be less valuable than \North-South" integration between countries of different incomes.

Turning to the components of variable profit, the estimate of the constant, $_1$ = 0.81(*s.e.* = 0.36), is positive and statistically significant at standard levels. However, the coefficients on exports and agricultural labor productivity are not statistically significant. Conditional on market size, therefore, we do not have statistical power to quantify the specific effect of either income shock on poverty reduction. The fact that the coefficient on exports, $_2$ = 5.48 (s.e. = 14.12), is positive and large is however reassuring. Somewhat surprisingly, the effect of agricultural productivity growth, $_3$ = 0.95 (s.e. = 14.71), is negative though not significant. This contrasts with prior work, for instance by Bustos, Caprettini and Ponticelli (2016) on Brazil, that finds agricultural productivity growth to have contributed to structural transformation.[12] One interpretation of our

[12]The Bustos et al study however examines the effects of an agricultural productivity boost on sectoral employment shares and industrial growth, and not on poverty reduction as in our paper. As we discussed earlier, growth does not always translate to poverty reduction. Another difference is that the Brazilian study focuses on local/relative effects rather than aggregate effects.

results is that | at least for the sample we are considering | the initial boost to income is not the binding constraint; countries have enough resources as it is to reduce poverty, the binding constraint however is market size, which makes it not pro table to adopt the xed cost technology.

Having estimated the coe cients of the pro t function, and con rmed both the presence of economies of scale and the statistical signi cance of the market size variables, we now examine what these coe cients imply for our outcome, sustained poverty reduction. In column 2, our preferred speci cation, the threshold market size to achieve sustained poverty reduction is $\hat{S} = 405$ million people, where those people have purchasing power less than the global middle class. This implies that a large market indeed is required for sustained poverty reduction. This market size can be achieved in a small country however through international trade agreements, or through a more equitable income distribution. The coe cients in parameter vector convert domestic and international market size variables into units of population, which allows one to determine what it will take for a given country to meet the threshold. It is clear therefore that income distribution and international integration will be relatively more important for small countries. Very large countries, for instance India and China, have been able to meet this threshold on the basis of population alone.

5.1 Robustness

In columns 3 and 4, we rerun the estimation using alternative de nitions of the outcome. In column 3, we consider an alternative de nition of sustained poverty reduction that smooths out short term increases in the poverty rate. This alternative de nition is equal to one in instances of sustained poverty reduction as de ned by our baseline measure, but is also equal to one if the poverty rate has fallen by at least 5 percent between the rst and last years of the ve-year window. In column 3, the market size variables remain statistically signi cant, though the threshold market size falls to 116 million people, as expected because the alternative measure is less demanding in classifying instances of sustained poverty reduction. This result suggests poverty reduction can be achieved with a smaller market size, though that it may not be sustained in all periods, as our baseline outcome variable requires. In column 4, we consider alternative ve-year windows over which the evolution of poverty is examined, in order to explore the sensitivity of our results to the windows selected. When calculating sustained poverty reduction instead of the windows 1981-85, 1986-90, etc. we shift the window one year back to be 1980-84, 1985-89, etc. Right hand side variables are again matched on the rst year of the window. The results in this speci cation are qualitatively similar to the results in column 2.

In columns 5 and 6, we rerun the estimation on two select subsamples of the data, in order to

test whether our results are a ected by two measurement issues discussed earlier: the additional volatility introduced from the use of income surveys to measure poverty, and the implications of using higher frequency household surveys. Speci cation 5 includes only consumption surveys, reducing the sample to 216 observations. Speci cation 6 includes only surveys in which 0, 1 or 2 years of poverty headcounts are observed, reducing the sample to 234 observations. Though the middle class is no longer signi cant, coe cients on the relative income of the international market remain signi cant in all speci cations. We cannot reject, however, that any of these coe cients are di erent from speci cation 2.

6 Counterfactuals

To evaluate the e ect of international integration and the income distribution on sustained poverty reduction, we simulate several counterfactual economies and compare them to the status quo (with current levels of international integration and equality). The rst is a counterfactual closed economy, without international integration in which $_2 = _3 = 0$. This could be understood as the development policy doomsday scenario, in which comparative advantage from trade becomes irrelevant for sustained poverty reduction. The second is a counterfactual maximum equality economy, in which the share of the population in the middle class is calculated using Equation 11, and the current national GDP per capita but a Gini coe cient of 0.20, the value for Slovakia in 1992, the lowest in the sample. This could be understood as a scenario where national income stays the same, but government redistributes income to about the extent achieved in the Czechoslovak Socialist Republic, which dissolved in 1989. The third is a fully integrated counterfactual, in which the relative population and income of the integrated market equal to the relative population and income of the whole world. This could be understood as a maximal trade liberalization scenario in which the country signs a deep trade agreement establishing and protection economic integration rights with every country. Annex B reports estimates of the status quo market size for each country period in our data set, as well as each counterfactual market size. All theses scenarios should be thought of as polar cases that serve the purpose of helping us quantify the contributions of equality and international market size towards poverty reduction, rather than realistic policies on the table. We note however that in principle, our framework with the detailed information on speci c provisions of trade agreements it provides, could be used to also assess the e ects of speci c liberalization measures (e.g., signing speci c provisions of trade agreements with particular countries).

We summarize these results in two gures. Figure 7 shows the estimated status quo market size, calculated as $M_{it}^{\wedge}$, and the three counterfactual market sizes for select economies, using data from

2011, the last window in our sample, to provide a recent view. The blue set of columns correspond to the status quo, in which market size is calculated using the reported in column 2 of Table 4. The orange columns show a market size estimate in which $_2$ = $_3$ = 0, so market size is determined only by population and the size of the middle class. The khaki columns show the maximum equality scenario and the dark green columns show the fully integrated secnario.

Two economies, Côte d'Ivoire and Ethiopia, do not have su ciently large markets (i.e., $\hat{S}$ = 405) to achieve sustained poverty reduction under the status quo. As expected, under the closed economy counterfactual, their markets are even smaller. Only under the fully integrated counterfactual do these economies achieve large enough or nearly large enough markets (Côte d'Ivoire reaches 402 million people, just under the threshold, and Ethiopia reaches 718 million). This result highlights the value of international integration for sustained poverty reduction. The fact that market size increases for Ethiopia more under the fully integrated scenario re ects both that is more closed than Côte d'Ivoire, and that the size of the international market in the model is measured relative to national GDP per capita. Since Ethiopia has a lower GDP per capita, integrating with a higher income international market is more valuable than if it had a GDP per capita like Côte d'Ivoire. For these economies, the market size is slightly smaller than the status quo under the maximum equality counterfactual. This re ects the fact that these countries have relatively low GDP per capita, so more equality reduces the share of the population making between $11 -$110 per day.

The four other economies in Figure 7, China, Ghana, Indonesia, and the Philippines have large enough markets to support sustained poverty reduction under the status quo. One of them, Ghana, which had a population of only 25 million in 2011, would not be large enough to sustain poverty reduction as a closed economy, but the others would, in part due to their larger populations. For these economies, fully integrating produces some gains, but because these economies already have substantial domestic markets, the relative value of the international market is less than it was for Ethiopia. For these economies, the maximum equality counterfactual increases market size, because their GDP per capita is high enough that increasing equality increases the share of the population making between $11 -$110 per day.

Figure 8 shows average market sizes averaged over deciles of GDP per capita, weighting observations by population to provide a welfare relevant view of the heterogeneity across the national income distribution. Notably, in the closed economy scenario, it is not until the sixth decile of GDP per capita, which corresponds to $2,417, that the market becomes large enough to meet the estimated threshold $\hat{S}$ = 405. International integration appears to help however. In all except the rst and second deciles, the status quo market size is on average greater than the threshold. In all

deciles, the market size in the fully integrated scenario is on average greater than the threshold. This suggests that, if the value of international markets remains as it has in the past, most countries should be able to achieve sustained poverty reduction. The average market size of the open economy however does not go far above the threshold.

7 Conclusions

In the demand-side framework, with a fixed population, there are two strategies for development: integrate internationally or develop the middle class. Worryingly, for countries with small populations, these strategies will require big changes to reach the threshold market size. What then is the way forward? A few options are clear. First, deeper economic integration via more provisions especially with richer countries, for instance regarding the mobility of labor (including the unskilled and professional tradespeople). If this proves infeasible in the current era of waning multilateralism, regionalism may provide an appealing alternative; in fact, many countries in Asia and Africa have embraced a regionally-focused approach in recent years, as evidenced by regional trade agreements, such as RCEP and AfCFTA. Second, redistribution of income which targets the poor *and* the middle class. While direct aid to the poor is a valuable tool to help them escape poverty, resources must also be made available to broaden the middle class, who sustain the value of the market. The presence of imperfect competition underlying our model suggests that redistribution of firm profits in particular is important. Efforts to assist households in accumulating equity shares may therefore be especially useful policies for redistribution, as opposed to the redistribution of wage income.

Our empirical results are relevant for governments considering the question of which development objectives they should prioritize. The traditional approach (among economists) has been to recommend that, even if one is concerned with poverty reduction, one should focus primarily on economic growth, because it is "the most direct route" to development (Hausmann, Rodrik and Velasco, 2008). Though growth is indeed good for the poor (Dollar and Kraay, 2002; Dollar, Kleineberg and Kraay, 2013), which we confirm here, we have shown that it is not sufficient for sustained poverty reduction. The 17 Sustainable Development Goals (SDGs) adopted by United Nations member states in 2015 are an effort to incorporate broader development objectives than growth alone into decision making. The goals include 169 specific targets for line ministries and donors working on specific thematic issues, such as poverty, water, education, climate and gender.[13] A drawback is that they do not aggregate well into a few headline targets that could define a na-

[13] https://sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf

tional development strategy | it is di cult for citizens, politicians and business people to keep the multitude in mind all at once.

The demand-side framework described here suggests a middle way, which is speci cally for governments to focus on three high-level objectives in their development strategy. The rst goal is to eliminate poverty. Progress towards this goal is measured by

- Sustained poverty reduction: a continuous reduction in the poverty headcount.

Our empirical results suggest that two intermediate goals support progress towards the rst:

- Equitable income distribution supporting a sizeable middle class, de ned using a global standard;
- International integration: legal a rmation of rights to the mobility of goods, services, labor, capital and ideas between countries.

There is a straightforward mapping of the SDGs to these high-level objectives. Progress towards Goal (1), i.e., no poverty, can be measured by sustained poverty reduction. Goals ensuring a sizable middle class are those linked to human capital: (2) zero hunger, (3) good health and well-being, (4) quality education and (6) clean water; as well as: (5) gender equality, (10) reducing inequality, and (16) peace, justice and strong institutions; and also the goals most directly linked to economic performance: (8) decent work and economic growth and (9) industry, innovation and infrastructure. Notably however, international integration corresponds to only one Goal:(17) partnership for the goals, a target for which is to conclude the WTO Doha round of trade negotiations. Given the empirical importance of international integration for sustained poverty reduction, it is perhaps surprising that the SDG agenda does not give more prominence to international integration as an objective.

We evaluated the t of our model using the AUC, a statistic for predictive performance used by the machine learning community. Here, our empirical model was selected not by a machine, but by an economic model of development as old as at least the 1950s, further motivated using advances in economic theory from the 1980s regarding increasing returns to scale and imperfect competition. If presented with one ve-year period of sustained poverty reduction and one without sustained poverty reduction, our preferred speci cation is able to classify the period correctly 73.9 percent of the time, compared to a random guess, which would get it right 50 percent of the time. We venture that this is not too bad for the domain of economic development policy.

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		Sustained real per capita GDP growth		
		No	Yes	Total
Sustained extreme poverty reduction	No	76	82	158
		48%	52%	100%
	Yes	45	144	189
		24%	76%	100%
	Total	121	226	347
		35%	65%	100%

Percentages report shares of row totals.

An observation is a country five-year period, ranging from 1981-2015.

POVCALNET. Penn World Tables 9.1.

goods	• Industrial tariffs • Agricultural tariffs			• Industrial tariffs (WTO+) • Agricultural tariffs (WTO+) • Export taxes (WTO+)
services		• General Agreement on Trade in Services (GATS)		• GATS (WTO+)
capital		• Agreement on Trade-Related Investment Measures (TRIMS)		• TRIMS (WTO+) • Local content (WTO-X) • Repatriation of capital (WTO-X)
labor				• Visa and asylum (WTO-X)
ideas		• Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)		• TRIPS (WTO+) • Intellectual property rights (WTO-X)
	• Customs administration • Anti-dumping (GATT Article VI) • Countervailing measures (GATT Article VI)	• Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures • Technical Barriers to Trade (TBT) Agreement • Agreement on Subsidies and Counterveiling Measures (ASCM) • State trading enterprises (GATT Article XVII)	• Public procurement	• Customs administration (WTO+) • Anti-dumping (WTO+) • Countervailing measures (WTO+) • SPS (WTO+) • TBT (WTO+) • Subsidies (WTO+) • State trading enterprises (WTO+) • Public procurement (WTO+) • Competition policy (WTO-X)

For preferrential trade agreements, WTO+ indicates provisions that are within the scope of the WTO's jurisdiction, whereas provisions indicated by WTO-X are not.

WTO and Hofmann, Osnago, and Ruta (2017). In Hofmann et. al. provisions related to local content are labeled "investment," and provisions related to repatriation of capital are called "movement of capital".

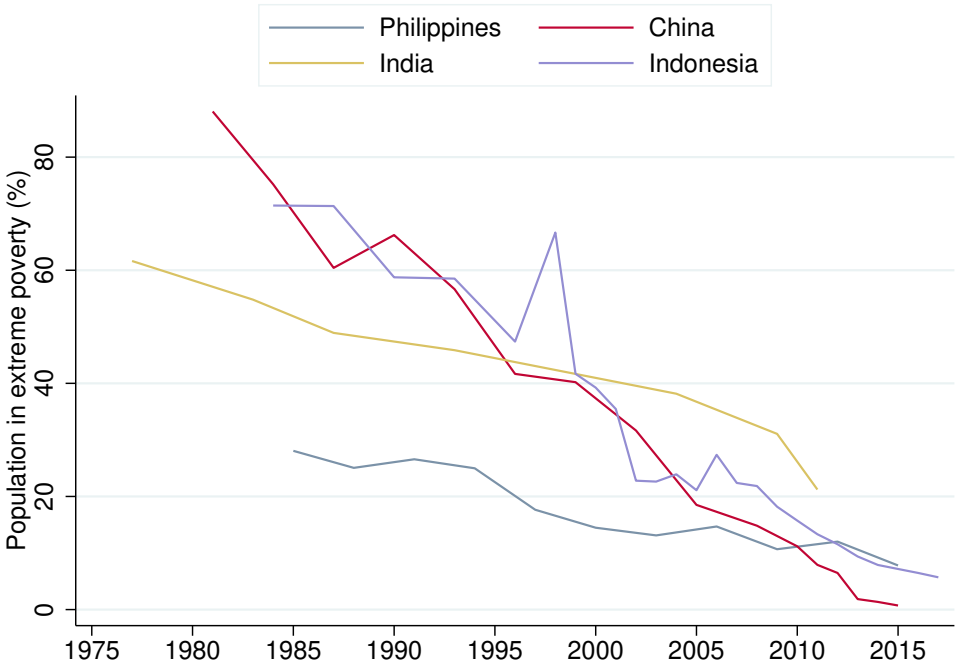
Variables	Mean	Standard Deviation	Min	Max	Mean, Sustained Poverty Reduction = 0	Mean, Sustained Poverty Reduction = 1	Difference	P-value
Domestic market								
Population (billions of people)	0.07	0.20	0.00	1.34	0.04	0.09	0.05	[0.016]
Middle class (% of total population)	0.37	0.29	0.00	0.97	0.34	0.40	0.06	[0.071]
Relative size of integrated international market								
Population (1,000s of people)	0.23	0.42	0.00	2.93	0.19	0.26	0.07	[0.119]
Income per capita	7.84	8.55	0.00	50.87	7.79	7.88	0.09	[0.922]
Past income boosts								
Exports (% annual growth, last 5 years)	0.06	0.09	-0.36	0.50	0.04	0.08	0.04	[0.0004]
Agricultural labor productivity (% annual growth, last 5 years)	0.02	0.03	-0.11	0.15	0.02	0.02	0.00	[0.266]
Geographic variables								
Tropical climate (% of land area)	0.48	0.43	0.00	1.00	0.59	0.39	-0.20	[0.00001]
Desert climate (% of land area)	0.03	0.10	0.00	0.75	0.01	0.05	0.03	[0.002]
Distance to ice-free coast (1,000s of km)	0.43	0.44	0.00	2.21	0.37	0.47	0.10	[0.036]
Ruggedness	1.41	1.25	0.11	6.74	1.48	1.34	-0.14	[0.301]
Legal origins								
British legal origins	0.25	0.44	0.00	1.00	0.17	0.32	0.15	[0.001]
French legal origins	0.57	0.50	0.00	1.00	0.66	0.49	-0.18	[0.001]
Socialist legal origins	0.18	0.38	0.00	1.00	0.16	0.19	0.03	[0.532]

Sustained poverty reduction is a continuous reduction in the share of the population in extreme poverty (i.e., earning less than $1.90/day PPP in 2011 US dollars) over a 5 year period, assuming a linear trend between years of survey data. The sample includes 347 observations of 93 countries between 1981-2015, and excludes advanced economies (i.e., those with less than 3% of the population in extreme poverty for all periods in the sample). Middle class is the share of the population earning $11-110/day PPP 2011, calculated as a funtion of the Gini coefficient and real GDP per capita, assuming a log-normal income distribution. Population and income of integrated international market is calculated summing all the countries in the world, weighted by the depth of trade agreements signed between them.

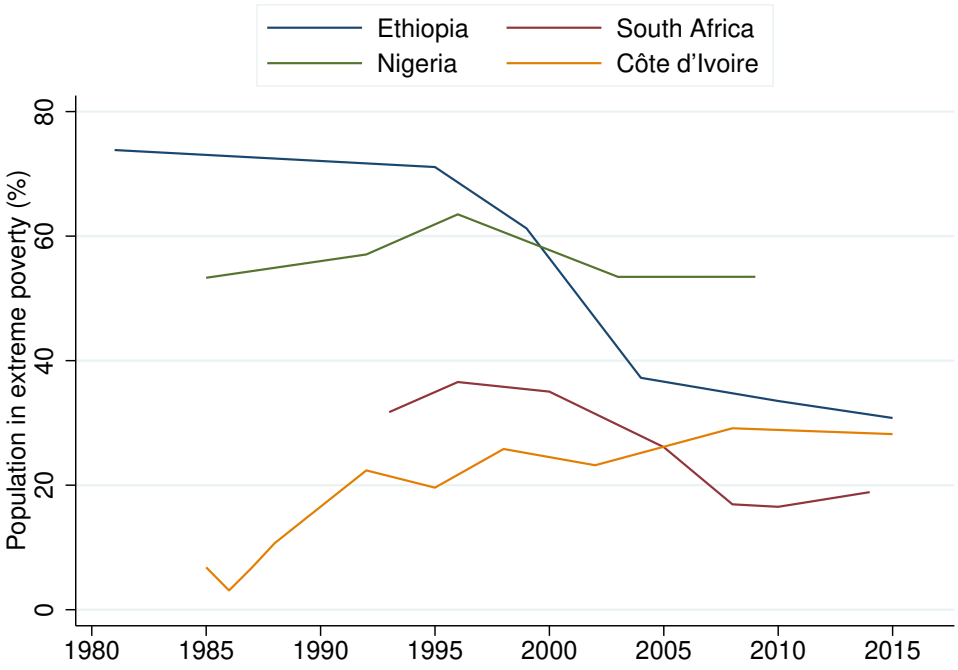
POVCALNET, Penn World Tables, WTO, Hofmann, Osnago, and Ruta (2017), WDI, USDA ERS, Nunn and Puga (2012), La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999).

		(1)	(2)	(3)	(4)	(5)	(6)
DEPENDENT VARIABLE		Sustained poverty reduction	Sustained poverty reduction	Sustained poverty reduction	Sustained poverty reduction	Sustained poverty reduction	Sustained poverty reduction
Market size (S)	Middle class (% of total population)	0.59	0.72	0.82	0.62	0.80	2.07
		(0.09)	(0.22)	(0.27)	(0.15)	(0.68)	(8.39)
	Relative population of integrated international market (1,000s of people)	0.18	0.21	0.14	0.04	0.15	0.58
		(0.01)	(0.04)	(0.04)	(0.01)	(0.02)	(0.68)
	Relative income per capita of integrated international market	0.02	0.02	0.02	0.02	0.01	0.03
		(0.0001)	(0.0002)	(0.0003)	(0.0001)	(0.0002)	(0.0023)
Variable profit (V)	Constant	1.13	0.81	0.74	0.92	1.82	0.36
		(0.34)	(0.36)	(0.31)	(0.32)	(4.16)	(0.28)
	Exports (% annual growth, last 5 years)	6.22	5.48	3.97	-0.14	7.56	3.65
		(11.55)	(14.12)	(7.92)	(5.54)	(60.15)	(24.9)
	Agricultural labor productivity (% annual growth, last 5 years)	-1.98	-0.95	0.44	7.51	9.72	-1.20
		(19.86)	(14.71)	(9.66)	(36.27)	(125.34)	(12.75)
Fixed cost (F)	Constant	0.55	0.40	-0.09	0.23	0.28	0.37
		(0.04)	(0.14)	(0.18)	(0.15)	(0.25)	(0.28)
	Tropical climate (% of land area)		0.70	0.46	0.69	0.64	0.66
			(0.06)	(0.07)	(0.06)	(0.11)	(0.09)
	Desert climate (% of land area)		-1.32	-2.35	-0.70	-0.60	-0.69
			(0.73)	(3.3)	(0.75)	(0.97)	(0.98)
	Distance to ice-free coast (1,000s of km)		-0.10	0.07	-0.01	-0.18	-0.36
			(.041)	(0.05)	(0.04)	(0.08)	(0.1)
	Ruggedness		0.10	-0.03	0.06	0.20	0.07
			(.004)	(.005)	(.004)	(.007)	(.007)
	British legal origins		-0.79	-0.28	-0.60	-0.23	-0.62
			(.07)	(.09)	(.06)	(0.14)	(0.15)
	French legal origins		-0.22	0.26	-0.20	-0.03	-0.28
			(.05)	(.07)	(.06)	(0.14)	(0.15)
Specification		Baseline	Baseline	Alternative definition of sustained poverty reduction	Five year windows shifted one year back	Consumption survey countries only	Maximum two years of poverty rate observed
Log likelihood		-224.3	-206.7	-198.5	-216.9	-118.0	-133.7
Area under the reciever operating characteristic curve (AUC)		0.667	0.739	0.728	0.684	0.771	0.747
Threshold market size (billions of people outside middle class)		0.352	0.405	0.116	0.334	0.267	0.451
Number of observations		347	347	347	344	216	234

Asymptotic standard errors in parenthesis. Market size also includes population of people not in the middle class, with a coefficient set equal to one. This allows the threshold market size to be interpreted in units of people who are in the middle class. Socialist legal origins are the omitted legal orgins category in specifications 2-6.



(a) Asia



(b) Africa

Figure 1: Poverty reduction in select countries

Notes: Extreme poverty is living on $1.90/day PPP in 2011 US dollars.

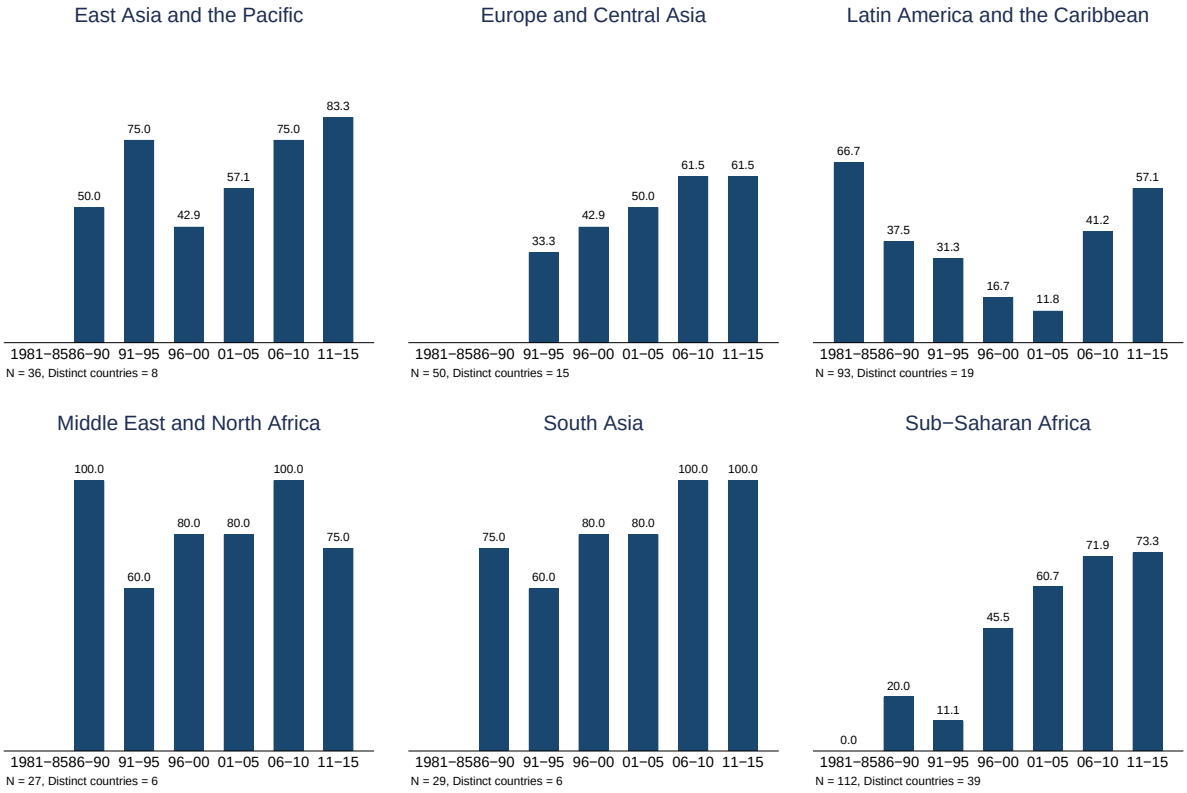


Figure 2: Sustained poverty reduction

Notes: The sample includes 347 5-year periods, from 93 distinct countries, excluding advanced economies (i.e., those with less than 3% of the population in extreme poverty for all periods in the sample). Extreme poverty reduction is a continuous reduction in the share of the population living on $1.90/day PPP in 2011 US dollars, assuming a linear trend in the poverty headcount ratio between years of survey data.

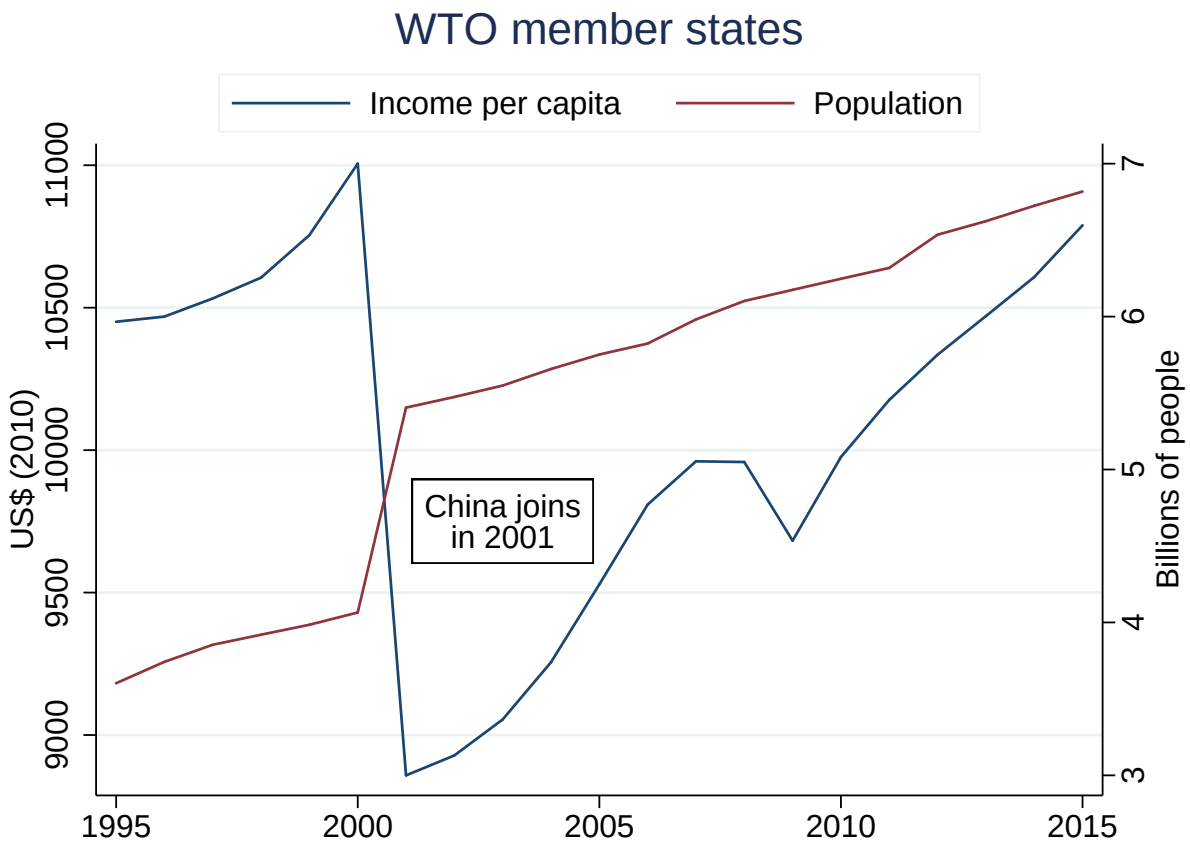


Figure 3: The China shock to the World Trade Organization

Notes: Income and population are summed over all member countries for each year.

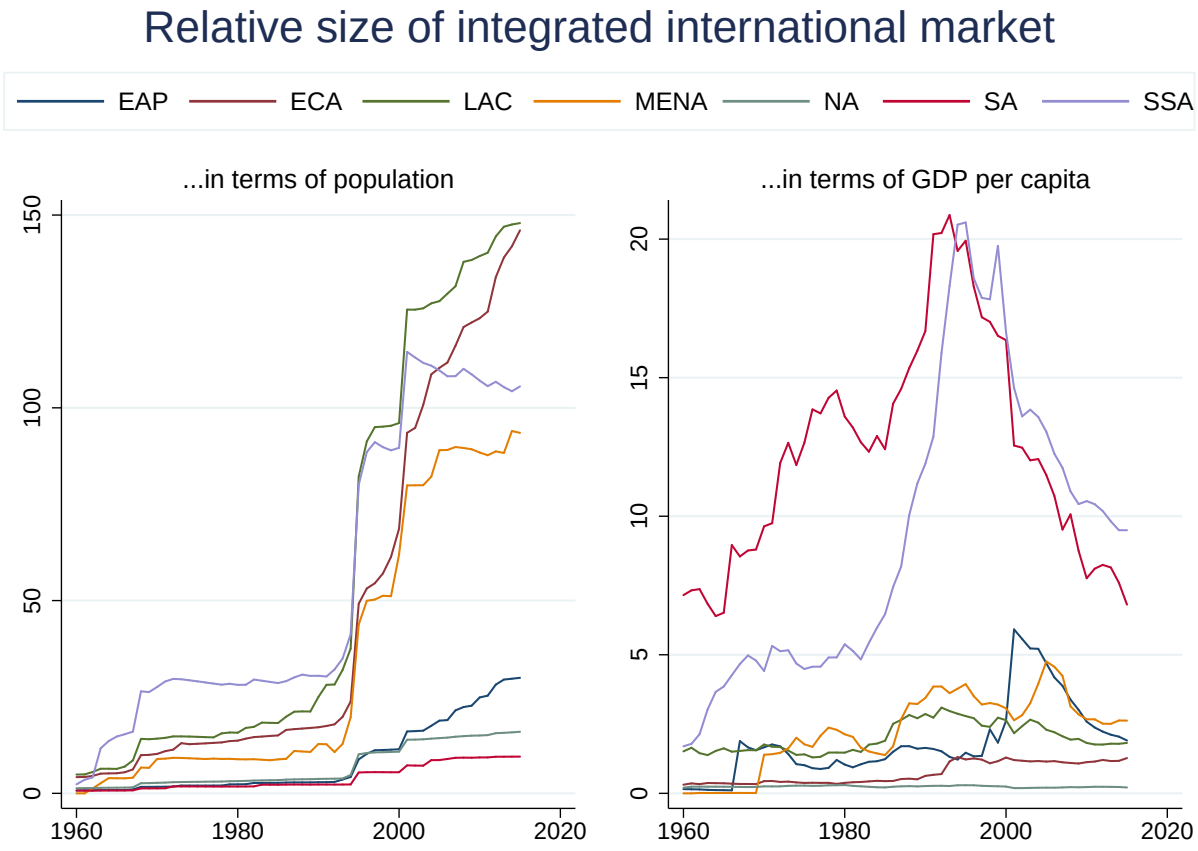


Figure 4: The rise (and fall) in the value of the integrated international market

Notes: Regional average values are weighted by population. If an economy has not signed any trade agreements, relative population and income are set equal to zero. EAP is East Asia and Pacific, LAC is Latin America and the Carribean, ECA is Europe and Central Asia, MENA is Middle East and North Africa, SA is South Asia and SSA is Sub-Saharan Africa.

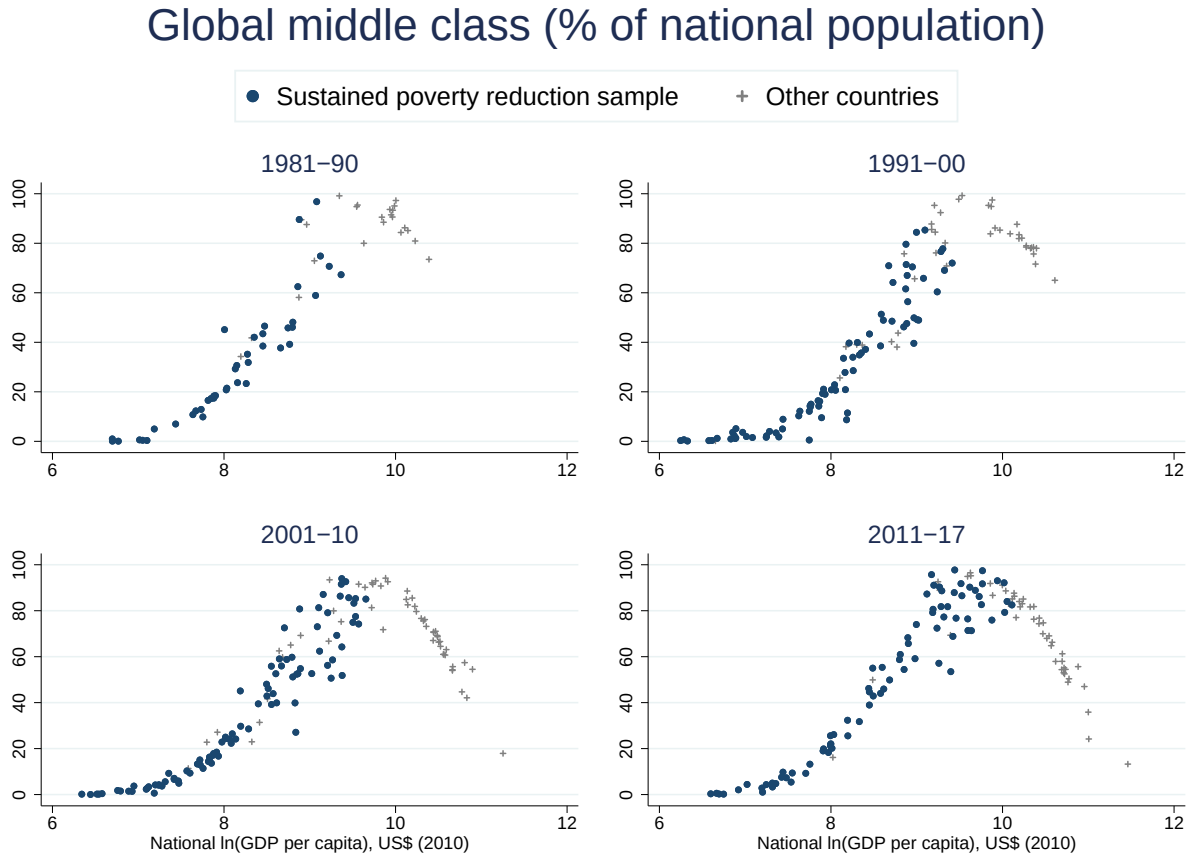


Figure 5: The global middle class, or those consuming US$11-110 per day, PPP 2011

Notes: Each dot is a country average for the time period. Calculation of the middle class share combines real GDP per capita and the Gini coefficient, assuming a log normal income distribution within each country.

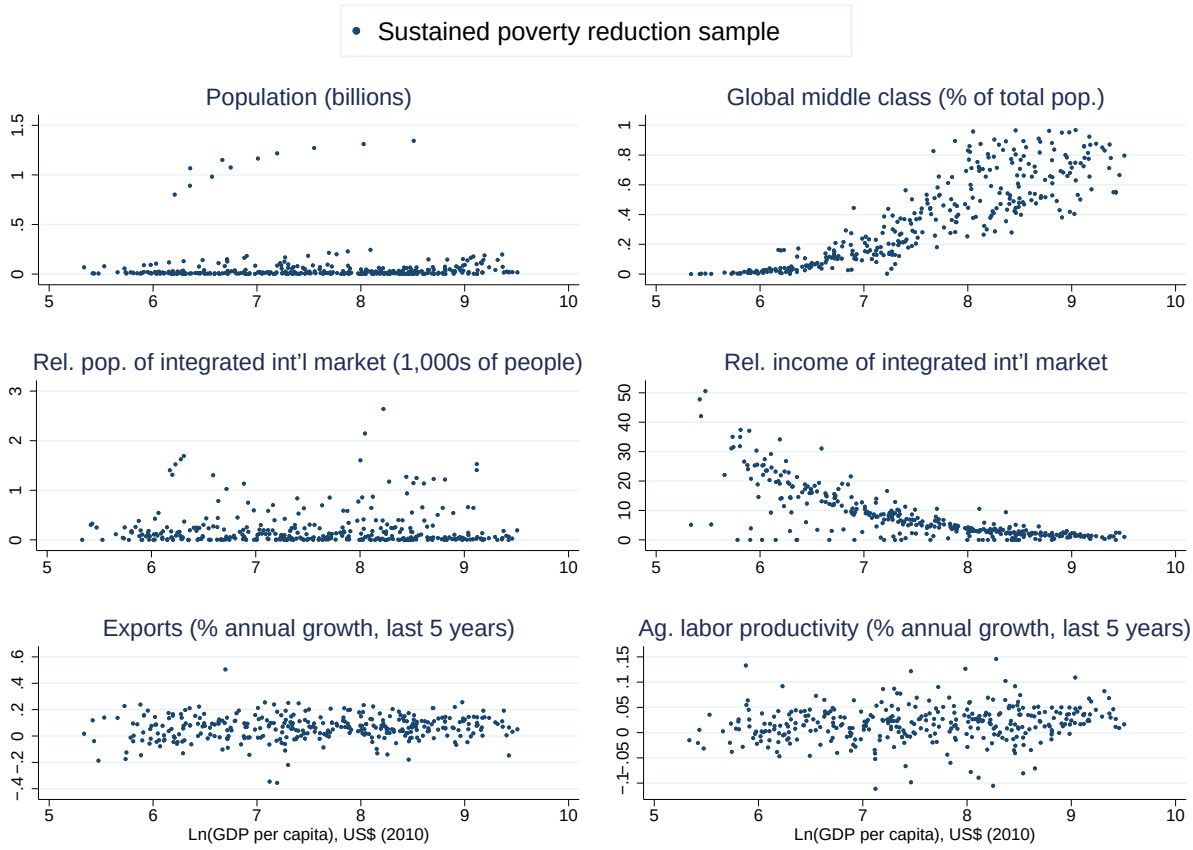


Figure 6: Market size and variable pro t data

Notes: Includes all countries that are not advanced (i.e., those with *more* than 3% of the population in extreme poverty for all periods in the sample), a total of 347 country-five-year periods, from 1981-2015. All variables are measured at the first year of the period. For closed economies, integrated market income and population are zero.

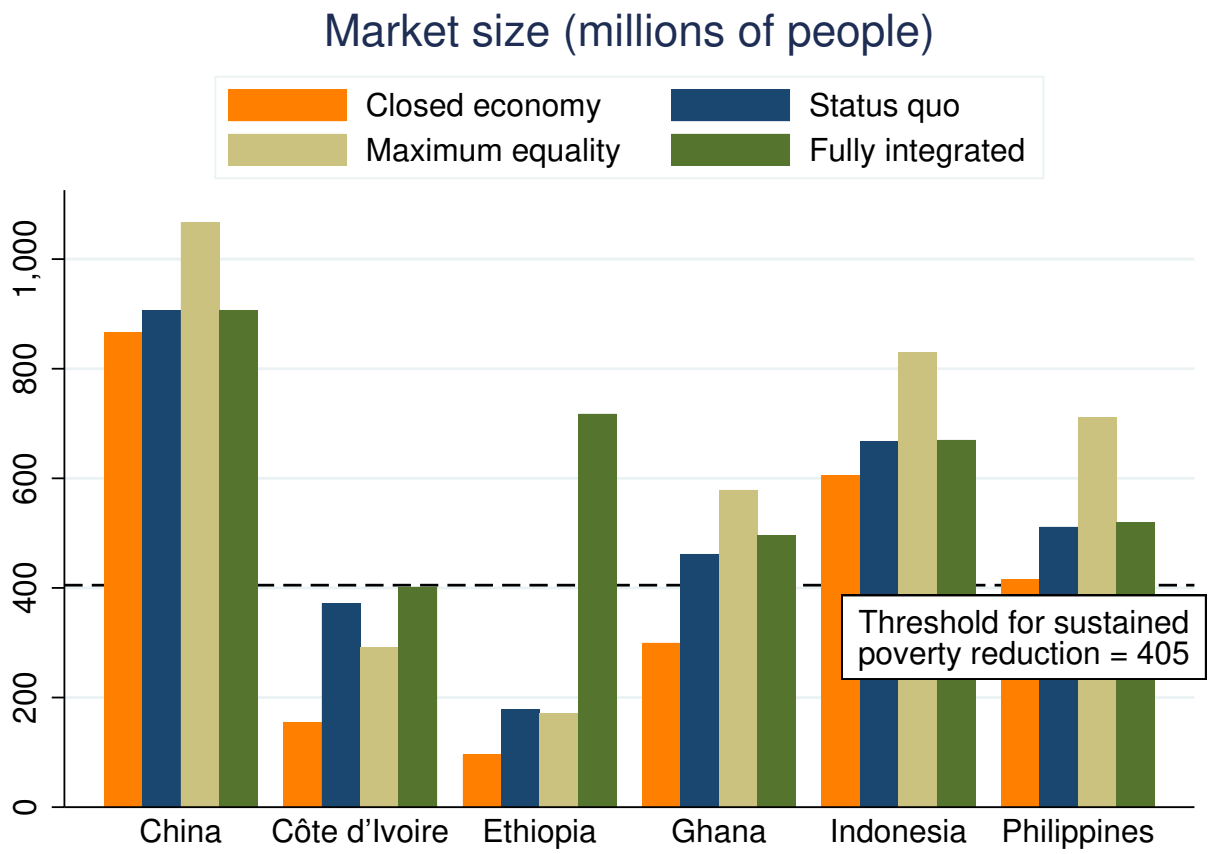


Figure 7: Counterfactual market sizes in select countries

Notes: Data are for 2011. Market size is calculated using coefficients estimated in column 4 of Table 4. The status quo indicates the market size observed in the data. The closed economy counterfactual is the market size when setting the relative population and income of the integrated market to zero. The maximum equality counterfactual is the market size when the share of the population in the middle class is calculated with the current national GDP per capita, but a Gini coefficient of 0.20, the value for Slovakia in 1992, the lowest in the sample. The fully integrated counterfactual sets the relative population and income of the integrated market equal to the relative income of the whole world, as if the country signed all trade agreements with all countries.

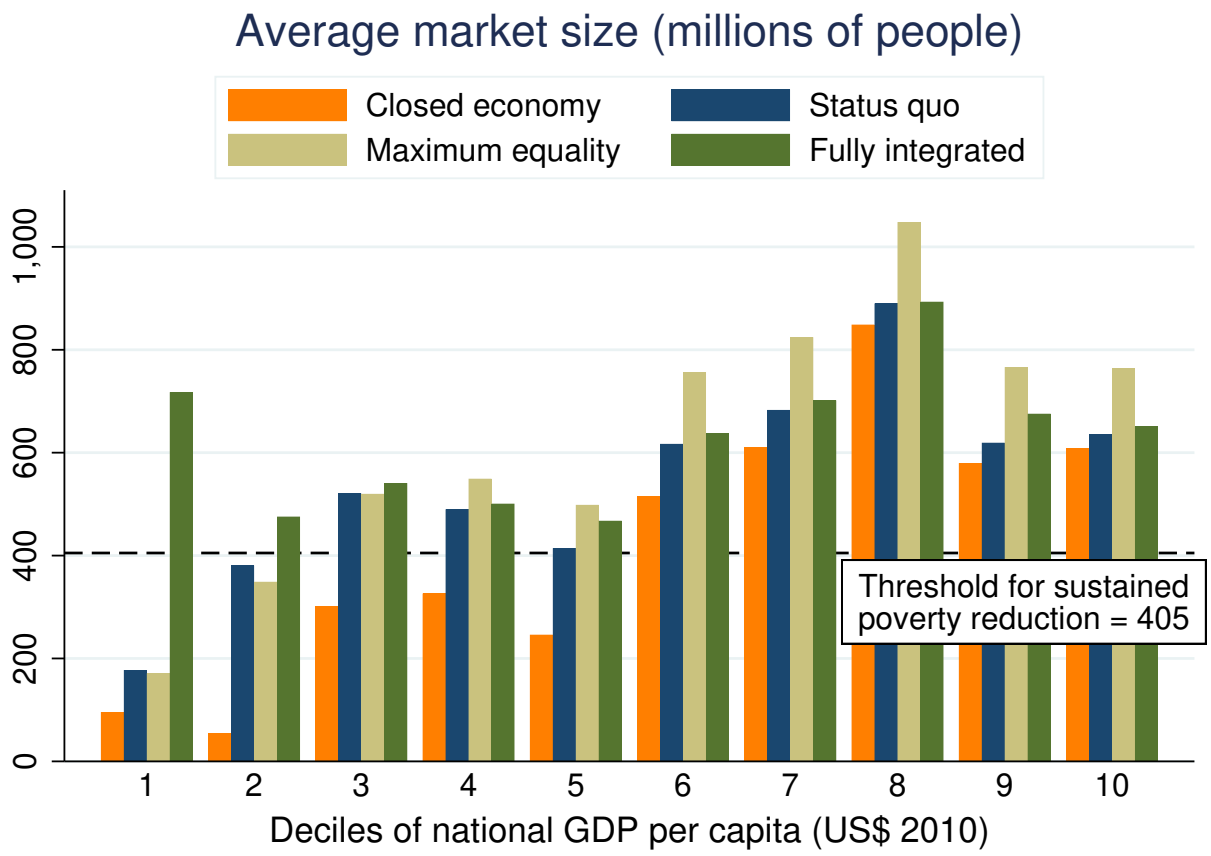


Figure 8: Counterfactual market sizes in full sample, by national GDP per capita

Notes: Averages are weighted by population in the base year. Market size is in units of people outside the middle class, i.e., those consuming less than $11 per day, PPP in 2011 US dollars. Data are for 2011. Market size is calculated using coefficients estimated in column 4 of Table 4. The status quo indicates the market size observed in the data. The closed economy counterfactual is the market size when setting the relative population and income of the integrated market to zero. The maximum equality counterfactual is the market size when the share of the population in the middle class is calculated with the current national GDP per capita, but a Gini coefficient of 0.20, the value for Slovakia in 1992, the lowest in the sample. The fully integrated counterfactual sets the relative population and income of the integrated market equal to the relative income of the whole world, as if the country signed all trade agreements with all countries.

Afghanistan[a]	Djibouti[a]	Libya[a]	Sao Tome and Principe
Albania[a]	Ecuador[b]	Maldives[a]	Saudi Arabia[a]
Algeria	Equatorial Guinea[a]	Marshall Islands[a]	Seychelles[a]
Andorra[a]	Eswatini (Swaziland)	Mexico	Solomon Islands[a]
Angola	Ethiopia	Micronesia, Fed. Sts.[a]	Somalia[a]
Bahamas, The[a]	Fiji	Monaco[a]	Sudan
Bahrain[a]	Guinea	Mongolia	Thailand[b]
Bhutan	Guinea-Bissau	Morocco	Tonga[a]
Bolivia	Iran, Islamic Rep.	Mozambique	Tunisia
Botswana[b]	Iraq[a]	Namibia	Tuvalu[a]
Brunei Darussalam[a]	Jordan[a,b]	Nauru[a]	United Arab Emirates[a]
Bulgaria	Kiribati[a]	Nepal	Vanuatu[a]
Cabo Verde[a]	Korea, Dem. People's Rep.[a]	Oman[a]	Venezuela, RB
Cambodia[a]	Lao PDR	Panama	Vietnam
China	Lebanon	Paraguay	Yemen, (Arab) Rep.[a]
Comoros	Lesotho	Qatar[a]	Zambia
Czech Republic (Czechoslovakia)[a]	Liberia	San Marino[a]	

Afghanistan[a]	Korea, Dem. People's Rep.[a]	Nepal	Somalia[a]
Algeria	Marshall Islands[a]	Palau[a]	Timor-Leste[a]
Bhutan	Micronesia, Fed. Sts.[a]	Samoa[a]	Tonga[a]
Bosnia and Herzegovina[a]	Monaco[a]	San Marino[a]	Tuvalu[a]
Iran, Islamic Rep.	Montenegro[a]	São Tomé and Príncipe	Vanuatu[a]
Kiribati[a]	Nauru[a]	Serbia	

Afghanistan[a]	Marshall Islands[a]	São Tomé and Príncipe	
Iran, Islamic Rep.	Monaco[a]	Somalia[a]	
Korea, Dem. People's Rep.[a]	Palau[a]	Timor-Leste[a]	

List includes all sovereign states that are members of the United Nations in 2019, if they existed at the time. For instance, in 1981, the USSR had not signed the GATT, but does not exist today so it is not on the list. Superscript (a) indicates that country is not included in analysis of sustained poverty reduction, either because it had kept the extreme poverty headcount at less than 3% of the population for the entire sample, or sufficient poverty data were not available. Superscript (b) indicates that economy was classified as open in 1981 by Sachs and Warner (1995) and Waczirag and Welch (2008). Signatures are included only if in-force and have been notified to GATT or WTO.

The estimate for breakeven market size is 0.405 billion people earning less than $11 per day, US$ PPP.

			Pop. outside of middle class (bn)	Middle class (% of total pop.)	Rel. pop. of integrated international market (1000s of people)	Rel. income. of integrated international market	Status quo	Closed economy counterfactual	Maxmimum equality counterfactual	Full integration counterfactual	Status quo	Closed economy
AGO	2001-05	1	0.014	18.1%	127.95	10.58	0.389	0.145	0.282	0.430	4%	64%
ARG	1981-85	1	0.018	38.1%	14.51	1.35	0.324	0.293	0.370	0.345	20%	28%
ARG	1986-90	1	0.018	43.0%	15.40	1.22	0.356	0.328	0.497	0.378	12%	19%
ARG	1991-95	0	0.016	52.9%	18.56	1.07	0.424	0.398	0.668	0.448		2%
ARG	1996-00	0	0.009	74.6%	42.62	0.98	0.578	0.548	0.760	0.597		
ARG	2001-05	0	0.013	66.0%	57.02	0.80	0.518	0.490	0.762	0.540		
ARG	2006-10	1	0.009	78.2%	58.25	1.40	0.615	0.573	0.771	0.636		
ARG	2011-15	1	0.006	85.1%	60.08	0.86	0.651	0.621	0.755	0.674		
ARM	2001-05	0	0.002	26.5%	33.33	2.15	0.245	0.194	0.223	0.780	39%	52%
ARM	2006-10	1	0.001	69.4%	772.24	3.81	0.744	0.502	0.846	1.045		
ARM	2011-15	1	0.000	87.5%	870.39	3.20	0.882	0.633	0.952	1.206		
AZE	1996-00	1	0.007	13.0%	12.67	4.58	0.197	0.100	0.128	0.529	51%	75%
AZE	2001-05	1	0.006	20.5%	12.22	2.14	0.201	0.155	0.153	0.472	50%	62%
BDI	1996-00	0	0.006	0.3%	250.05	50.61	1.102	0.008	1.100	0.985		98%
BDI	2001-05	1	0.007	0.3%	326.23	42.14	0.944	0.008	0.942	1.028		98%
BDI	2006-10	1	0.008	0.0%	302.47	47.85	1.056	0.008	1.055	1.145		98%
BEN	2006-10	0	0.008	6.7%	272.36	9.61	0.311	0.056	0.268	0.411	23%	86%
BEN	2011-15	0	0.009	7.9%	256.99	9.44	0.314	0.065	0.262	0.411	23%	84%
BFA	1996-00	1	0.010	2.2%	139.57	30.38	0.681	0.026	0.664	0.590		93%
BFA	2001-05	1	0.012	2.8%	173.55	21.73	0.515	0.032	0.495	0.553		92%
BFA	2006-10	1	0.013	2.6%	161.73	17.38	0.424	0.032	0.405	0.471		92%
BGD	1986-90	0	0.093	0.4%	5.07	18.87	0.485	0.096	0.482	0.366		76%
BGD	1991-95	0	0.105	0.8%	5.01	22.14	0.567	0.111	0.562	0.432		73%
BGD	1996-00	1	0.115	2.2%	11.99	19.67	0.538	0.131	0.523	0.423		68%
BGD	2001-05	1	0.128	2.0%	15.58	14.27	0.438	0.142	0.425	0.417		65%
BGD	2006-10	1	0.135	4.1%	16.11	15.90	0.495	0.165	0.468	0.488		59%
BGD	2011-15	1	0.129	13.2%	16.49	12.24	0.480	0.225	0.442	0.484		44%
BGR	1991-95	1	0.001	90.4%	-	-	0.655	0.655	0.719	0.857		
BGR	1996-00	1	0.002	78.9%	167.81	5.31	0.717	0.572	0.815	0.793		
BGR	2001-05	0	0.001	83.4%	253.03	3.34	0.726	0.604	0.827	0.829		
BGR	2006-10	0	0.001	89.0%	287.27	1.86	0.743	0.644	0.820	0.862		
BLR	1996-00	0	0.002	82.7%	9.43	1.29	0.628	0.599	0.720	0.796		
BLR	2001-05	1	0.001	86.0%	11.38	1.26	0.651	0.623	0.732	0.842		
BLR	2006-10	1	0.000	96.6%	12.85	1.29	0.728	0.698	0.751	0.884		
BLR	2011-15	1	0.000	96.3%	13.08	1.56	0.731	0.697	0.750	0.885		
BOL	1991-95	0	0.006	13.4%	77.04	8.39	0.292	0.103	0.223	0.384	28%	75%
BOL	1996-00	0	0.006	19.5%	182.85	8.12	0.353	0.147	0.339	0.420	13%	64%
BOL	2001-05	0	0.007	21.5%	237.71	6.22	0.340	0.162	0.325	0.430	16%	60%
BOL	2006-10	1	0.007	29.2%	233.90	6.86	0.408	0.217	0.522	0.496		46%
BOL	2011-15	0	0.005	47.4%	233.06	4.64	0.493	0.348	0.704	0.584		14%
BRA	1986-90	0	0.082	40.5%	3.42	2.27	0.422	0.375	0.738	0.413		7%
BRA	1991-95	1	0.088	41.9%	3.63	1.62	0.425	0.391	0.739	0.421		4%
BRA	1996-00	0	0.077	53.2%	8.71	1.50	0.494	0.462	0.826	0.491		
BRA	2001-05	0	0.088	50.2%	11.57	1.88	0.492	0.451	0.830	0.493		
BRA	2006-10	1	0.081	57.0%	11.74	1.42	0.524	0.493	0.825	0.527		
BRA	2011-15	0	0.057	71.3%	12.13	0.82	0.591	0.572	0.797	0.596		
BTN	2006-10	1	0.000	56.3%	144.18	0.59	0.450	0.407	0.588	2.637		
BTN	2011-15	1	0.000	61.2%	147.01	0.54	0.485	0.443	0.681	2.651		
BWA	1986-90	1	0.001	25.4%	-	-	0.184	0.184	0.296	1.163	55%	55%
BWA	1991-95	1	0.001	35.5%	399.07	2.18	0.387	0.258	0.757	1.139	4%	36%
BWA	1996-00	1	0.001	42.3%	937.36	2.41	0.554	0.307	0.946	1.150		24%
BWA	2001-05	1	0.001	46.9%	1,248.13	1.76	0.639	0.340	1.016	1.151		16%
BWA	2006-10	1	0.001	52.4%	1,228.42	1.48	0.670	0.380	1.012	1.164		6%
BWA	2011-15	1	0.001	61.0%	1,217.58	1.41	0.728	0.442	1.008	1.201		
CAF	1996-00	1	0.003	2.7%	426.35	25.49	0.636	0.022	0.617	0.756		94%
CAF	2001-05	0	0.004	1.5%	544.73	23.64	0.615	0.014	0.605	0.804		96%
CHL	1991-95	0	0.007	51.7%	39.22	2.32	0.436	0.380	0.755	0.496		6%
CHL	1996-00	0	0.005	63.0%	96.69	1.45	0.511	0.461	0.776	0.565		
CHL	2001-05	1	0.005	65.6%	134.39	1.32	0.535	0.479	0.780	0.587		
CHL	2006-10	1	0.004	78.0%	180.96	1.23	0.631	0.567	0.788	0.669		
CHL	2011-15	1	0.004	79.7%	191.90	1.03	0.641	0.579	0.772	0.679		
CHN	1986-90	0	0.941	11.8%	-	-	1.026	1.026	0.987	1.242		
CHN	1991-95	1	0.953	17.2%	-	-	1.077	1.077	1.020	1.352		
CHN	1996-00	1	0.830	31.8%	-	-	1.060	1.060	1.066	1.218		
CHN	2001-05	1	0.746	41.4%	1.59	5.62	1.161	1.045	1.266	1.150		
CHN	2006-10	1	0.524	60.0%	1.72	3.91	1.039	0.958	1.257	1.035		
CHN	2011-15	1	0.312	76.8%	1.87	1.88	0.906	0.867	1.068	0.906		
CIV	1986-90	0	0.008	17.8%	45.87	4.96	0.249	0.137	0.191	0.305	39%	66%
CIV	1991-95	0	0.011	13.0%	42.82	7.65	0.271	0.105	0.205	0.304	33%	74%

			Pop. outside of middle class (bn)	Middle class (% of total pop.)	Rel. pop. of integrated international market (1000s of people)	Rel. income. of integrated international market	Status quo	Closed economy counterfactual	Maxmimum equality counterfactual	Full integration counterfactual	Status quo	Closed economy
CIV	1996-00	0	0.013	14.4%	98.66	9.16	0.326	0.117	0.274	0.334	20%	71%
CIV	2001-05	0	0.015	12.7%	122.93	8.74	0.312	0.107	0.245	0.350	23%	74%
CIV	2006-10	0	0.016	13.2%	119.19	8.67	0.315	0.111	0.239	0.354	22%	73%
CIV	2011-15	1	0.017	19.0%	118.45	9.38	0.372	0.154	0.291	0.402	8%	62%
CMR	2001-05	0	0.013	16.0%	127.26	9.09	0.343	0.129	0.277	0.380	15%	68%
CMR	2006-10	0	0.015	17.7%	119.86	7.90	0.331	0.143	0.264	0.369	18%	65%
COD	2006-10	1	0.056	0.3%	41.17	31.15	0.708	0.058	0.706	0.709		86%
COG	2006-10	1	0.003	28.3%	583.34	4.06	0.414	0.207	0.411	0.655		49%
COL	1981-85	1	0.015	44.3%	14.95	2.83	0.396	0.335	0.725	0.408	2%	17%
COL	1986-90	1	0.016	47.1%	15.47	3.86	0.439	0.357	0.747	0.443		12%
COL	1991-95	0	0.017	50.7%	15.90	4.41	0.477	0.383	0.761	0.479		5%
COL	1996-00	0	0.019	48.3%	39.44	2.91	0.437	0.368	0.767	0.444		9%
COL	2001-05	0	0.022	45.1%	51.74	2.44	0.409	0.348	0.737	0.426		14%
COL	2006-10	0	0.020	53.9%	51.94	2.24	0.467	0.410	0.775	0.485		
COL	2011-15	1	0.016	65.2%	54.00	1.53	0.530	0.487	0.779	0.548		
COM	2006-10	0	0.001	18.1%	191.11	0.77	0.187	0.131	0.155	2.489	54%	68%
CRI	1986-90	1	0.001	74.9%	0.95	0.58	0.554	0.542	0.691	0.948		
CRI	1991-95	0	0.001	58.8%	166.24	2.89	0.521	0.426	0.769	0.820		
CRI	1996-00	0	0.001	65.5%	389.23	2.42	0.607	0.475	0.837	0.845		
CRI	2001-05	1	0.001	63.4%	504.21	1.50	0.597	0.459	0.854	0.810		
CRI	2006-10	0	0.001	69.3%	542.17	2.05	0.659	0.502	0.877	0.852		
CRI	2011-15	1	0.001	74.9%	659.50	1.31	0.708	0.542	0.889	0.884		
DJI	2006-10	1	0.001	14.6%	2,898.76	8.27	0.888	0.106	0.881	2.016		74%
DJI	2011-15	0	0.001	15.7%	2,929.98	7.16	0.880	0.114	0.806	1.988		72%
DOM	1991-95	1	0.004	38.7%	72.80	4.85	0.399	0.284	0.522	0.507	2%	30%
DOM	1996-00	0	0.004	49.2%	177.36	3.38	0.467	0.360	0.704	0.561		11%
DOM	2001-05	0	0.004	57.6%	237.40	1.98	0.511	0.420	0.784	0.609		
DOM	2006-10	0	0.004	60.9%	238.61	2.02	0.535	0.443	0.806	0.633		
DOM	2011-15	1	0.003	72.3%	267.05	2.23	0.627	0.525	0.825	0.712		
DZA	1991-95	1	0.008	70.6%	-	-	0.518	0.518	0.706	0.613		
DZA	1996-00	1	0.008	72.2%	-	-	0.530	0.530	0.692	0.641		
DZA	2001-05	1	0.006	80.7%	-	-	0.589	0.589	0.714	0.694		
DZA	2006-10	1	0.004	89.2%	4.75	9.41	0.843	0.648	0.920	0.736		
ECU	1991-95	1	0.006	42.2%	1.00	1.05	0.333	0.311	0.606	0.475	18%	23%
ECU	1996-00	0	0.007	41.0%	120.89	3.60	0.403	0.303	0.606	0.459	1%	25%
ECU	2001-05	0	0.008	39.3%	157.89	3.12	0.389	0.292	0.623	0.451	4%	28%
ECU	2006-10	0	0.006	54.2%	156.27	2.51	0.483	0.398	0.776	0.545		2%
ECU	2011-15	0	0.004	70.8%	156.10	2.09	0.592	0.516	0.795	0.654		
EGY	1991-95	1	0.050	12.2%	9.22	9.97	0.345	0.138	0.287	0.298	15%	66%
EGY	1996-00	1	0.041	36.3%	23.54	6.89	0.449	0.303	0.554	0.426		25%
EGY	2001-05	0	0.035	50.0%	30.21	4.09	0.487	0.396	0.580	0.494		2%
EGY	2006-10	1	0.026	65.6%	32.07	7.01	0.652	0.501	0.746	0.633		
EGY	2011-15	1	0.009	89.5%	31.97	4.46	0.754	0.656	0.821	0.750		
ETH	2001-05	1	0.068	0.0%	1.22	5.16	0.174	0.068	0.174	0.999	57%	83%
ETH	2006-10	1	0.078	0.1%	1.22	5.25	0.188	0.079	0.187	0.918	54%	80%
ETH	2011-15	1	0.089	0.9%	1.16	3.96	0.178	0.096	0.171	0.718	56%	76%
FJI	2006-10	1	0.000	59.2%	2,639.37	2.24	1.031	0.428	1.217	2.146		
GAB	2006-10	1	0.000	85.7%	1,527.63	1.16	0.966	0.620	1.068	1.612		
GAB	2011-15	1	0.000	86.1%	1,407.01	1.01	0.940	0.623	1.039	1.517		
GEO	2001-05	0	0.003	23.3%	530.06	7.12	0.429	0.171	0.391	0.633		58%
GEO	2006-10	0	0.002	50.3%	588.65	4.12	0.575	0.366	0.704	0.803		10%
GEO	2011-15	1	0.001	71.5%	644.80	2.72	0.709	0.518	0.887	0.963		
GHA	1991-95	0	0.012	20.9%	34.81	14.97	0.478	0.163	0.430	0.448		60%
GHA	1996-00	1	0.014	18.6%	82.83	19.09	0.559	0.149	0.488	0.499		63%
GHA	2001-05	1	0.016	19.7%	104.65	21.61	0.625	0.158	0.564	0.633		61%
GHA	2006-10	1	0.017	25.1%	99.66	9.04	0.405	0.198	0.354	0.436		51%
GHA	2011-15	0	0.015	39.3%	95.43	6.91	0.462	0.300	0.579	0.496		26%
GIN	1996-00	0	0.006	17.2%	194.03	14.61	0.472	0.131	0.467	0.508		68%
GIN	2001-05	0	0.008	10.6%	245.89	17.25	0.491	0.084	0.430	0.566		79%
GIN	2006-10	1	0.009	5.7%	239.90	18.16	0.474	0.050	0.435	0.551		88%
GMB	2001-05	1	0.001	16.2%	1,522.69	11.49	0.676	0.118	0.627	1.294		71%
GMB	2006-10	1	0.001	16.3%	1,403.95	12.42	0.671	0.119	0.599	1.232		71%
GMB	2011-15	1	0.002	15.9%	1,313.26	14.01	0.682	0.116	0.594	1.195		71%
GNB	1996-00	1	0.001	3.7%	1,304.80	31.09	0.942	0.028	0.917	1.581		93%
GNB	2001-05	0	0.001	3.2%	1,691.48	18.12	0.754	0.024	0.732	1.430		94%
GNB	2006-10	0	0.001	4.1%	1,625.80	19.11	0.767	0.031	0.738	1.410		92%
GTM	1991-95	1	0.007	25.9%	57.17	6.39	0.337	0.194	0.405	0.406	17%	52%
GTM	1996-00	1	0.007	31.3%	134.10	5.21	0.369	0.234	0.502	0.424	9%	42%
GTM	2001-05	0	0.008	36.4%	171.25	3.75	0.384	0.271	0.587	0.450	5%	33%
GTM	2006-10	0	0.008	39.9%	177.04	4.64	0.429	0.297	0.684	0.471		27%

			Pop. outside of middle class (bn)	Middle class (% of total pop.)	Rel. pop. of integrated international market (1000s of people)	Rel. income. of integrated international market	Status quo	Closed economy counterfactual	Maxmimum equality counterfactual	Full integration counterfactual	Status quo	Closed economy
HND	1991-95	0	0.004	20.0%	0.54	1.16	0.173	0.149	0.124	0.470	57%	63%
HND	1996-00	0	0.005	21.2%	240.61	8.73	0.388	0.158	0.361	0.490	4%	61%
HND	2001-05	0	0.005	21.4%	301.20	5.27	0.332	0.160	0.307	0.451	18%	61%
HND	2006-10	0	0.006	24.5%	306.78	7.47	0.401	0.183	0.436	0.477	1%	55%
HND	2011-15	0	0.006	28.1%	302.30	6.25	0.402	0.209	0.491	0.486	1%	48%
HTI	2006-10	1	0.009	7.2%	233.89	16.49	0.449	0.061	0.399	0.523		85%
IDN	1986-90	1	0.143	15.1%	2.81	9.28	0.444	0.252	0.392	0.386		38%
IDN	1991-95	1	0.132	28.2%	2.87	10.27	0.548	0.337	0.535	0.487		17%
IDN	1996-00	0	0.108	46.2%	7.09	6.80	0.583	0.441	0.668	0.545		
IDN	2001-05	0	0.136	36.6%	9.50	7.88	0.565	0.400	0.577	0.554		1%
IDN	2006-10	0	0.122	46.9%	10.28	4.99	0.565	0.461	0.653	0.567		
IDN	2011-15	1	0.060	75.4%	12.04	2.92	0.668	0.605	0.830	0.670		
IND	1986-90	1	0.797	0.6%	0.59	14.20	1.094	0.801	1.089	0.997		
IND	1991-95	1	0.879	1.4%	0.59	21.42	1.329	0.889	1.320	1.191		
IND	1996-00	1	0.934	4.9%	1.44	19.41	1.369	0.970	1.337	1.249		
IND	2001-05	1	0.966	10.1%	1.89	13.10	1.309	1.039	1.251	1.284		
IND	2006-10	1	0.921	20.9%	1.90	10.33	1.286	1.073	1.244	1.272		
IRN	1991-95	1	0.042	28.0%	-	-	0.244	0.244	0.250	0.305	40%	40%
IRN	1996-00	1	0.032	48.9%	-	-	0.385	0.385	0.633	0.462	5%	5%
IRN	2001-05	1	0.022	66.4%	-	-	0.502	0.502	0.723	0.579		
IRN	2006-10	1	0.013	81.7%	-	-	0.604	0.604	0.734	0.666		
IRN	2011-15	1	0.009	88.1%	-	-	0.646	0.646	0.725	0.693		
JAM	1991-95	0	0.001	47.2%	217.36	3.89	0.468	0.342	0.578	0.860		16%
JAM	1996-00	1	0.001	51.0%	551.69	2.70	0.541	0.370	0.710	0.884		9%
KAZ	2001-05	0	0.005	66.2%	7.58	1.04	0.507	0.484	0.667	0.645		
KAZ	2006-10	1	0.001	95.3%	7.90	0.92	0.710	0.689	0.743	0.810		
KAZ	2011-15	1	0.001	92.4%	7.32	0.85	0.688	0.669	0.719	0.776		
KEN	1996-00	0	0.025	12.2%	52.76	17.30	0.480	0.113	0.412	0.419		72%
KEN	2001-05	0	0.029	10.5%	64.96	14.29	0.413	0.105	0.346	0.424		74%
KEN	2006-10	1	0.034	10.4%	61.28	11.64	0.361	0.109	0.298	0.379	11%	73%
KEN	2011-15	1	0.036	15.7%	58.06	10.67	0.381	0.150	0.315	0.405	6%	63%
KGZ	2001-05	0	0.005	6.6%	433.69	18.42	0.522	0.052	0.489	0.672		87%
KGZ	2006-10	0	0.005	11.3%	440.87	15.13	0.491	0.087	0.433	0.647		79%
KGZ	2011-15	0	0.004	29.3%	450.89	9.68	0.510	0.216	0.499	0.674		47%
LAO	1996-00	0	0.005	2.8%	-	-	0.025	0.025	0.006	0.565	94%	94%
LAO	2001-05	1	0.005	7.5%	3.04	3.44	0.131	0.059	0.087	0.637	68%	85%
LAO	2006-10	1	0.005	21.6%	31.03	3.54	0.240	0.161	0.184	0.668	41%	60%
LBR	2011-15	0	0.004	0.2%	14.37	3.02	0.071	0.005	0.069	0.732	83%	99%
LKA	1986-90	1	0.014	15.4%	28.82	11.29	0.363	0.125	0.319	0.343	10%	69%
LKA	1991-95	0	0.013	23.1%	30.18	12.65	0.447	0.180	0.385	0.422		55%
LKA	1996-00	1	0.012	35.1%	76.79	10.26	0.493	0.266	0.552	0.479		34%
LKA	2001-05	1	0.011	40.9%	114.26	6.70	0.469	0.307	0.558	0.508		24%
LKA	2006-10	1	0.009	53.3%	119.84	5.45	0.532	0.395	0.710	0.576		3%
LKA	2011-15	1	0.005	77.0%	125.46	3.19	0.653	0.561	0.804	0.700		
LSO	1991-95	0	0.002	7.4%	303.75	16.06	0.450	0.055	0.397	0.929		86%
LSO	1996-00	0	0.002	9.7%	784.06	14.83	0.542	0.072	0.478	0.928		82%
LSO	2001-05	0	0.002	11.6%	1,026.71	14.22	0.595	0.086	0.526	0.997		79%
LSO	2006-10	1	0.002	13.3%	1,133.31	9.05	0.523	0.098	0.452	0.971		76%
MAR	1986-90	1	0.017	27.2%	-	-	0.213	0.213	0.253	0.330	47%	47%
MAR	1991-95	0	0.016	36.9%	20.95	5.08	0.391	0.282	0.507	0.399	3%	30%
MAR	1996-00	0	0.015	44.1%	51.51	4.93	0.446	0.334	0.658	0.449		18%
MAR	2001-05	1	0.017	40.3%	75.07	5.20	0.431	0.309	0.533	0.435		24%
MAR	2006-10	1	0.018	42.9%	82.61	5.48	0.458	0.328	0.577	0.444		19%
MDA	2001-05	0	0.003	8.1%	728.78	11.26	0.447	0.062	0.398	0.725		85%
MDA	2006-10	1	0.003	18.9%	793.46	6.95	0.450	0.139	0.399	0.756		66%
MDA	2011-15	1	0.002	43.8%	867.63	3.68	0.577	0.319	0.625	0.907		21%
MDG	1981-85	0	0.009	5.1%	45.83	7.05	0.200	0.045	0.163	0.247	51%	89%
MDG	1986-90	0	0.010	4.0%	45.68	10.50	0.265	0.039	0.238	0.283	35%	90%
MDG	1991-95	0	0.012	3.0%	44.32	23.82	0.532	0.033	0.511	0.462		92%
MDG	1996-00	0	0.014	1.8%	108.82	20.49	0.471	0.027	0.458	0.428		93%
MDG	2001-05	0	0.016	3.8%	130.73	16.95	0.420	0.043	0.392	0.453		89%
MDG	2006-10	0	0.018	2.6%	121.69	23.68	0.550	0.037	0.531	0.582		91%
MEX	1986-90	0	0.025	68.3%	6.09	2.54	0.572	0.518	0.797	0.566		
MEX	1991-95	0	0.027	68.0%	6.19	1.77	0.557	0.519	0.785	0.557		
MEX	1996-00	0	0.026	71.6%	17.03	2.23	0.593	0.544	0.796	0.582		
MEX	2001-05	0	0.028	72.5%	23.24	1.17	0.581	0.552	0.778	0.579		
MEX	2006-10	0	0.024	77.5%	23.90	1.40	0.618	0.584	0.780	0.615		
MEX	2011-15	0	0.021	81.5%	23.99	1.52	0.647	0.610	0.778	0.644		
MKD	2001-05	1	0.001	69.4%	96.92	10.58	0.741	0.503	0.908	1.201		
MKD	2006-10	0	0.001	71.5%	1,174.76	3.16	0.830	0.517	1.020	1.237		

			Pop. outside of middle class (bn)	Middle class (% of total pop.)	Rel. pop. of integrated international market (1000s of people)	Rel. income. of integrated international market	Status quo	Closed economy counterfactual	Maxmimum equality counterfactual	Full integration counterfactual	Status quo	Closed economy
MKD	2011-15	0	0.000	83.7%	1,272.10	2.59	0.927	0.605	1.042	1.359		
MLI	1996-00	1	0.010	1.4%	147.17	26.81	0.602	0.020	0.592	0.537		95%
MLI	2001-05	1	0.011	2.5%	183.92	18.86	0.456	0.029	0.438	0.503		93%
MNG	1996-00	0	0.002	12.9%	-	-	0.095	0.095	0.034	0.812	76%	76%
MNG	2001-05	1	0.002	21.9%	837.56	11.30	0.569	0.160	0.528	0.909		60%
MNG	2006-10	1	0.001	58.2%	853.34	6.29	0.731	0.422	0.904	1.083		
MNG	2011-15	1	0.000	82.2%	855.10	2.90	0.835	0.594	0.945	1.183		
MOZ	2001-05	1	0.018	1.0%	114.43	19.84	0.457	0.025	0.450	0.475		94%
MOZ	2006-10	1	0.021	1.7%	106.70	18.90	0.444	0.033	0.432	0.467		92%
MRT	1991-95	0	0.002	11.8%	253.51	6.35	0.271	0.087	0.198	0.717	33%	79%
MRT	1996-00	1	0.002	9.2%	594.41	8.64	0.372	0.069	0.327	0.706	8%	83%
MRT	2001-05	1	0.002	10.0%	749.91	9.16	0.421	0.074	0.361	0.727		82%
MRT	2006-10	1	0.003	14.4%	701.69	6.52	0.389	0.107	0.395	0.676	4%	74%
MWI	2001-05	0	0.011	2.8%	189.87	37.14	0.835	0.032	0.815	0.879		92%
MWI	2006-10	1	0.013	1.4%	181.00	25.62	0.588	0.023	0.578	0.648		94%
MWI	2011-15	1	0.015	1.9%	170.86	19.15	0.458	0.028	0.445	0.528		93%
NAM	2006-10	1	0.001	39.9%	1,144.02	2.06	0.573	0.289	0.949	1.033		29%
NAM	2011-15	1	0.001	49.7%	1,137.79	1.88	0.639	0.360	0.988	1.081		11%
NER	1996-00	1	0.010	0.5%	147.33	30.80	0.678	0.013	0.674	0.589		97%
NER	2001-05	1	0.012	0.5%	176.40	27.88	0.626	0.016	0.622	0.656		96%
NER	2006-10	1	0.014	0.4%	158.12	24.52	0.554	0.017	0.552	0.591		96%
NGA	1986-90	0	0.053	38.7%	5.51	6.90	0.475	0.332	0.197	0.439		18%
NGA	1991-95	0	0.091	6.7%	5.42	12.91	0.406	0.140	0.358	0.333		65%
NGA	1996-00	0	0.110	0.3%	12.91	16.62	0.457	0.112	0.455	0.364		72%
NGA	2001-05	0	0.121	3.6%	16.33	9.93	0.355	0.147	0.329	0.344	12%	64%
NIC	1996-00	0	0.004	23.4%	298.15	8.53	0.411	0.173	0.380	0.552		57%
NIC	2001-05	0	0.004	27.7%	395.28	5.71	0.405	0.204	0.403	0.564	0%	50%
NIC	2006-10	1	0.004	30.1%	424.96	8.65	0.489	0.221	0.496	0.603		45%
NPL	1986-90	1	0.017	0.3%	-	-	0.020	0.020	0.017	0.445	95%	95%
NPL	1991-95	1	0.019	1.0%	-	-	0.027	0.027	0.019	0.536	93%	93%
NPL	1996-00	1	0.022	1.8%	-	-	0.035	0.035	0.022	0.633	91%	91%
NPL	2001-05	1	0.024	2.9%	-	-	0.044	0.044	0.024	0.544	89%	89%
NPL	2006-10	1	0.025	4.1%	87.34	23.29	0.552	0.055	0.523	0.568		87%
PAK	1991-95	1	0.095	13.9%	4.78	15.76	0.521	0.196	0.466	0.428		52%
PAK	1996-00	0	0.108	15.1%	11.08	15.62	0.541	0.217	0.503	0.451		46%
PAK	2001-05	0	0.123	15.9%	13.88	10.88	0.464	0.237	0.421	0.449		41%
PAK	2006-10	1	0.119	27.5%	13.84	9.69	0.520	0.318	0.500	0.517		22%
PAK	2011-15	1	0.102	44.5%	15.32	8.55	0.602	0.423	0.654	0.616		
PAN	1981-85	0	0.001	44.4%	-	-	0.322	0.322	0.633	0.809	20%	20%
PAN	1986-90	0	0.001	41.1%	-	-	0.299	0.299	0.647	0.775	26%	26%
PAN	1991-95	1	0.001	43.3%	-	-	0.315	0.315	0.645	0.794	22%	22%
PAN	1996-00	0	0.001	47.9%	-	-	0.348	0.348	0.681	0.815	14%	14%
PAN	2001-05	0	0.001	54.4%	655.92	1.46	0.563	0.395	0.880	0.844		3%
PAN	2006-10	0	0.001	65.8%	645.02	1.57	0.645	0.477	0.891	0.915		
PAN	2011-15	0	0.001	74.6%	645.26	1.16	0.700	0.540	0.881	0.960		
PER	1986-90	0	0.014	32.4%	23.37	5.85	0.373	0.248	0.475	0.379	8%	39%
PER	1991-95	0	0.015	35.0%	23.90	4.21	0.359	0.268	0.319	0.378	11%	34%
PER	1996-00	0	0.015	37.7%	57.38	3.46	0.372	0.288	0.560	0.387	8%	29%
PER	2001-05	0	0.016	38.5%	76.02	3.04	0.373	0.295	0.567	0.400	8%	27%
PER	2006-10	1	0.013	54.5%	78.12	2.65	0.478	0.407	0.756	0.507		
PER	2011-15	1	0.008	74.1%	108.29	2.09	0.609	0.543	0.791	0.630		
PHL	1986-90	0	0.044	20.4%	8.48	8.23	0.363	0.192	0.299	0.323	10%	53%
PHL	1991-95	0	0.045	28.6%	8.34	9.07	0.440	0.252	0.450	0.397		38%
PHL	1996-00	1	0.045	37.4%	19.91	6.65	0.456	0.315	0.617	0.428		22%
PHL	2001-05	0	0.050	36.9%	25.61	5.94	0.445	0.317	0.510	0.445		22%
PHL	2006-10	0	0.055	37.4%	26.88	5.45	0.443	0.325	0.533	0.451		20%
PHL	2011-15	0	0.047	51.1%	30.94	4.33	0.511	0.416	0.711	0.519		
PRY	1991-95	0	0.003	30.1%	23.03	2.66	0.280	0.220	0.304	0.537	31%	46%
PRY	1996-00	1	0.003	28.7%	310.66	3.80	0.355	0.211	0.461	0.516	12%	48%
PRY	2001-05	0	0.004	26.5%	394.64	3.71	0.355	0.195	0.401	0.506	12%	52%
PRY	2006-10	0	0.004	37.9%	390.01	3.64	0.434	0.277	0.642	0.582		32%
PRY	2011-15	1	0.003	52.9%	394.32	2.07	0.511	0.385	0.805	0.658		5%
ROU	1991-95	0	0.004	80.4%	23.01	5.15	0.697	0.586	0.759	0.707		
ROU	1996-00	0	0.005	79.4%	62.36	4.75	0.689	0.578	0.802	0.700		
ROU	2001-05	1	0.003	85.3%	91.57	3.24	0.706	0.620	0.784	0.739		
ROU	2006-10	1	0.001	95.1%	103.03	1.46	0.740	0.688	0.774	0.781		
ROU	2011-15	0	0.001	96.8%	143.51	1.54	0.762	0.700	0.780	0.797		
RUS	1996-00	0	0.046	68.7%	0.32	0.31	0.549	0.543	0.764	0.593		
RUS	2001-05	1	0.024	83.7%	0.35	0.38	0.636	0.629	0.748	0.690		
RUS	2006-10	1	0.019	86.9%	0.42	0.35	0.654	0.647	0.746	0.680		

			Pop. outside of middle class (bn)	Middle class (% of total pop.)	Rel. pop. of integrated international market (1000s of people)	Rel. income. of integrated international market	Status quo	Closed economy counterfactual	Maxmimum equality counterfactual	Full integration counterfactual	Status quo	Closed economy
RUS	2011-15	1	0.024	83.1%	0.43	0.33	0.632	0.625	0.708	0.650		
RWA	1986-90	0	0.006	0.5%	73.38	14.61	0.326	0.010	0.322	0.371	19%	97%
RWA	1991-95	0	0.007	0.8%	74.72	24.06	0.523	0.013	0.517	0.510		97%
RWA	1996-00	0	0.006	1.0%	252.00	31.57	0.716	0.013	0.708	0.700		97%
RWA	2001-05	1	0.008	1.6%	258.56	27.84	0.646	0.020	0.635	0.719		95%
RWA	2006-10	1	0.009	3.3%	254.40	21.75	0.533	0.033	0.510	0.620		92%
RWA	2011-15	1	0.010	5.0%	244.70	15.38	0.414	0.046	0.378	0.508		89%
SEN	1996-00	1	0.008	13.4%	162.46	10.53	0.355	0.104	0.288	0.396	12%	74%
SEN	2001-05	1	0.009	14.8%	206.60	9.42	0.353	0.116	0.287	0.425	13%	71%
SEN	2006-10	0	0.010	15.8%	196.55	7.90	0.328	0.124	0.262	0.399	19%	69%
SLE	2006-10	1	0.006	1.3%	383.16	25.46	0.619	0.015	0.610	0.747		96%
SLV	1996-00	0	0.004	27.6%	248.43	4.60	0.351	0.204	0.386	0.484	13%	50%
SLV	2001-05	0	0.004	34.9%	343.14	2.85	0.387	0.256	0.532	0.529	4%	37%
SLV	2006-10	0	0.003	47.0%	386.61	4.03	0.507	0.343	0.711	0.632		15%
SLV	2011-15	1	0.003	57.1%	413.00	3.99	0.585	0.416	0.795	0.719		
SRB	2011-15	0	0.001	91.1%	33.68	4.58	0.760	0.659	0.823	0.894		
STP	2006-10	0	0.000	10.4%	-	-	0.075	0.075	0.030	8.833	81%	81%
SWZ	1996-00	1	0.001	44.6%	1,604.33	4.28	0.749	0.323	1.116	1.676		20%
SWZ	2001-05	1	0.000	51.4%	2,145.99	3.66	0.900	0.372	1.189	1.729		8%
TCD	2006-10	1	0.010	4.0%	208.90	11.82	0.326	0.039	0.298	0.397	19%	90%
TGO	2011-15	1	0.006	3.8%	368.72	18.17	0.486	0.034	0.458	0.623		92%
THA	1986-90	1	0.035	33.9%	8.92	5.42	0.393	0.280	0.412	0.374	3%	31%
THA	1991-95	1	0.031	45.8%	9.25	3.78	0.441	0.362	0.637	0.435		11%
THA	1996-00	1	0.018	70.1%	23.65	2.53	0.582	0.525	0.779	0.581		
THA	2001-05	1	0.022	65.5%	32.12	3.11	0.566	0.496	0.768	0.574		
THA	2006-10	1	0.015	77.4%	36.06	2.38	0.631	0.574	0.788	0.643		
THA	2011-15	1	0.007	89.4%	43.82	1.94	0.702	0.653	0.778	0.714		
TJK	2001-05	1	0.006	1.7%	18.13	9.29	0.214	0.019	0.201	0.869	47%	95%
TJK	2006-10	0	0.007	5.3%	16.58	12.36	0.303	0.045	0.271	0.636	25%	89%
TJK	2011-15	0	0.007	11.6%	14.93	12.25	0.346	0.091	0.305	0.535	15%	78%
TUN	1986-90	1	0.004	44.5%	-	-	0.326	0.326	0.434	0.514	20%	20%
TUN	1991-95	0	0.004	52.8%	62.80	4.18	0.485	0.386	0.656	0.578		5%
TUN	1996-00	1	0.003	65.2%	152.20	3.67	0.582	0.475	0.808	0.659		
TUN	2001-05	1	0.003	71.3%	222.94	3.10	0.629	0.518	0.809	0.700		
TUN	2006-10	1	0.002	78.4%	235.04	3.04	0.681	0.569	0.821	0.752		
TUN	2011-15	1	0.001	87.0%	242.25	3.02	0.743	0.630	0.831	0.818		
TUR	1991-95	0	0.013	76.5%	9.65	2.37	0.617	0.566	0.779	0.620		
TUR	1996-00	1	0.013	78.4%	25.97	3.05	0.648	0.580	0.801	0.637		
TUR	2001-05	0	0.013	80.1%	33.72	2.24	0.645	0.591	0.786	0.647		
TUR	2006-10	1	0.008	87.7%	34.45	1.26	0.675	0.642	0.763	0.682		
TUR	2011-15	1	0.009	87.1%	35.51	1.11	0.669	0.639	0.752	0.678		
TZA	1996-00	0	0.030	1.2%	49.52	34.18	0.752	0.039	0.743	0.600		90%
TZA	2001-05	1	0.034	2.0%	61.06	14.54	0.360	0.048	0.346	0.365	11%	88%
TZA	2006-10	1	0.038	5.0%	57.30	17.28	0.441	0.074	0.406	0.447		82%
UGA	1991-95	0	0.018	0.8%	29.48	35.09	0.751	0.023	0.745	0.579		94%
UGA	1996-00	0	0.021	1.2%	71.82	25.33	0.565	0.029	0.557	0.474		93%
UGA	2001-05	1	0.024	2.8%	87.63	23.56	0.547	0.044	0.527	0.557		89%
UGA	2006-10	1	0.027	4.1%	80.87	22.93	0.545	0.057	0.516	0.565		86%
UGA	2011-15	0	0.031	6.6%	75.00	12.54	0.353	0.079	0.309	0.383	13%	81%
UKR	1996-00	0	0.025	50.3%	1.54	2.30	0.436	0.389	0.548	0.540		4%
UKR	2001-05	1	0.023	53.4%	1.68	2.05	0.451	0.408	0.511	0.576		
UKR	2006-10	1	0.008	83.1%	2.19	2.32	0.657	0.608	0.744	0.707		
UKR	2011-15	1	0.002	95.8%	54.10	3.06	0.769	0.695	0.789	0.787		
VEN	1986-90	0	0.008	55.2%	-	-	0.407	0.407	0.697	0.483		
VEN	1991-95	0	0.007	66.5%	26.80	2.41	0.543	0.488	0.759	0.578		
VEN	1996-00	0	0.010	54.8%	63.46	2.45	0.470	0.406	0.748	0.496		
VEN	2001-05	0	0.011	55.0%	82.67	1.18	0.451	0.409	0.712	0.484		
VNM	1996-00	0	0.072	5.7%	0.15	6.02	0.237	0.113	0.200	0.472	41%	72%
VNM	2001-05	0	0.072	11.1%	0.17	3.07	0.215	0.152	0.157	0.440	47%	63%
VNM	2006-10	1	0.064	23.8%	2.11	2.69	0.292	0.237	0.258	0.457	28%	42%
VNM	2011-15	1	0.050	43.9%	33.32	7.00	0.518	0.367	0.611	0.524		9%
ZAF	1996-00	0	0.022	47.6%	33.39	2.22	0.419	0.366	0.776	0.426		10%
ZAF	2001-05	1	0.022	51.2%	48.17	2.51	0.454	0.392	0.792	0.462		3%
ZAF	2006-10	1	0.025	49.1%	49.20	1.73	0.426	0.380	0.790	0.437		6%
ZMB	1996-00	0	0.009	2.6%	162.13	18.86	0.450	0.028	0.431	0.447		93%
ZMB	2001-05	0	0.010	3.0%	203.04	14.56	0.374	0.032	0.353	0.441	8%	92%
ZMB	2006-10	0	0.011	10.1%	192.93	7.53	0.279	0.084	0.213	0.350	31%	79%
ZMB	2011-15	1	0.011	22.2%	182.33	6.12	0.336	0.171	0.358	0.405	17%	58%