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IZA DP No. 10804

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ABSTRACT

The Long-Awaited Rise of the Middle Class in Latin America Is Finally Happening[1]

In many developing countries, the supply of skilled workers is likely to continue to be stronger than demand, and this should drive down the skill premium and reduce inequality. Within the limitations of any exercise based on simulations, this paper finds that the recently observed reduction in inequality in Latin America may continue. Building on counterfactual scenarios projecting economic and demographic (including age and education) growth, the paper also highlights that by 2030 the long-awaited rise of the middle class in Latin America will be in full swing, as its share will be 43 percent of the region's population, twice the value in 2005. This achievement is not guaranteed, as countries with large initial inequalities will have to achieve very high rates of inclusive growth.

JEL Classification: D31, D58, I24, J11

Keywords: inequality, middle class, skill premium, Latin America

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1. Introduction and motivation

What would happen to the global income distribution if the strong economic expansion of developing countries, including the sustained growth of China and India, will continue for the next two decades? Per-capita incomes will converge at the global level, but would also a truly *global middle class* composed of millions of developing countries' consumers emerge by 2030? Several papers have looked at the past evolution of global income distribution (Bourguignon and Morrisson 2002; Milanovic, 2002 and 2005; Atkinson and Brandolini, 2010, among others) and a consensus is emerging that distributional shifts have been large, especially between countries, and that a decline in global inequality may be finally in sight (Milanovic, 2013). This literature points at the high growth rates of large and poor countries as the main factor behind the recent reduction of global inequality while, at the same time, highlighting the widening of within-countries income distributions. Some authors assert that a developing countries' middle class is emerging but it is still vulnerable (Ravallion, 2010). Fewer studies consider what would happen if current trends continue: Hillebrand (2008) contends that unless "broad swaths of the developing world substantially improve their economic performance beyond that experienced in the last 25 years, the global income distribution will soon start to worsen again"; World Bank (2007) warns about potential distributional tensions within countries, but also emphasizes the strong presence of developing country citizens among the future global middle class.

Within a global context, this paper considers in detail the evolution of income distribution in Latin America. This region shares, with Sub-Saharan Africa, the highest levels of initial (within-country) inequality but has witnessed a surge in the pace of its per capita growth, accompanied by a reduction of inequality, since the early 2000s. This has led some – Ferreira et al. (2013), Birdsall (2012), OECD (2010) – to state that a middle class in Latin America may have finally emerged.

In this paper, members of the middle class are individuals living with more than 10 and less than 50 dollars per day[2]. Given this definition, growth will mechanically shift people above the lower threshold into the middle class. However, the number of people that cross the line depends on the initial level of inequality and on the incidence of growth.

Fast growth is often characterized by high urbanization rates and rising demand for skills, both of which can result in widening of inequality *within* countries and in a potential hindrance of the

[2] Dollars are expressed in 2005 Purchasing Power Parity terms for international comparison purposes.

expansion of the middle class.[3] This paper, based on a scenario analysis, shows that this is not the case. Confirming recent findings, see for example Lustig et al (2013), our results show that skill premia may go down further and thus support the continuation of the observed downward trend for inequality in the region.

More in detail, the counterfactual scenarios analysis detects the following trends. As average incomes rise, consumers will demand more services relative to agricultural or manufacturing goods. This, in turn, implies that the share of services in total output will increase; in Latin America, countries will be registering increases of the share of services in total output in the order of 3 to 10 percentage points. The structural shift towards services leads to an increase in the demand for skilled workers, who are used intensively in the production of services. At the same time, even with the conservative assumption of no improvements in education systems, the average educational attainments will increase. This takes place because, with population growth, younger and more educated cohorts are replacing older less educated ones (Bussolo et. al. 2014). The expansion of skilled workers is projected (with this conservative assumption) to be very fast in Sub-Saharan Africa with an average growth of 3.5% over 2005-2030. Among Latin American countries, Chile, Colombia and Peru are expected to experience the fastest growth rates of skilled workers of about 2 percent over the same period. Generally, in the region, the supply of skilled workers increases at a rate at least twice as fast as that of unskilled workers. This rising supply more than counter balances growing demand for skilled workers and skill premia will tend to decrease. In Argentina and Chile the skill premia will be falling at an annual rate of around 1.5 percent, much faster than the rate of decline in the remaining LAC countries (0.5%).

The drop in the skill premium tends naturally to lower inequality, but the order of magnitude of the effect varies across countries, as it also depends on other factors that affect growth incidence patterns. For example in Brazil, projected growth has significant un-equalizing effects: incomes of the top two deciles in 2005 will grow (cumulatively) by more than 80% while the earnings of the bottom two deciles will rise by only less than 70%. In Peru, the opposite happens: the bottom 20 percent will experience an expansion of incomes at a rate above 180%, while earnings of the top 20% will increase by less than 80%.

The second major finding of this paper, beyond that on the further reduction of skill premia and inequality, is that the long awaited rise of the middle class in Latin America is finally happening. In 2005 less than a quarter (24 percent) of the Latin American population, around 140 million of

[3] For a thorough discussion of the interaction between technological change and education and its effect on inequality see Goldin and Katz (2008).

people, belonged to the middle class. But, by 2030, 310 million, or close to half of the regional population (43 percent) will be in the middle class. There will be significant heterogeneity across countries: the middle class is expected to expand the most in Peru, Chile, Venezuela and Argentina, but small increases will be observed in Mexico, Brazil and Colombia.

More importantly, due to less unequal within country distributions, middle class members will not anymore be close to the top of the distribution within their own countries. In 2005 and for the Latin America region as a whole, 80 percent of middle class individuals belonged to the top two deciles of the income distribution. By 2030, 40 percent of the middle class members will be either in the seventh or in a lower decile. Being in the middle class (defined in 10-50 US dollar absolute terms) will also mean being closer to the middle (in relative terms) of the distribution. Latin American countries will look much more as true middle class societies.

This encouraging result is not a *certain* result. In particular, achieving it will be easier for countries with lower initial levels of inequality and progressive growth incidence. But, with inequality close to the high levels of Colombia, growth alone may have a small impact on the expansion of the middle class. Policies that directly contribute to more equity, by means of providing fairer access to productive assets, will be needed and their results may take time to materialize. After all, it took a few decades for the large education effort to finally impact the skill premium and inequality.

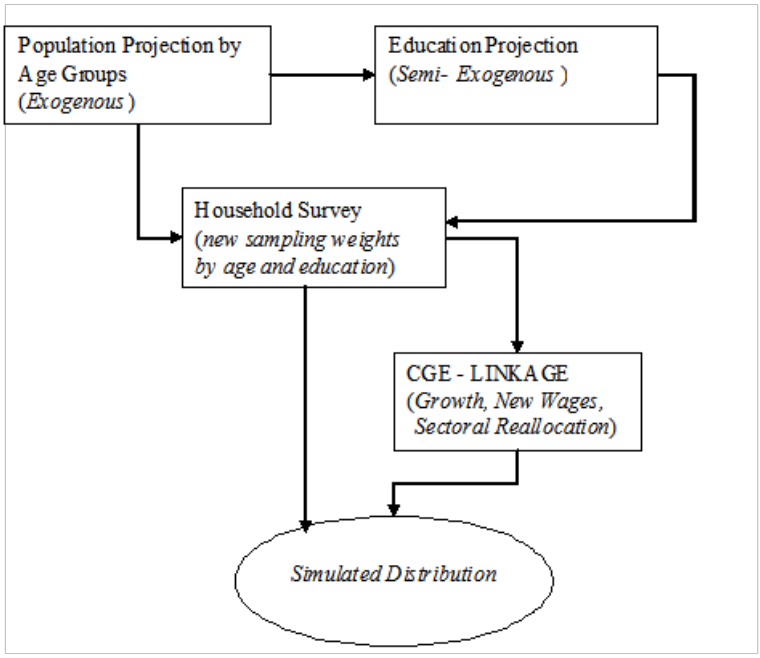
The paper is organized as follows. The next section briefly describes the modeling tools used to assess changes in the global income distribution: the global dynamic computable general equilibrium model LINKAGE and the Global Income Distribution Dynamics (GIDD) model. Section 3 presents the macroeconomic results of the baseline scenario. Section 4 presents the micro, household surveys, results. The final section offers some concluding remarks.

2. Methodology

Assessing the evolution of the middle class should be seen as a ceteris paribus exercise, or as a scenario analysis, rather than a forecast. The key questions this paper addresses are: (a) how will the middle class look like if economic and population growth will continue at given rates, while technology, preferences and other parameters (for example taxes, and structure of the government expenditures) are held constant; and (b) what explains this evolution. A disaggregated structural model is best suited to address these questions. With enough detail in terms of goods, factors, and households, such a model can illustrate how demand and supply interact and how relative prices change given certain trends of productivity and population growth. These price changes, in turn, explain how income distributions adjust and, ultimately, how many people enter, or exit, the middle class.

This paper uses a macro-micro structural model which combines a computable general equilibrium (CGE) model and a microsimulation framework.[4] This macro-micro tool produces a set of (macro) price and volume changes that, once transmitted to the households (micro level), generate a simulated distribution of income. In a schematic form, Figure 1 summarizes this tool.

Figure 1: LINKAGE-GIDD methodological framework



Source: Bussolo, De Hoyos and Medvedev (2010). Note: XXX say something about the names LINKAGE and GIDD

The scenario analysis can be described as a sequence of three main steps. It starts with population projections. Forthcoming changes in population shares by age (upper left part of Figure 1) are assumed exogenous and taken from the United Nation population projections[5]. Because younger more educated cohorts are replacing older less educated ones, the changes in population shares by education groups are also accounted for (in Figure 1 **Error! Reference source not found.**arrow linking top left box with top right box). These demographic shifts are included in the household data by rescaling the household sampling weights. In a second step, these demographic changes, together with assumptions on productivity trends, are incorporated into the CGE model. The CGE model is then used to generate estimates for sector reallocation of labor and for the growth of

[4] The LINKAGE global computable general equilibrium (CGE) model and the Global Income Distribution Dynamics (GIDD) microsimulation framework were developed at the Development Economic Prospects Group of the World Bank. For more information see www.worldbank.org/prospects/GIDD.

[5] Fertility decisions and mortality rates are exogenous, i.e. they are fixed and not influenced by the evolution of income generated in the CGE model. For more information see: http://www.un.org/en/development/desa/population/

incomes by education groups (link between the middle and bottom boxes). In the third and final step, these CGE model's results are passed on to the re-weighted household survey and a new simulated distribution is obtained (bottom link in Figure 1). In the real world, the changes represented by these three steps take place simultaneously, but in this macro-micro simplified framework they are accommodated in a sequential fashion.

The observed initial and the simulated distributions can be compared and the evolution of inequality and middle class can thus be quantified and described. The remainder of this section provides additional details on the three steps of the simulation procedure.

2.1 Demographic change and reweighting ('aging') of the household surveys

The starting point for the microsimulations is the global income distribution in 2005, assembled with data from household surveys. More than one million households are sampled in 63 developing countries, while household information for developed countries comes from the Luxemburg Income Study dataset.[6] Detailed survey data is combined with more aggregate information (usually vintiles) for the remainder of the world; the final global sample covers 91 percent of the world population.[7] To produce the simulated 2030 distribution the first step consists of applying demographic changes.

The size and age structure of the population in all countries is modified in accordance to the United Nation's projections for 2030. In addition, a simple and conservative assumption of no improvement in education achievements of the young cohorts is used to project the change in education composition of the population. As countries are aging, younger more educated generations replace older less educated ones. The overall improvement depends on the inter-generational gaps in education levels and on the relative size of the young and old cohorts. These changes are included in the household surveys by rescaling sampling weights[8]. More in detail, households whose heads are older and better educated are assigned larger weights than households with younger less educated heads. For a complete technical description of this re-weighting procedure, see Bussolo, De Hoyos and Medvedev (2010). The assumption of no improvement in education for future younger cohorts may be too restrictive, especially for certain countries that have been improving their education systems more recently. In these cases, human

[6] Consumption or expenditure per capita is a more reliable measure than income, and its distribution is normally more equal than the distribution of income. Nevertheless, consumption data are not available for all countries' survey, so, to get a global picture, the study had to include countries from which only income data were available.
[7] Throughout the paper, when we talk about the global distribution, we are indeed referring to the GIDD's sample covering 91 percent of the world population.
[8] This method is similar to the one described in Robilliard and Robinson (2003)

capital accumulation derived from simple aging may be underestimated. In contrast, this procedure does not account for the quality of education. It may be possible that the quantity of education may increase, but its quality decrease.

This first step in the macro-micro analysis generates changes in the relative supplies of skilled and unskilled labor, an essential input used in the CGE model described below.

2.2 Population and economic growth: a general equilibrium analysis

The LINKAGE model is essentially a neo-classical growth model, with aggregate growth predicated on assumptions regarding the growth of the labor force by skill level, savings/investment decisions (and therefore capital accumulation) and productivity.[9]

For each year of the simulation, production is modeled using nested CES (Constant Elasticity of Substitution) functions that combine at various levels, with different substitution elasticities, intermediates and primary factors. Households' consumption demand is derived from maximization of household specific utility function following the Linear Expenditure System (LES). International trade is modeled assuming imperfect substitution among goods originating in different geographical areas. Imports demand results from a CES aggregation function of domestic and imported goods. Export supply is symmetrically modeled as a Constant Elasticity of Transformation (CET) function. Producers decide to allocate their output to domestic or foreign markets responding to relative prices. The assumptions of imperfect substitution and imperfect transformability grant a certain degree of autonomy of domestic prices with respect to foreign prices and prevent the model from generating corner solutions.

The labor market specification is a key element of the CGE model and an important driver of its distributional results. Therefore, its specification calls for some clarification and justification. Two types of labor are distinguished, skilled and unskilled. These categories are considered imperfectly substitutable inputs in the production process. Moreover, some degree of factor market segmentation is assumed: skilled workers are perfectly mobile across sectors, whereas the labor market for the unskilled is divided into agriculture and non-agriculture segments.

The labor market segmentation by skill level has become a standard assumption in CGE modeling. The imperfect substitution in the production process for workers with different skills is likely to persist for the medium term time horizon, as unskilled workers cannot be 'transformed' into skilled ones, even with increased on-the-job training.

[9] See van der Mensbrugghe, 2011, for a detailed description.

The assumption that the market for unskilled labor is further segmented into agricultural and non-agricultural activities is more controversial. However, econometric analysis indicates that a gap in remunerations between these two segments remains even after controlling for education, gender, experience and other variables including cost of living differentials (between rural areas, where agricultural activities are predominantly located, and urban ones). Some barrier to mobility – land ownership providing economic security to farmers, specificity to human capital acquired in agriculture, or others – must exist and hinder equalization of wages across the two segments. In the model, this segmentation is implemented with some flexibility. Using a Harris-Todaro specification, a certain number of unskilled workers migrate from one segment to the other in response to changes of the wage differentials across the segments.

This rich set-up allows to capture changes in wages for different types of workers. And since skilled-unskilled and rural-urban (or, more precisely, agriculture-non agriculture) wage gaps represent important drivers of inequality, this set-up allows to explain changes in distributions.

This short description of the model is concluded with a brief discussion of its dynamic elements: capital accumulation, labor (demographic) growth, and productivity changes.

In each period t, capital stock is equal to the depreciated capital stock from period t-1 augmented with the investment of period t. Investment is driven by savings which, in turn, depend on per capita income growth and the population youth and elderly dependency ratios. In contrast to national savings, foreign savings are exogenous and their time paths are obtained by assuming that the initial current account imbalances will to tend to zero in the long run.

The evolution of labor force is in line with the change (forecasted by the UN population division) of working age population, i.e. the population between 15 and 64[10]. The growth of the supplies of skilled and unskilled workers is consistent with this overall growth the labor force, as explained above in section 2.1.

The assumptions on changes of productivity are more complex. Productivity in agriculture is assumed to be factor-neutral and exogenous and is set to estimates from empirical studies (e.g., Martin and Mitra, 1999). Productivity in manufacturing and services is labor-augmenting; it is skill-neutral but sector-biased. In the case of agriculture, productivity growth averages 2.5 percent per annum for all countries. In manufacturing and services changes in productivity are country-specific and based on the past trends. Following the broad findings of Bosworth and

[10] This is a simplistic assumption given that the overall labor force participation rates are likely to increase as more women enter the labor force in developing cobuntries or due to the changes in the retirement age in high income countries.

Collins (2007) productivity growth in manufacturing is assumed to grow about 3 percentage points faster than in services.

The version of the LINKAGE model used here has a 2007 base year and relies on the Global Trade Analysis Project (GTAP) 7 database[11] to calibrate initial parameters. A scenario is developed by solving for a new equilibrium in each subsequent year through 2030. The results of the model, in terms of changes between 2030 and the base year of: (i) prices (for food and non-food items), (ii) wages (for the four labor market segments), (iii) unskilled labor migration from agriculture to non-agricultural activities, and (iv) overall per capita income growth are passed to the household survey data and, in the third step using the GIDD microsimulation, a new hypothetical global income distribution is generated for 2030.

2.3 Linking macroeconomic outcomes to micro survey data: the GIDD microsimulations

The core of the GIDD micro-simulation approach is based on an income generation model and follows the recent literature.[12] In simplified terms, the income generation model can be represented by the following equation:

$$Y_h = \sum_l \theta_{h,l} w_l + Y_h^0$$

where Y_h is the real income of household 'h', w_l is remuneration of labor type 'l' (i.e. skilled, unskilled in the agriculture and non-agriculture labor market segments), $\theta_{h,l}$ represents the shares of different labor types earnings in in total labor income of household h, and Y_h^0 is the exogenous (non-labor) part of the income of the household.

Changes in household total income are determined by changes in labor remunerations, as a result of changes in the returns to skilled and unskilled labor in the different labor market segments, Δw_l, and changes in the allocation of workers in the different labor market segments, $\Delta\theta_{h,l}$. Given the same definitions of labor type l, changes in earnings can be mapped straightforwardly from the CGE results to the micro-data. However, transmitting the CGE results of labor reallocation requires an additional step. At the microeconomic level, specific workers moving across the agriculture and non-agriculture segments are identified using a probit model in which the probability of switching segments is estimated as a function of several personal and household

[11] See www.gtap.org for details.
[12] See, for example, Bourguignon and Pereira da Silva (2003); Ferreira and Leite (2003, 2004); Chen and Ravallion (2003); and Bussolo, Lay, and van der Mensbrugghe (2006), Bourguignon and Bussolo (2012).

characteristics.[13] For these movers, a labor income is imputed on the basis of the workers' characteristics and the returns to these in the receiving segment of the labor market.

A new household welfare aggregate is computed by adding the exogenous household income to the sum of simulated labor incomes for each member of the household, given his or her skill endowments and sector of employment. A counterfactual distribution of income for 2030 is thus generated. Finally, a last adjustment is made so that the change in the mean income between the initial and this counterfactual distribution is consistent with the overall growth rate of real income per capita calculated by the CGE. This last adjustment consists of multiplying by the same scalar all households' incomes so, while it changes the mean, it does not change the shape of the distribution.

2.4 Caveats and limitations

The simulation model described in Figure 1 changes national income distribution under a set of strong assumptions. In particular, income inequality within population subgroups formed by age, skills, and sector of employment is assumed to be time invariant. Changes in the distribution are assumed to depend exclusively on changes of earnings across these subgroups (and some reallocation amongst them). The microsimulation does not account for the role of non-labor income (public and private transfers, returns to capital). Specifically, non-labor income is simply supposed to increase at the same growth rate for all households in the same country. This may represent an important limitation since, in theory, increasing and progressive government transfers may play a significant part in the reduction of inequality. This, however, is more a data than a conceptual limitation of the global micro-simulation and can be easily amended were incidence data on government and other transfers available.

Additional data limitations affect estimates of the initial levels of inequality. Consumption expenditure is a more reliable welfare measure than income, and its distribution is normally more equal than the distribution of income, consumption data are not available for all countries' surveys. To get a global picture, the GIDD dataset includes also countries for which only income data were available. Finally, measurement errors implicit in purchasing power parity exchange rates, which have been used to convert local currency units, also affect comparability across countries.

[13] These variables include gender, years of schooling, experience, being self-employed, living in a rural or urban area, and some other controls.

The results of the CGE model are also subject to some caveats. For example, GDP growth rates for any specific country or region contain a large margin of error. These growth rates depend on *exogenous* assumptions, the most important of which include: (i) accumulation of factors (employment growth, depreciation of capital) and (ii) productivity changes – which, as mentioned, are partially judgmental. Among the *endogenous* mechanisms the most relevant for growth are: (iii) rates of investment (i.e. accumulation of capital) which depend on the availability of savings which, in turn, are a function of demographic factors (dependency rates) and endogenous prices of capital goods. There is no consensus on the exogenous values governing (i) and (ii), and on the correct parameterization of the savings function. It is clear then that the level of uncertainty on the resulting growth rates is quite large. However, the main advantage of a model-based analysis is not of providing exact forecasts, but of having a framework which is consistent with economic theory. This framework can then be used to test and explain the *ceteris paribus* effects of changes in growth rates and factor rewards on the expansion of the middle class and thus address the key questions of this paper.

3. The World Economy in 2030: a scenario analysis

Focusing on recent inequality trends in Latin America, López-Calva and Lustig (2010) conclude that a decrease in the earning gap between skilled and unskilled workers and an increase in the government transfers to the poor were the two main factors behind the decline in inequality in the region. The reduction of the earnings inequality was in turn the result of the expansion of education since the 1980s and the tapering off of the skill-biased technical change that took place in the 1990s. These supply (education) and demand (technical change) forces will continue interacting in the future and determine what will happen to the skill premium. Similarly, the structural shift of demand towards manufacturing and services, following increasing incomes, will generate resource movements towards these sectors and possibly reductions of the urban (non-agriculture) wage premium.

A main contribution of the LINKAGE model is to generate estimates of the dynamics of the skill premium – and other relative prices, such as the urban wage premium – in a 'laboratory' setting where demand and supply changes determine prices endogenously, but other factors are controlled for. The other main result of the LINKAGE model is to produce a scenario for the growth of per capita incomes, and the related evolution of sectoral employment and consumption patterns.

3.1 Skill and urban wage premia

The CGE results in Table 1 provide a good first take on forthcoming changes in inequality. It is likely that countries like Argentina, Chile and Mexico may register a reduction of inequality as both premia decline at rates well above one percentage point a year. Outside Latin America and the Caribbean, also China and the rest of East Asia will likely experience a significant decline of skill and urban premia and thus their middle class will be expanding at a fast rate.[14]

The evolution of the relative supply of skilled and unskilled workers vis-à-vis that of relative demand explains the change of the skill premia.[15]

Table 1: Baseline scenario – main results

	Skill premium			Urban (Non-agric.) Premium			Real GDP
	2005	2030	Yearly % change	2005	2030	Yearly % change	Yearly % change
European Union	1.5	0.8	-2.3	2.9	2.9	0.0	1.3
USA	1.5	1.1	-1.4	2.6	2.6	0.0	1.8
Rest of High Income countries	1.6	1.0	-1.9	3.4	3.4	0.0	1.5
China	5.9	4.3	-1.3	1.9	1.1	-2.2	7.0
Rest of East Asia	1.7	1.3	-1.0	5.6	3.9	-1.4	4.5
South Asia	3.0	2.4	-0.9	3.6	3.5	-0.1	5.0
Europe and Central Asia	2.4	2.3	-0.1	2.0	1.3	-1.5	4.1
Middle East and North Africa	1.4	1.0	-1.4	2.9	3.1	0.3	3.0
Sub-Saharan Africa	3.7	2.9	-0.9	5.5	4.6	-0.7	3.8
Argentina	2.3	1.6	-1.5	1.5	1.0	-1.5	3.5
Brazil	3.1	2.7	-0.5	1.4	1.0	-1.2	2.6
Chile	2.0	1.4	-1.4	1.7	1.2	-1.4	2.7
Colombia	2.5	2.2	-0.6	1.3	1.0	-1.2	2.5
Mexico	2.6	2.3	-0.5	2.0	1.3	-1.7	1.9
Peru	1.8	1.5	-0.5	1.8	1.5	-0.9	4.6
Central America and Caribbean	2.5	2.2	-0.6	1.5	1.2	-0.9	3.3
Rest of Latin America	2.4	1.2	-2.5	1.2	1.2	0.0	2.5

Source: Authors' calculations using the LINKAGE model

Consider first the supply side. The simple demographic 'pipeline' effect, explained in section 2.1, indicates that the faster expansion of skilled workers relative to unskilled workers in Latin America (and other developing regions) will continue in the next couple for decades.

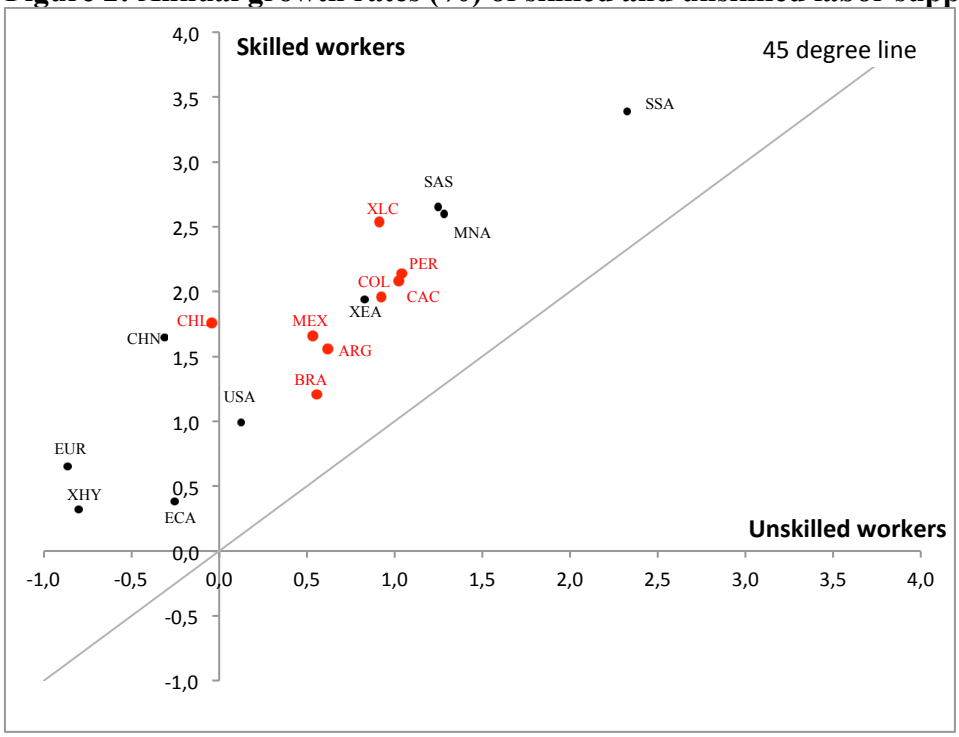
The expansion of skilled workers is not the same in all countries, as shown in Figure 2. It is most pronounced in Chile, where their share of the total labor force is likely to increase by 9

[14] Table 1 also shows the initial premia. In 2005, at the level of almost 6 the skill premium in China was the highest among the reported countries/regions. At 4.6 the skill premium in Sub-Saharan Africa was also quite remarkable. In Brazil, Colombia, Mexico, Central America and the Caribbean, wages of skilled workers were more than 2.5 times higher than wages of unskilled workers.

[15] Note that other factors can play a role in the reduction of the skill premia, notable a deterioration of the quality of higher education; however this is not considered here.

percentage points. In Brazil instead the expected growth of the share of skilled workers will be even slower than in high income countries such as the US. These disparities in the expansion of skilled workers is driven by differences in pre-2005 evolution of the educational system. The growth of skilled workers is expected to be fast in Chile, where graduation rates had improved over the two decades before 2005, and where the education differential between young cohorts and old cohorts is large. Conversely, the average educational level of the population is not expected to increase much over the coming years in Brazil, where the performance of the educational system does not seem to have changed much before 2005, as reflected by an almost equal educational achievement of the young and old cohorts.

Figure 2: Annual growth rates (%) of skilled and unskilled labor supplies (2005-2030)



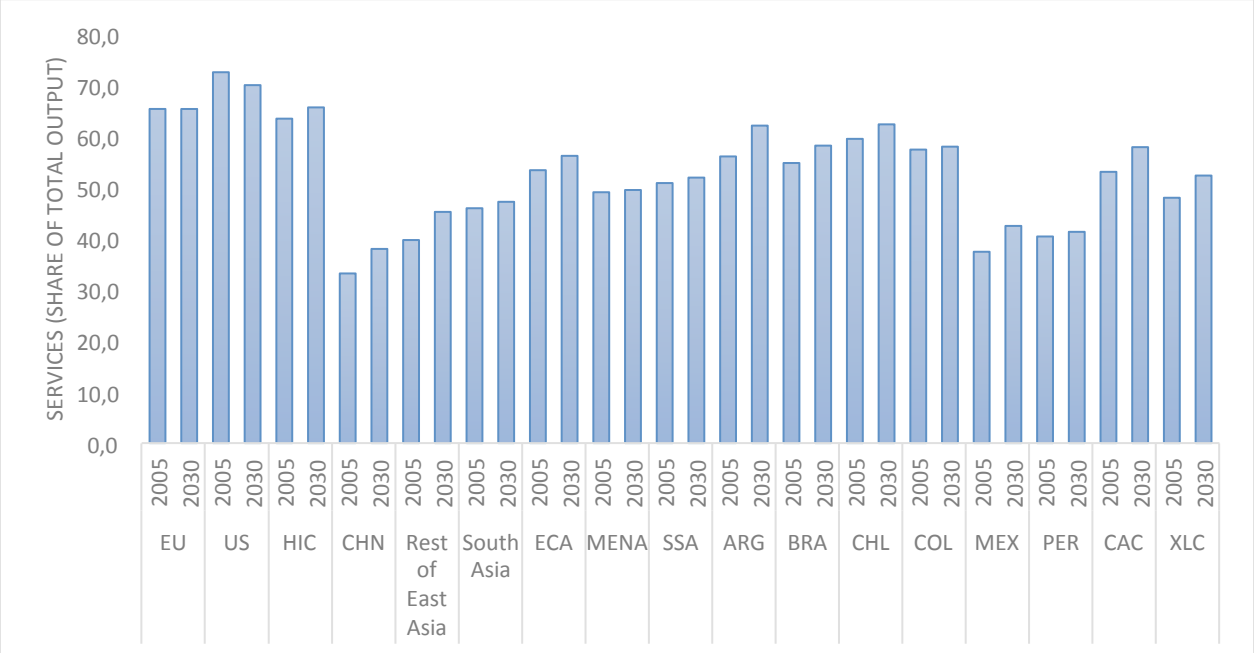
Source: Authors' calculations.
Note: ARG-Argentina, BRA-Brazil, CAC-Central America & Caribbean, CHL-Chile, CHN-China, COL-Colombia, ECA-Europe & Central Asia, EUR-EU27 & EFTA, MEX-Mexico, MNA-Middle East & North Africa, PER-Peru, SAS-South Asia, SSA-Sub-Saharan Africa, USA-United States, XEA-Rest of East Asia, XHY-Rest of high-income, XLC-Rest of Latin America

What about the demand side? As average incomes increase, richer consumers will want to buy more services given that income elasticity of demand for services is greater than one. At the same time, slower productivity growth in services relative to manufacturing (see section 2.2) by rising costs and prices of services more rapidly than those of manufacturing, will contribute to the growing value share of services in total output. The increase in prices and demand for services in low and middle income countries, combined with the sustained demand for health and public services by the aging OECD populations, is likely to translate into a pronounced shift of production towards service activities at a global level (see Figure 3). Increases in services are

driving up the demand for skilled workers. This is because production of services is relatively intensive in the use of skilled labor. For Latin America and the Caribbean, the share of value added paid to skilled labor is on average 25 percent in services while in manufacturing is 7 percent, and less than 1 percent in agriculture. Skilled labor can be substituted for unskilled labor in production, but it is complementary with capital. Therefore slower investment and increases in the price of capital will also contribute to upward pressure on demand for skilled workers.

The final impact on wages is going to be determined by the interplay between demand and supply of skilled workers and will depend on country circumstances. The model shows that the influence of supply appears to be stronger than that of demand and the results of Table 1 indicate that in the skill premium is expected to continue to fall. The most significant drop in the skill premium is expected in Argentina and Chile, which record a significant increase in the supply of skilled workers, only partially attenuated by the shift of demand (and production) towards skilled workers-intensive services.

Figure 3: Shift into services in developing countries



Source: Authors' simulations using the Linkage model.
Notes: Top line represents 2030 shares, bottom line - 2005 shares of sectors in total national/regional output.
ARG-Argentina, BRA-Brazil, CAC-Central America & Caribbean, CHL-Chile, CHN-China, COL-Colombia, ECA-Europe & Central Asia, EUR-EU27 & EFTA, MEX-Mexico, MNA-Middle East & North Africa, PER-Peru, SAS-South Asia, SSA-Sub-Saharan Africa, USA-United States, XEA-Rest of East Asia, XHY-Rest of high-income, XLC-Rest of Latin America

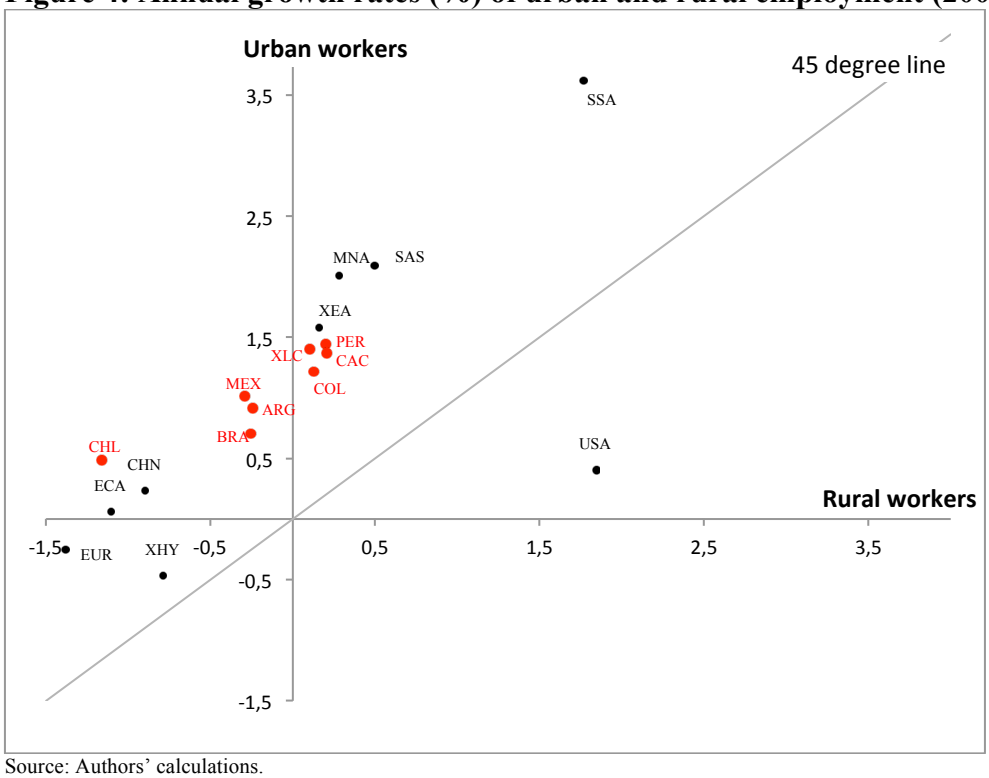
Another distribution-relevant price is the urban premium defined as a ratio of the wage paid to unskilled workers in urban areas over that paid to unskilled workers in rural areas. As discussed in section 2.2, the unskilled labor market is segmented between a rural and urban part. The model adopts the simplifying assumption that rural sector is determined not by geographical location,

but by economic activity and that all unskilled workers employed in agriculture are located in rural areas.

Urban premia were above 2 in all regions in 2005. The size of urban premium depends on several factors such the extent of segmentation of the labor market in a given country, relative skill intensity of urban employment, the relative growth of urban and rural economies, the ability to substitute between different labor types and the supply of skilled and unskilled workers. In 2005 the urban premium was very high in Sub-Saharan Africa and the Rest of East Asia (over 5), around 3 in the developed countries and significantly lower in Latin America and the Caribbean. In this region, urban premium was the highest in Mexico, Peru and Chile. With expanding services sectors in urban areas and the reallocation of workers towards the cities, the growth of employment of unskilled workers in the urban areas will outpace the growth of employment in rural areas.

Indeed the simulations indicate an increasing urbanization as unskilled labor moves to the cities (see Figure 4)**Error! Reference source not found.**. The main exception is the USA, where agricultural output expands due to its comparative advantage in agriculture, attracting unskilled labor force into rural areas. The decline in the number of unskilled rural workers is most pronounced in Europe and Central Asia and in Western Europe, as well as in Chile and Mexico among Latin American countries. As a result of fast growth of urban employment, urban premium is expected to fall in almost all regions. The notable exception is the Middle East and North Africa region, where wages of unskilled workers in urban areas are expected to increase more than in rural areas despite a significant migration of rural population to urban areas.

Figure 4: Annual growth rates (%) of urban and rural employment (2005-2030)



Source: Authors' calculations.
Note: ARG-Argentina, BRA-Brazil, CAC-Central America & Caribbean, CHL-Chile, CHN-China, COL-Colombia, ECA-Europe & Central Asia, EUR-EU27 & EFTA, MEX-Mexico, MNA-Middle East & North Africa, PER-Peru, SAS-South Asia, SSA-Sub-Saharan Africa, USA-United States, XEA-Rest of East Asia, XHY-Rest of high-income, XLC-Rest of Latin America

3.2 Global economic growth

Economic growth, as explained above, shifts final demand towards services and together with inter-sectoral productivity differentials impacts relative wages and thus inequality dynamics within countries. However, growth also impacts how fast the mean of the distribution (i.e. the income per capita of the average individual) increases and, thus, the speed of expansion of the middle class.

The baseline scenario assumes the continuation of past trends in productivity growth and no major policy changes and projects an average annual growth rate for global GDP of 2.4 percent between 2005 and 2030.[16] For example, output of the Latin America and the Caribbean region is expected to almost double in size and its share of the world economy is expected to increase slightly from 5.3% in 2005 to 5.7% in 2030. However, with a projected average annual growth of

[16] This represents a modest acceleration of what was observed between 1980 and 2005. For high-income countries, projected growth rates decrease substantially (from 2.0 to 1.5) but a more significant acceleration is attributed to developing countries (from 2.4 to 4.6).

2.7% (Figure 5) countries in LAC will account for a decreasing share of the income of developing countries i.e. a drop from 25% in 2005 to 16% in 2030.

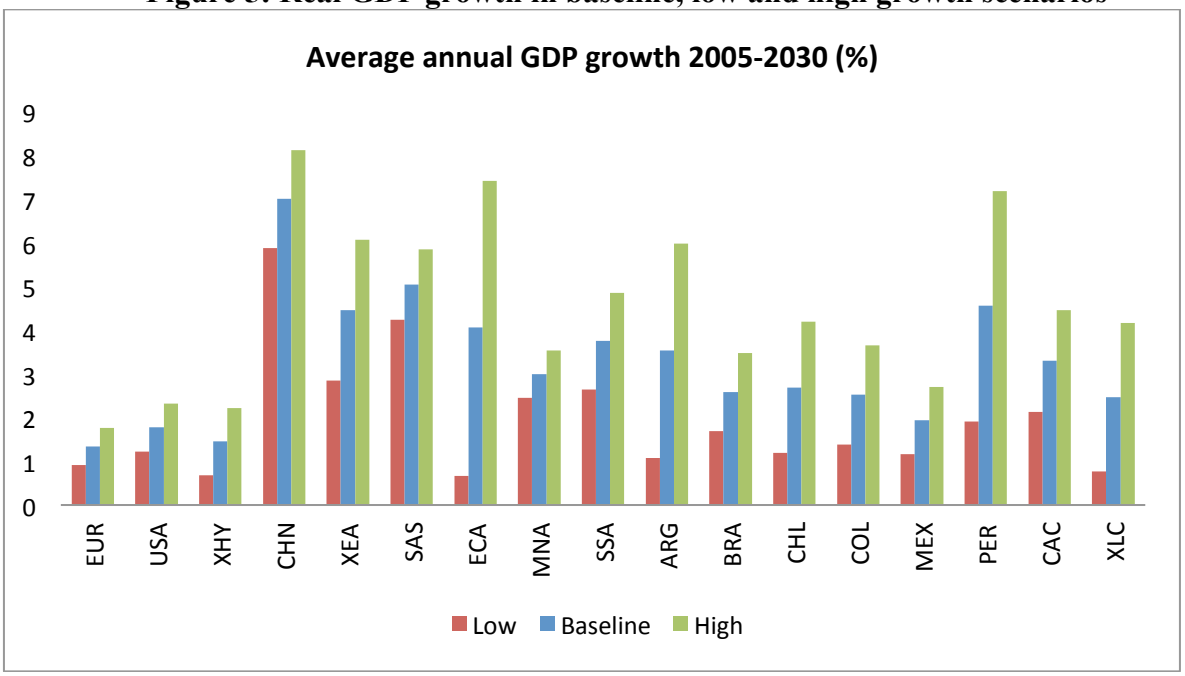
In the baseline growth scenario and using 2004 PPP exchange rates[17], the speed of convergence between developing- and developed-country incomes would be rather slow and varying significantly across regions. In 2004, the average developing-country resident receives about 14 percent of the average income of a resident of high income countries. This ratio would rise to 25 percent in 2030. The convergence would be particularly modest in Sub-Saharan Africa. Chinese incomes would rise much faster, from 11 percent of the average high income level to 53 percent, achieving an average income close to the lower range of today's poorest high-income countries. Latin America would also see a noticeable convergence with the developed countries. Countries such as Argentina or Chile are expected to reach income levels of over half of the high income average, while citizens of Mexico and Peru will be earning on average close to 45 percent of the income of rich countries' citizens by 2030.

3.3 Alternative growth scenarios

To test how strong the links between income growth, shift of demand to services, and skill and urban premia are – and therefore how robust is the result of declining wage premia – the model was run with different economic growth assumptions. A high and low economic growth scenarios and their implications for skill and urban premia were tested. In these scenarios, the rate of growth was increased, or decreased, by adding, or subtracting, a 5-year moving average of the standard deviation of real GDP growth in a respective country/region over 1990-2009 to, or from, the baseline growth projections (see Figure 5**Error! Reference source not found.**).

[17] Using the market dollar exchange rate of an economy provides a biased estimate of individual wellbeing because prices differ substantially across economies—particularly for non-traded goods such as personal and housing services. For this reason, it is more appropriate to use the PPP exchange rates, which take into account these differences in prices.

Figure 5: Real GDP growth in baseline, low and high growth scenarios



Source: Authors' calculations.
Note: ARG-Argentina, BRA-Brazil, CAC-Central America & Caribbean, CHL-Chile, CHN-China, COL-Colombia, ECA-Europe & Central Asia, EUR-EU27 & EFTA, MEX-Mexico, MNA-Middle East & North Africa, PER-Peru, SAS-South Asia, SSA-Sub-Saharan Africa, USA-United States, XEA-Rest of East Asia, XHY-Rest of high-income, XLC-Rest of Latin America

The impact on skill premia is symmetric around the baseline: the highest reduction of the skill premium is found in the low growth scenario; and the smallest reduction of the skill premium is found in the high growth scenario (with an absolute size of deviation from the baseline being similar in the high and low growth scenarios, see Table 2). In the high growth scenario, the shift towards services is strongest, therefore the demand for skilled workers grows at the faster pace than in the baseline, while the supply of skilled workers remains the same. As internal migration from rural to urban areas applies only to unskilled workers and is relatively low, the growth of skilled wages is therefore very high in this scenario, and hence results in the smallest reduction of the skill premium. In high income countries, the two alternative growth scenarios result in almost unchanged skill premia given that the relative growth deviations between the scenarios are rather small. On the other hand, the differences between low and high growth scenarios in developing countries are quite significant, close to one percentage point per annum in the cases of Argentina, Chile and the Rest of Latin America. This is associated with significant differences in the growth of wages across scenarios. In Peru, for example, in the low growth scenario wages of skilled workers are expected to increase by 40 percent over 2005-2030 period, while in the high growth scenario their growth is 200 percent or over five times faster.

The urban premium is related to the developments in sectoral composition of output. As an example consider again the case of Peru, where agriculture expands in the low growth scenario,

but contracts in the baseline and high growth scenarios. In the low growth scenario, urban premium increases, as the expansion of agriculture slows down migration to the cities driving up wages of unskilled workers in urban areas. In the remaining two scenarios, agriculture is contracting releasing excess unskilled labor to be used in the fast expanding services sectors. Even though producers have at their disposal a relatively faster growing supply of skilled workers, the urban sector cannot fully substitute away from unskilled workers and its fast expansion is attracting unskilled workers to the cities. In rural areas, a declining agriculture output is produced with ever more shrinking labor force leading to a faster growth of rural wages. As a result, urban premium is falling in the scenarios with faster economic growth and stronger expansion of urban sectors.

Table 2: Skilled and urban premia in the low, baseline and high growth scenarios

	Skill premium			Urban premium		
	Low	Baseline	High	Low	Baseline	High
European Union	-2.4	-2.3	-2.4	0.0	0.0	0.0
USA	-1.5	-1.4	-1.4	0.0	0.0	0.0
Rest of High Income countries	-2.1	-1.9	-1.9	0.0	0.0	0.0
China	-1.4	-1.3	-1.4	-1.2	-2.2	-2.7
Rest of East Asia	-1.2	-1.0	-1.0	-0.6	-1.4	-2.0
South Asia	-0.9	-0.9	-1.0	0.9	-0.1	-1.1
Europe and Central Asia	-0.2	-0.1	-0.1	-0.1	-1.5	-2.1
Middle East and North Africa	-1.4	-1.4	-1.3	0.9	0.3	-0.3
Sub-Saharan Africa	-0.9	-0.9	-0.9	-0.2	-0.7	-1.0
Argentina	-2.3	-1.5	-1.4	-0.7	-1.5	-1.6
Brazil	-0.7	-0.5	-0.4	0.4	-1.2	-1.7
Chile	-2.0	-1.4	-1.1	0.9	-1.4	-2.8
Colombia	-0.9	-0.6	-0.5	-0.7	-1.2	-1.3
Mexico	-0.7	-0.5	-0.3	-0.5	-1.7	-2.5
Peru	-0.5	-0.5	-0.6	0.3	-0.9	-1.6
CAC	-0.8	-0.6	-0.7	0.3	-0.9	-1.5
Rest of Latin America	-3.2	-2.5	-2.3	2.0	0.0	-1.3

Source: Authors' calculations.
Note: ARG-Argentina, BRA-Brazil, CAC-Central America & Caribbean, CHL-Chile, CHN-China, COL-Colombia, ECA-Europe & Central Asia, EUR-EU27 & EFTA, MEX-Mexico, MNA-Middle East & North Africa, PER-Peru, SAS-South Asia, SSA-Sub-Saharan Africa, USA-United States, XEA-Rest of East Asia, XHY-Rest of high-income, XLC-Rest of Latin America

These CGE model's results provide an initial indication of the likely evolution of the distribution of income. However, it is only when economic growth, wage premia and inter-sectoral migration are used to shock the household level data that the full distributional picture arises. This is described in the next section.

4. The future of the middle class: simulation results

The scenario analysis indicates that the global middle class will likely continue to expand and its composition will significantly change. By 2030, citizens from rich countries will become a

minority of the global middle class, while people from developing countries, increasingly from the Asian continent and less from Latin America, will become its largest group. Within the Latin America and Caribbean region, the expansion of the middle class will be very different across countries, considerable in Peru and Chile and much smaller in Brazil, Mexico or Colombia. This is because of differences in the rate of economic growth which is almost twice higher in Peru than in Mexico. The initial level of inequality also plays a role. At a given rate of growth, the middle class expands more slowly in more unequal countries like Colombia, than in more equal countries, such as Peru or Chile. Finally, growth may not be distributed equally along the income ladder. For example growth exhibits a progressive and inclusive pattern in Chile and Peru but a more regressive and unequal pattern in Brazil. These three elements – pace of economic growth, initial inequality, and growth incidence (or change of inequality) – together explain why the middle class expands differently across the world and specifically across countries in Latin American and the Caribbean.

During the next decade and a half, the middle class's living standards which, in 2005, were achieved by just the richest minority (the top 20%), will likely, by 2030, become affordable for a much larger group of increasingly educated households in the middle of the national income scale, and probably less restricted to urban households.

4.1 The expansion of the middle class in the world and in Latin America and the Caribbean

Definition of the middle class

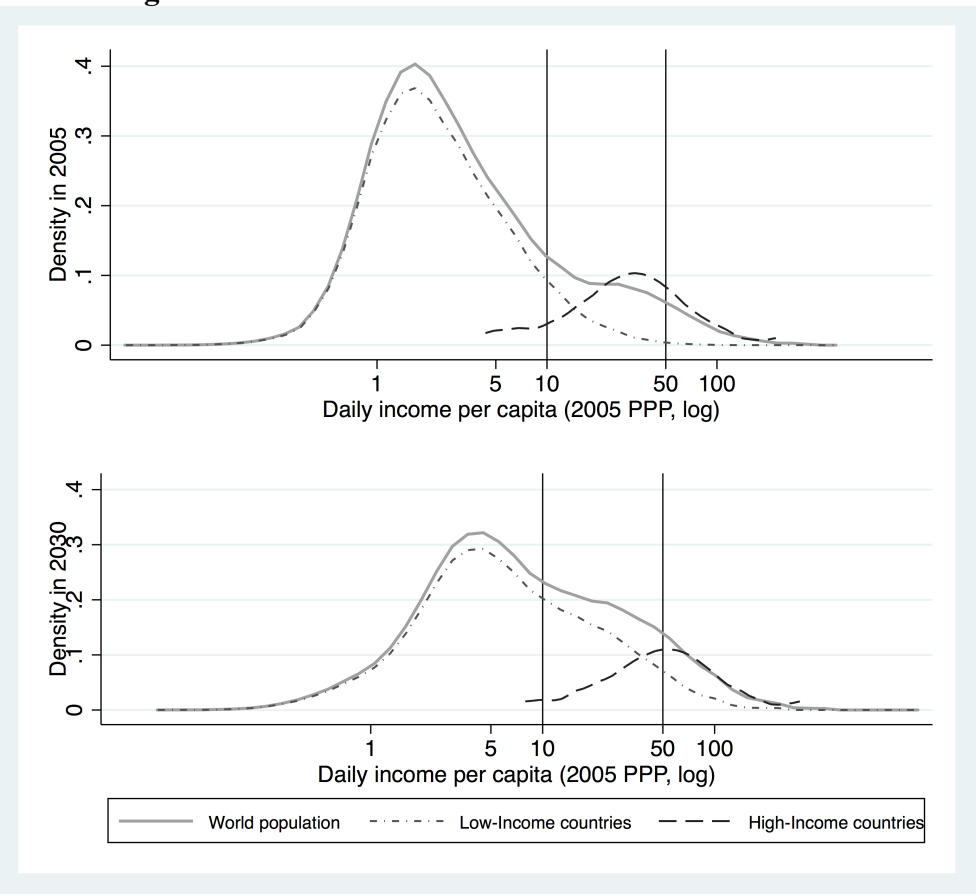
Following the definition proposed by Lopez-Calva and Ortiz-Juarez (2013) based on vulnerability (further validated for several Latin American countries by Ferreira et al. 2013), members of the middle class are individuals living with more than 10 and less than 50 dollars per day. Dollars are expressed in 2005 Purchasing Power Parity terms for international comparison purposes. The same thresholds of 10 and 50 dollars are used in 2005 and 2030.

Individuals living with a little more than $10 per day may be considered as upper middle earner by LAC standards, but they are certainly rich by Indian standards. In 2005, the 10 dollars threshold corresponds to the 75^{th} percentile of the income distribution in LAC countries, but it represents the 95^{th} percentile in the Asian continent and in Sub-Saharan Africa. The $10-$50 per day definition appears therefore close to what Ravaillon (2010) termed "the developing world's upper middle class", as distinct from "the developing world's middle class" composed of people living on $2 to 13$ a day.

The middle class around the world in 2005 and 2030

Members of the middle class represented about 14% of the world population in 2005 and one third of them resided in developing countries. As Table 3 shows, middle class earners are expected to account for more than 30% of the world population by 2030 and most of them (80%) will likely live in developing countries. As illustrated by Figure 6, this significant expansion and compositional shift is due to a combination of factors: the different positions of developing and developed countries in terms of their initial incomes vis-à-vis the middle class thresholds of 10 and 50 $, and the differences in economic and demographic growth of these two groups.

Figure 6: World Income Distribution in 2005 and 2030



Source: Authors 'calculations

In explaining the changes of the size of the middle class, economic growth plays a major role as income per capita of the developing world is projected to grow significantly and almost four

times as fast as that of the developed countries group. A couple of alternative simulations[18] clarify the importance of economic growth. The first alternative scenario considers a situation where there is no economic growth at all and only demographic change is at work. As expected, demographic expansion alone cannot generate any changes in the overall *size* of the middle class. And even if developing countries populations expand three times faster than those of rich countries, the compositional shift of the global middle class due to just demography is negligible (see third column of Table 3)

Table 3: The global middle class is growing, its composition changing (percentage shares)

		Business as Usual	Demographic growth only	1% annual growth
	2005	2030	2030	2030
World Poor	82.2	59.7	83.1	80.0
World Middle Class	14.4	30.8	13.8	15.2
High income countries	9.1	5.9	8.0	6.8
Low and middle income countries	5.3	24.9	5.8	8.4
China	0.9	14.0	0.8	1.8
Eastern Europe and Central Asia	1.2	3.0	1.0	1.5
Middle East and North Africa	0.4	0.9	0.4	0.6
South Asia	0.0	1.3	0.1	0.2
Sub-Saharan Africa	0.2	0.4	0.3	0.4
East Asia	0.3	1.5	0.3	0.5
Latin America and the Caribbean	2.3	3.9	2.9	3.5
World Rich	3.4	9.5	3.2	4.8
Total	100.0	100.0	100.0	100.0

Source: Authors' calculations.

A second simulation assesses how the global middle class changes when incomes in every country of the world grow at a common annual rate of one percent. The last column of Table 3 shows the results. These illustrate that, even if every country grows at the same rate, the share of high income countries' population in the middle class contracts while that of the low income countries expands, highlighting the relevance of the different initial positions of the two groups of countries. However, this compositional effect is not very large and, notably, the overall expansion of the middle class is low. This clearly establishes that the sustained economic growth rates of developing countries will be the main engine in the expansion and change of composition of the global middle class.

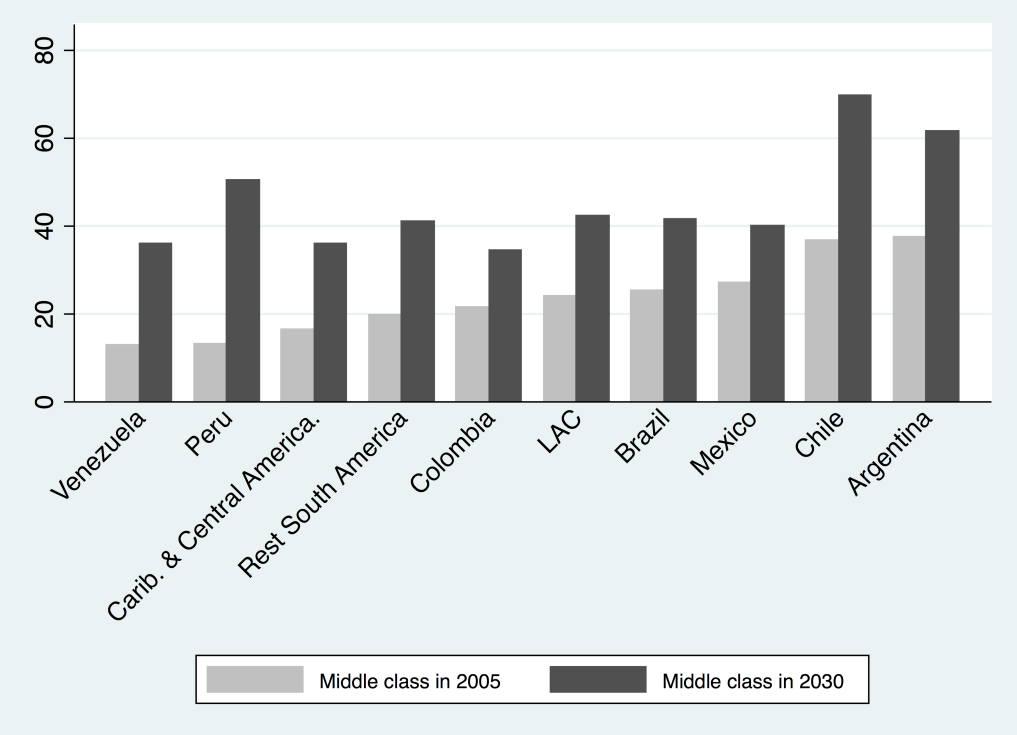
[18] Note that these alternative simulations do not correspond to those described in section 3.3. The simulations described in this section do not involve re-running the CGE model. They basically consist of decomposing the impact on the change in the distribution into a demographic and economic component.

For the same reasons, significant variations can be noted within the group of low income regions. While the size of the middle class may increase by more than 30 times in South Asia, 16 times in China and 6 times in East Asia, it may barely double in Latin America and the Caribbean. And even within this latter region considerable discrepancies are found across countries.

Focusing on Latin America: heterogeneity across countries

More than 135 million of residents of the Latin America and Caribbean region, about a quarter of its population, belonged to the middle class in 2005. By 2030, this number will have likely tripled and more than forty percent of the region's population will probably belong to the middle class. As Figure 7 shows, this overall improvement conceals noticeable variations across countries and sub-regions. In terms of initial level, countries in this region show a high degree of heterogeneity. In 2005, the middle class represented about one third of the respective population in Argentina and Chile, about one fourth in Mexico and Brazil, and less than 15% in Peru and Venezuela. In the coming decades, the middle class is expected to expand the most in Peru, Chile, Venezuela, Argentina and the least in Mexico, Brazil and Colombia. In Peru and Venezuela the middle class may triplicate, while it may only increase by a little more than 50% in Mexico and Brazil. As a result, by 2030 the size of the Peruvian middle class relative to its population (50%) will likely surpass the size of the Mexican (43%) and the Brazilian (41%) middle classes.

Figure 7: Middle Class as a percentage of population in 2005 and 2030, by country

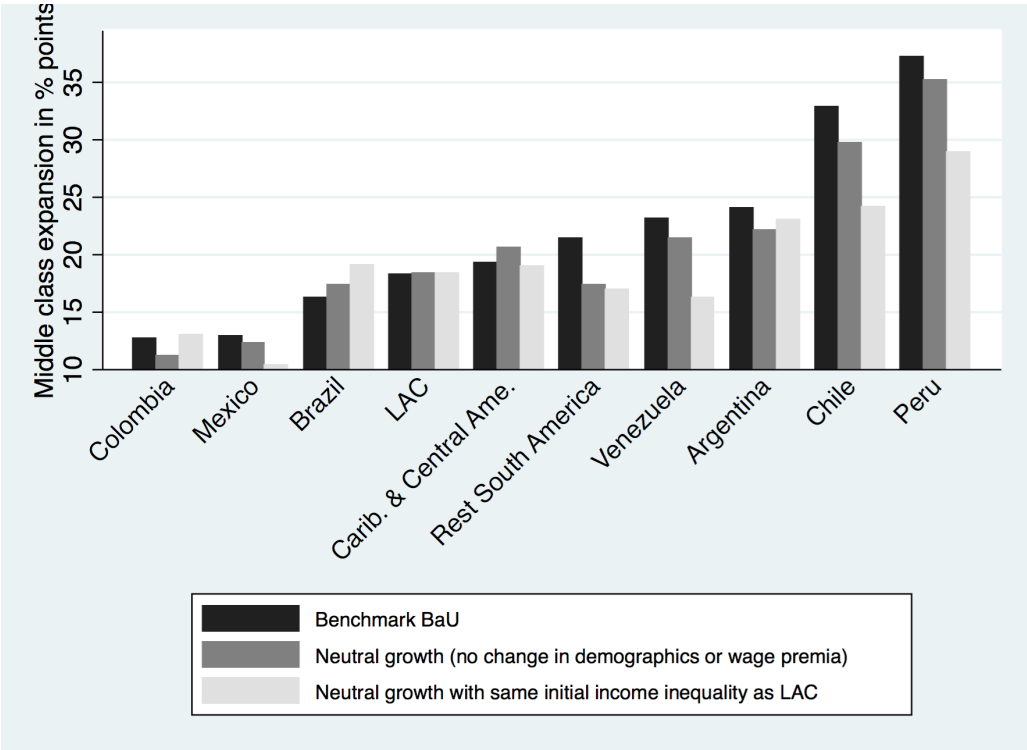


Source: Authors' calculations.

4.2 Economic growth, inequality change and demography as determinants of the expansion of the middle class

The expansion of the middle class varies considerably across countries in Latin America. As displayed in Figure 7, the share of the population belonging to the middle class increases by slightly more than 10 percentage points in Colombia, while it gains more than 35 percentage points in Peru. A simple thought experiment demonstrates the relative importance of economic growth, initial inequality, and changes of inequality (or the incidence of growth) in explaining this heterogeneity.

Figure 8: Expansion of the middle class (as a share of population) in LAC countries under different scenarios



Source: Authors' calculations.

The thought experiment consists of imagining what would happen to the middle class in each country if either (a) the country-specific economic growth were the same for each person in that country or (b) the initial inequality were the same for all countries[19] and, once again, (country-specific) income growth were equally distributed. In these cases, the effects of both the initial

[19] In practice, this is implemented by using the distribution of the whole of the region as the initial distribution for each country. Note that the mean of this Latin America and Caribbean region's income distribution is rescaled to correspond to the mean of each individual country. Then, as in the neutral growth scenario, all individual incomes of each country are multiplied by the same country specific growth rate.

shape of the distributions and their changing would be eliminated and only the effect of the difference in average growth rates would be maintained. The results of this thought experiment are presented in Figure 8 as the expansions of the middle class measured by percentage point changes of the share of the middle class over the population between 2030 and 2005.

The first important finding is that the ranking of countries – from the one with the largest growth of the middle class to the one with the least growth – remains almost unaltered across the three scenarios. In other words, countries where the middle class expands more are those enjoying higher income growth rates (see Table A3 in the appendix), no matter whether this growth is applied to initially more equal distributions or its incidence is biased.[20]

Note, however, that growth can be more or less supportive of the expansion of the middle class depending on the initial inequality and the change of inequality (i.e. the incidence of growth itself). The influence of these factors – measured by the vertical distances between the three bars in Figure 8 – has different magnitudes and even different signs across countries in the region.

The gaps between the middle class' expansion in the "Same-initial-inequality" and in the "Neutral-Growth" scenarios are due to the difference in initial inequality. In Peru, Chile or Venezuela, the lower initial level of inequality, relative to the LAC region (see the Gini coefficients in table A3), will positively contribute to the expansion of the middle class by enhancing the ability of growth of moving the poor up the income ladder. Specifically in the case of Peru, the same growth rate would produce a larger expansion (6 additional percentage points, from 29 percent to 35 percent) of its middle class if it is applied to the actual distribution rather than to the common initial distribution. Conversely, in the most unequal countries like Brazil or Colombia, the high level of actual inequality will undermine the ability of growth of reducing poverty and expanding the middle class.

Finally, the way in which economic growth itself is distributed does also matter. Following Ravallion and Chen (2003)[21], the extent of the incidence of growth can be evaluated by comparing the rate of growth of the poor – i.e. the growth rate of the average income of those living with less than 10$ a day – with that of the rich – i.e. the pace of the increase of incomes of those living with more than 10$ a day. As table A3 in appendix indicates, Peru, Chile, Venezuela and the Rest of South America (Ecuador, Bolivia, Uruguay, Paraguay) are countries/regions in which economic growth is very progressive, in the sense that the rate of 'pro-poor growth' is

[20] Clearly this is true at the global level as well. A simple ross-country regression (see figure A1 in appendix), shows that countries or regions where economic growth is strongest are those where the middle class expands the most over the 2005-2030.

[21] Ravallion, M., & Chen, S. (2003). Measuring pro-poor growth. Economics letters, 78(1), 93-99

substantially higher than the rate of 'pro-rich growth'[22]. For example, in Peru, the incomes of the poor, representing 86% of the population, will increase by 165% on average while those of the rich, making up 14% of the population, will rise by 146%. Conversely, projected growth is regressive in Brazil: incomes of the poor (72% of the population) will grow by 67% while earnings of the rich will rise by 78%. For a given country, Figure 8 shows the difference in the middle class' expansion between the "Neutral-Growth" and the "BaU" scenarios, which is only driven by the country-specific incidence of growth (and not by the level of growth). In countries like Chile, Peru, Argentina, or Rest of South America growth of the middle class in the BaU scenario is greater than that simulated in the distribution-neutral scenario, indicating a progressive growth pushing the poor into the middle class. This progressive growth is due to the reduction of the skill and urban premia highlighted in Table 1, and to the movement of workers from low paid agricultural jobs to highly remunerated jobs in manufacturing or services.

In summary, the ranking of countries in the Latin America and Caribbean region in terms of middle class expansion is primarily determined by differences in average economic growth at the country level. The initial level of inequality is also an important factor and may, for example, explain why the middle class will increase more in Venezuela than in Brazil, even if the rate of income growth is expected to be similar in these two countries. The way in which growth is distributed within a country seems also to play a role. Most countries seem likely to experience a reduction of inequality resulting from the progressive incidence of growth which, in turn, is due to the reduction of the wage premia. The next section explores this issue in more detail.

Within-country inequality: the determinants of how economic growth is distributed

It is important to examine the incidence of growth for at least two reasons. First, because worsening inequality can undermine social cohesion and political stability by increasing the risk of social alienation of people left behind. Second, because unequal growth increases the level of inequality in subsequent periods and lowers the ability of future growth to reduce poverty and expand the middle class. The projected rise in inequality in Brazil could imply that in 2030 the country will need higher growth rates than it currently needs to achieve a given expansion of the middle class. Countries such as Peru, Chile, Venezuela or Bolivia will instead reap the long-term benefits of reducing income inequality: with a more equal distribution of income in 2030, their economies will achieve faster poverty reduction from future growth.

[22] This exercise assumes rank-preserving growth.

Income distributions evolve in complex ways, but at least two sets of factors can be isolated thanks to the microsimulation model used here: (i) shifts in the demographic structure of the population, in terms of age and education attainment, and (ii) changes in rewards for individuals' characteristics, such as education level and sector specific skills. In other words, the microsimulation model allows identifying the impact on the distribution of income of changes in quantity and price of important assets. In the real world, demographic (i.e. quantity) and economic (i.e. price) shocks occur simultaneously; however, in the model they are applied sequentially (see Figure 1) and thus it is possible to carry out a statistical decomposition to infer how much of the total change can be attributed to each shock.

Consider first the quantity shock. As explained in section 2.1, the demographic structure of the world in 2030 is based on the UN's population projections by age group and, with the simple assumption of a continuation of the educational trends observed over the 1980–2000 period, the evolution of the education levels can also be inferred.

Controlling for other factors, both the level and dispersion (inequality) of household income tend to increase with the age and education of the household head. As the population ages and becomes more educated, groups within which income inequality is higher tend thus to represent a larger fraction of the total population, and this results in a rise of overall inequality. The impact of this demographic change is not the same for all countries. Figure 9 (dashed line) shows how the Growth Incidence Curve (GIC) would look like for Brazil and Peru if only the demographic structure were to change over the next decades, and no change in the returns to education and other assets.[23] As the upward sloping curve indicates that in both Peru and Brazil, changes in demographic structure increase income inequality.[24]

In terms of the price shock, section 3.1 already anticipated that the region may expect some decline of inequality. Countries in Latin America and the Caribbean are characterized by a slower transition to a service-oriented economy and lower rates of capital deepening. This tends to dampen the growth of demand and wages of skilled workers, whose labor is a complement to

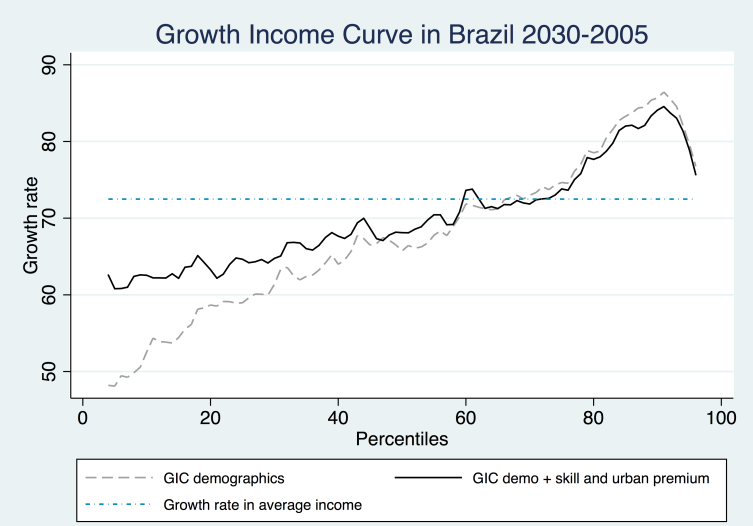
[23] The GIC summarizes the distributional effect of income growth by plotting the cumulative percentiles of the population ranked in ascending order of income against the income growth rates of each percentile of the distribution. These growth rates are calculated by comparing, for each percentile, the level of income in 2005 with the one of the final distribution in 2030. Hence, when interpreting an upward sloping GIC, it can be inferred that lower percentiles grew slower than upper percentiles and thus that inequality rose. It is important not to conclude that individuals who were at the bottom end of the distribution in 2005 benefited less than those at the higher end of the distribution. This is because an individual, who was in, say, the 10th percentile in 2005, may find himself in the 55th percentile. The GIC in this case assumes rank-preserving growth.

[24] This is also the case for all of the other countries in LAC, as table A3 in appendix shows by comparing the rate of pro-poor growth to the rate of pro-rich growth in columns 5 and 6.

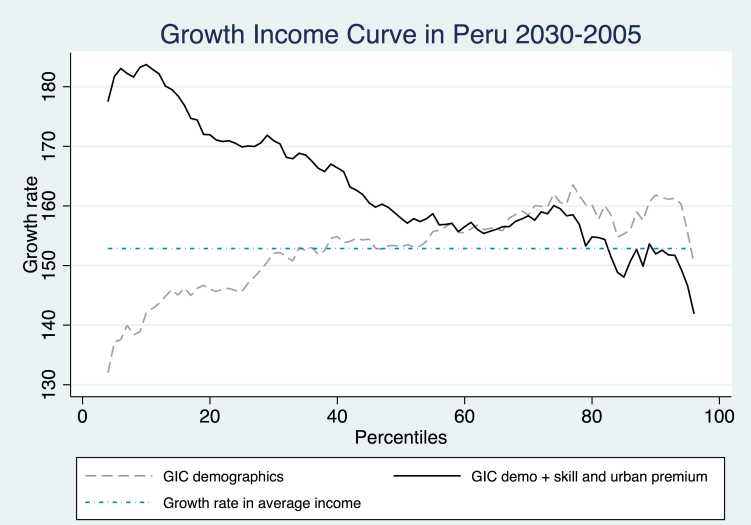
capital and is intensively demanded in the service sectors. In addition, as the population ages and becomes educated, labor supply of older and more skilled workers becomes less scarce (relative to younger unskilled workers). The combination of these two factors – a larger relative supply of skilled workers and an unskilled-intensive economic growth – tends to generate a decline in the skill and urban premia. The GIC (solid line) of Figure 9 displays these forces at work in Brazil and Peru, but similar graphs could be drawn for other countries in the region.

Figure 9: Growth Income Curve (projection over the 2030-2005 period)

Panel (A)



Panel (B)



Source: Authors' calculations.

The drop in the wage premia tends naturally to lower inequality, but the magnitude of the effect varies substantially across the two countries. In Brazil, it reduces the growth differential between the lower and upper tail of the income distribution and the GIC (solid line) becomes less steep but

still upward sloping. The reduction of the wage gaps does not seem sufficient to counterbalance the un-equalizing effect of demographic forces.

The reduction of the wage gaps in Peru, although similar to the Brazilian case, affects much more dramatically the distributional incidence of growth. The drop in wage premia transforms the regressive pattern of the Peruvian growth into a strongly progressive pattern, as the downward sloping curve of panel B in Figure 9 indicates. By 2030, incomes in the bottom two deciles will likely grow by 40% more than in the top two deciles (growth rate of 200% versus 140%).

The contraction of the earnings distribution seems to have equalizing effects strong enough to transforms the regressive pattern of growth caused by changes of the demographic structure into a progressive pattern more favorable to the poor in all other LAC countries except Brazil and Mexico.[25]

4.3 The face of the middle class in 2005 and 2030

From the top to the middle of the income scale: The middle class earnings position from 2005 to 2030

Members of the middle class living in LAC countries earn incomes well above the averages of their countries of residence in 2005. For example, in Venezuela and Peru middle class households generally belong to the 20% richest households in their country – and often even the 10% richest. This situation is likely to change dramatically by 2030. A full 40% of the middle class will probably earn incomes in the seventh decile or lower. In Chile, while the middle class members are usually among the 20% richest families in 2005, most of them will be located in the middle of the national income distribution by 2030, between the third to the seventh decile. In consequence, while middle class's living standards is affordable only by the richest minority in 2005, it is possible that by 2030, the same living standards can be attained by a much larger group of households in the middle of the income scale.

Education and occupation of the middle class in 2005 and 2030

Education and occupation are one of two most important factors determining whether an individual belongs to the middle class in 2005 in LAC countries. Relative to not having attended school at all, the completion of primary education raises the probability of joining the middle class by 15%. Secondary education augments this probability by 15 additional percentage points and studying even further till achieving tertiary level increases it by 20 percentage points. The sector of employment also plays an important role in determining household income because

[25] See table A3 in appendix for more details.

rural-urban wage gaps are high in most of the LAC countries. Everything else being equal, a worker in the agricultural sector is 10% less likely to earn middle class incomes than a worker in the non-agricultural urban sector.

Between 2005 and 2030, returns to education – in terms of their effect on the likelihood to escape poverty – may increase significantly in all LAC countries and particularly in Peru, Mexico, Central America and Caribbean, and Venezuela. By 2030, the reward of completing primary education will probably double with respect to 2005. In Peru, completing secondary school in 2005 after having finished primary increases by 6% the likelihood of earning middle class income. By 2030, this probability may jump to 22%. On the contrary, the sector of occupation may become less important as agricultural wages will likely converge towards those in the urban sectors. In LAC as a whole, the rural-urban difference in the probability of earning middle class incomes may halve by 2030. The rural-urban gap may even vanish in Mexico, country where this premium was initially the largest in 2005.

4. Conclusion

This paper analyses, in an ex-ante fashion using the GIDD macro-micro modeling framework, the effect of demographic and economic changes over the 2005-2030 period on the income distribution around the world. It focuses especially on the shifts in the middle class' size and composition in Latin America and the Caribbean. Under a baseline scenario based on past economic trends and UN population projection, GIDD – using a collection of household level surveys covering more than 90% of the world population – is used to generate scenarios for the distributional effects of growth not only between countries but also within countries (with a high degree of heterogeneity). The resulting simulated income distribution should not be seen as a *forecast* of what the future distribution might look like; instead it should be interpreted as the result of an exercise that captures the *ceteris paribus* distributional effect of demographic, sectoral, and economic changes.

Results show that, between 2005 and 2030, there will be quite a lot of upwards mobility towards the middle class. In the Latin American and Caribbean region this group of people will expand dramatically, almost doubling its size relative to the population. Although the growth of the middle class in LAC is significantly lower than in fast emerging countries such as China or India, (where the size of middle class is expected to increase by 10 times at least), it still represent a major improvement in the welfare of a great number of households. Assuming the economy remains roughly on the present growth path, LAC will turn into a true middle class society by 2030, with almost half of its population being part of the middle class. Standards of living previously reserved to the 20% richest households will become affordable to families earning the median income by 2030: economic growth in LAC will go hand in hand with upward socio-

economic mobility, helping people climb up the ladder of income from the lower class up to the middle class. Individuals joining the ranks of the middle class are likely to be more and more educated (as education becomes more accessible and at the same time the skill premium is reduced) and working less exclusively in the urban sector but also in the agricultural sector (as urban-rural wage gap shrinks).

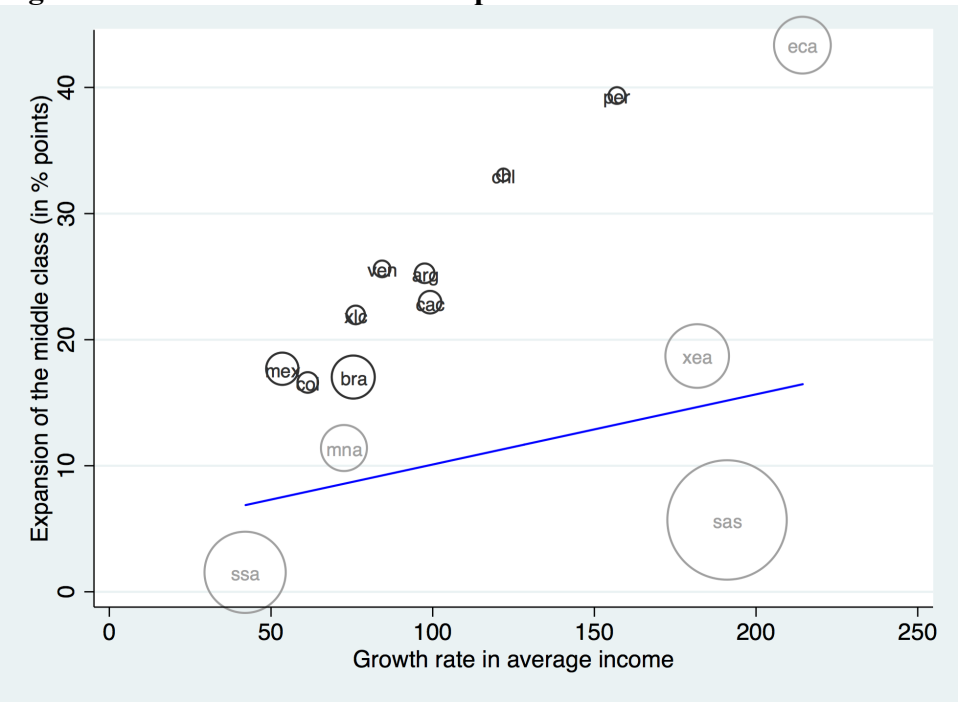
Demographic and economic changes display substantial variations across countries and sub-regions in LAC. Mainly due to differential in economic growth, the middle class will expand the most in Peru and Chile (the size of the middle class will treble relative to the population) and the least in Brazil and Colombia (the size of the middle class will increase by 50%). Even more importantly, growth will significantly affect the income distribution within countries. While it has significant un-equalizing effects on the income distribution in some countries such as Brazil, it reduces within inequality in others such as Peru[26]. How income growth is distributed matters for two reasons. First, a more progressive growth pattern is more efficient to lift people out of poverty and move them up into the middle class. Second, unequal growth means a higher level of income inequality by 2030, which by itself hampers the ability of future growth – by 2030 onwards – to reduce poverty and expand the middle class. Thus, unequal growth is detrimental to the development of the middle class both in the short and long run.

Finally, strong mobility towards the middle class may have far-reaching consequences. To mention only one, a significant larger global middle class composed of developing-country nationals will probably exert a stronger influence on international and domestic policy making. As shown in the paper, by 2030 the middle class members in developing countries, and notably in LAC, will constitute a significant share of their home country population, allowing them to have a greater say in the domestic policy arena. Although not uncontroversial (see for example Calva, Rigolini and Torche, 2011), some evidence points to a correlation between rising incomes and a shift in demand towards more globalization supportive policies. Other policy goals such as improved transparency, intensified anticorruption efforts, and demand for a more open society and cleaner environment, are also likely to move to the forefront of the policy agenda with the expansion in the size of the middle class.

[26] In each country, income distribution is affected by shifts in the demographic structure (age and education) and changes in the reward of individuals' characteristics (education and sector of employment).

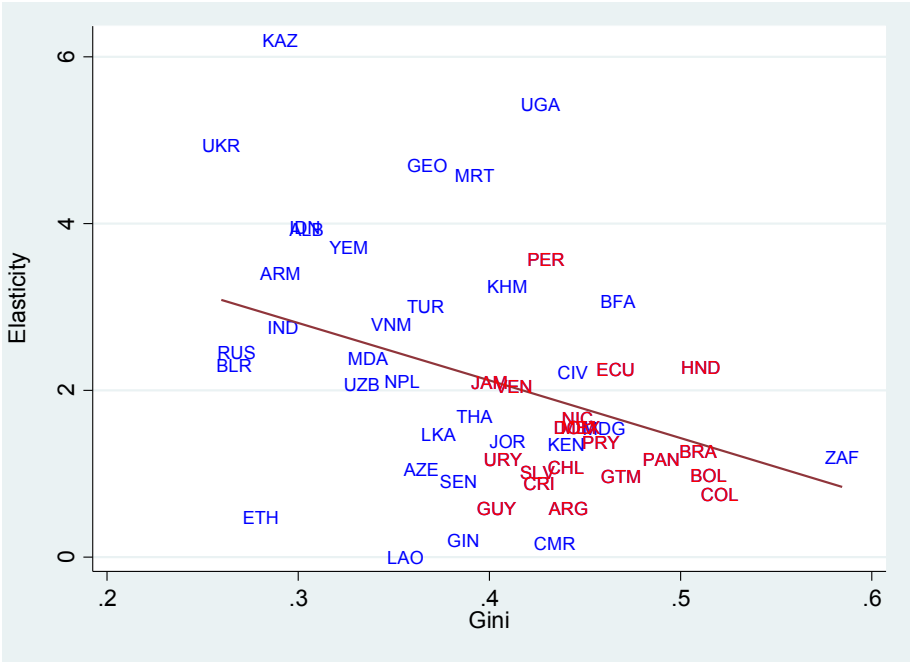
APPENDIX

Figure A1: Correlation between expansion of the middle class and income growth



Source: Authors' calculations.
Note: ARG-Argentina, BRA-Brazil, CAC-Central America & Caribbean, CHL-Chile, CHN-China, COL-Colombia, ECA-Europe & Central Asia, EUR-EU27 & EFTA, MEX-Mexico, MNA-Middle East & North Africa, PER-Peru, SAS-South Asia, SSA-Sub-Saharan Africa, USA-United States, XEA-Rest of East Asia, XHY-Rest of high-income, XLC-Rest of Latin America

Figure A2: Middle class' incidence elasticity of growth and the Gini coefficient in developing countries



Source: Authors' calculations.

Note: ARG-Argentina, BRA-Brazil, CAC-Central America & Caribbean, CHL-Chile, CHN-China, COL-Colombia, ECA-Europe & Central Asia, EUR-EU27 & EFTA, MEX-Mexico, MNA-Middle East & North Africa, PER-Peru, SAS-South Asia, SSA-Sub-Saharan Africa, USA-United States, XEA-Rest of East Asia, XHY-Rest of high-income, XLC-Rest of Latin America

Table A3: Level and incidence of income growth and income inequality in LAC countries over the 2005-2030 period

	Growth rates (in %, cumulative for the whole 2005-2030 period)					Poverty	Distribution indexes		
				Special scenario (neutral growth)					
Region CGE	Average individual	Poor individual	Middle class or rich individual	Poor individual	Middle class or rich individual	% people with < 10$ a day in 2005	Gini 2005	Gini 2030 no change in wage premia	Gini 2030
arg	98.4	108.9	98.0	96.9	99.6	61	0.44	0.44	0.42
bra	73.0	67.3	78.0	68.5	77.8	72	0.51	0.51	0.51
cac	85.9	88.8	87.3	79.5	90.4	83	0.47	0.48	0.47
chl	117.8	132.8	119.9	106.9	123.6	60	0.43	0.44	0.4
col	49.6	55.5	50.5	43.7	54.0	77	0.52	0.53	0.5
mex	36.3	37.5	38.5	31.3	40.5	71	0.44	0.45	0.44
per	152.9	165.3	146.5	150.8	153.5	86	0.43	0.43	0.4
ven	78.1	85.8	70.2	73.1	78.4	86	0.41	0.42	0.39
xlc	70.3	90.4	63.1	66.9	72.7	79	0.48	0.48	0.44

Source: Authors' calculations.

Note: ARG-Argentina, BRA-Brazil, CAC-Central America & Caribbean, CHL-Chile, CHN-China, COL-Colombia, ECA-Europe & Central Asia, EUR-EU27 & EFTA, MEX-Mexico, MNA-Middle East & North Africa, PER-Peru, SAS-South Asia, SSA-Sub-Saharan Africa, USA-United States, XEA-Rest of East Asia, XHY-Rest of high-income, XLC-Rest of Latin America

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