Economic Growth and Income Distribution: Linking Macroeconomic Models with Household Survey Data at the Global Level

Maurizio Bussolo, Rafael De Hoyos, and Denis Medvedev

Abstract

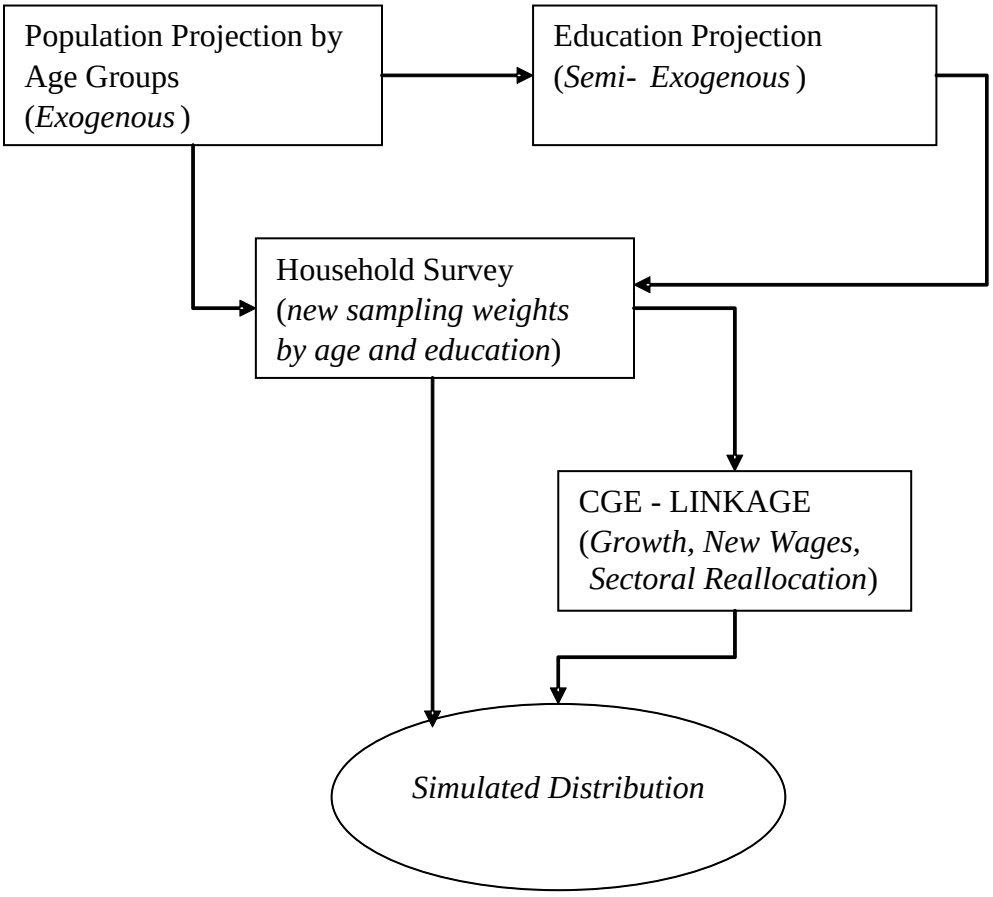
The recent literature has seen an increase in the number of macro-micro applications, where macroeconomic models are in some ways linked to household survey data in order to assess the income distribution consequences of macro policies. The applications vary from relatively simple micro-accounting exercises to complex micro-simulation models to a full integration of a micro module within a macro model. However, all of these applications have so far been undertaken at a single-country or regional level. In contrast, our approach—the Global Income Distribution Dynamics (GIDD) methodology—establishes consistency between a macroeconomic model and household survey data at the global level. The GIDD is a framework for ex-ante analyses of the distribution and poverty effects of changes in macroeconomic policy and/or trends in global markets. It complements a global CGE analysis with global micro-simulations based on standardized household surveys.

In this paper, we develop the methodological approach of the GIDD and illustrate its application with a series of forward-looking global scenarios. The forward-looking macro scenarios are produced with the World Bank's LINKAGE model. Although at its core, LINKAGE is essentially a neo-classical growth mode, it incorporates several features not found in more simple models (van der Mensbrugghe, 2006). First, it is multi-sectoral. This allows for more complex productivity dynamics including differentiating productivity growth between agriculture, manufacturing and services and picking up the changing structure of demand (and therefore output) as growth in incomes leads to a relative shift into manufactures and services. Second, it is linked multi-regionally allowing for the influence of openness—via trade and finance—on domestic variables such as output and wages. The model is also global with globally clearing markets for goods and services and balanced financial flows. Third, the LINKAGE model has a more diverse set of productive factors including land and natural resources (in the fossil fuel sectors), and labor is split between unskilled and skilled categories.

The GIDD framework is based on micro-simulation methodologies developed in the recent literature, including Bourguignon and Pereira da Silva (2003); Ferreira and Leite (2003, 2004); Chen and Ravallion (2003); and Bussolo, Lay, and van der Mensbrugghe (2005). The starting point is the global income distribution in 2000, assembled using data from household surveys for 1.2 million households in 84 developing countries; household information from developed countries comes from the *Luxemburg Income Study* dataset. These micro data are complemented with more aggregate information for countries where no surveys are available (usually vintiles), with the final dataset covers 91 percent of the world's population. The counterfactual distribution is then obtained by applying three main exogenous changes to the initial distribution: (a) demographic changes, including aging and shifts in the skill composition of the population; (b) shifts in the sectoral composition of employment; and (c) economic growth, including changes in relative

wages across skills and sectors. The empirical framework is depicted in Figure 1. Our simulations include the expected changes in the shares of population by groups formed by age and education characteristics (top boxes of Figure 1). The future changes in population shares by age (upper left part of Figure 1) are taken as exogenous from the population projections provided by the World Bank's Development Data Group. Therefore, we assume that fertility decisions and mortality rates are determined outside the model. The change in shares of the population by education groups incorporates the expected demographic changes (linking arrow from top left box to top right box in Figure 1). Next, new sets of population shares by age and education subgroups are computed and household sampling weights are rescaled according to the demographic and educational changes above (larger box in the middle of Figure 1). In a second step, the demographic changes will impact overall labor supply by age and skill groups. These changes are incorporated into the CGE model to simulate overall economic growth, growth in relative incomes by education groups and sector reallocation of labor (link between the middle and bottom rectangles). Finally, the results of the CGE are passed-on to the re-weighted household survey (bottom link in Figure 1).

Figure 1 GIDD methodological framework



We demonstrate the application of the GIDD by constructing a global baseline scenario extending to 2030 and examining the implications of differential growth in various parts

of the world on the distribution of income *between* and *within* countries. We pay particular attention towards translating changes in macro variables (such as economy-wide wages or consumption per capita, as well changing employment by sector) into changes in welfare at the household level, keeping in mind that we are unable to achieve perfect consistency between macro and micro data in the base year. Nonetheless, we are able to consistently apply the changes in macro aggregates to the income, consumption, and employment variables in the survey data. Our approach identifies specific groups of households that are likely to benefit more than average from the likely patterns of global growth over the next two decades (e.g., skilled workers in fast-growing economies such as China and India) as well as those who are likely to benefit less (e.g., agricultural workers in Sub-Saharan Africa). We also examine the likely outcomes of several alternative scenarios dealing with implications of changing patterns in global trade and migration.

References

Bourguignon, François and Luiz Pereira da Silva (ed.) (2003), "The Impact of Economic Policies on Poverty and Income Distribution: Evaluation Techniques and Tools", World Bank and Oxford University Press.

Bussolo, Maurizio, Jann Lay and Dominique van der Mensbrugghe. (2006) "Structural change and poverty reduction in Brazil : the impact of the Doha Round". *World Bank Policy Research Working Paper* 3833.

Chen, Shaohua, and Martin Ravallion. (2003) "Household Welfare Impacts of China's Accession to the World Trade Organization." *Policy Research Working Paper* 3040, World Bank, Washington, DC.

Ferreira, Francisco H. G., and Phillippe G. Leite. (2003) "Meeting the Millennium Development Goals in Brazil: Can Microsimulations Help?" *Economía* 3 (2): 235–79.

———. (2004) "Educational Expansion and Income Distribution: A Microsimulation for Ceará." In *Growth, Inequality and Poverty*, ed. Anthony Shorrocks and Rolph van der Hoeven. London: Oxford University Press

van der Mensbrugghe, Dominique (2006) "The LINKAGE Model Technical Documentation." Washington, DC: World Bank.