

Appendix: Key Features of the Computable General Equilibrium Model

The inter-temporal computable general equilibrium model underlying the results presented in this report is briefly described here. The model depicts an open economy in which agents consume and produce at each instant of time a manufactured good, an agricultural good, and services. The manufacturing and agricultural goods can be traded internationally, and the manufacturing good can also be allocated to capital. There are three factors of production: land, labor and capital. Labor services are not traded internationally and domestic residents own the entire stock of domestic assets. All three sectors employ labor and capital services with production characterized by constant returns to scale technologies. In addition, agriculture employs land.

Households are of two types: urban households that do not own land and other, mostly rural, households that own land. The only feature distinguishing household type is their endowments of labor, and the assets capital and agricultural land. They otherwise have identical preferences although their levels of expenditure and savings are endogenous to the model.

The model is inter-temporal, and traces adjustments over an approximately 50-year time period. To establish the baseline equilibrium time path for the economy, labor and land productivity and population are assumed to grow exogenously over time. Households maximize the discounted value of their utility subject to an inter-temporal budget constraint, stock of assets, and limits on borrowing. If, at an instant of time, returns to capital are relatively high, the household foregoes expenditures to accumulate assets for future

consumption, with the magnitude of impact depending on their elasticity of inter-temporal substitution. The household's utility is measured as a geometrically discounted flow of future utility.

The model is calibrated to 1997 data and solved under the assumption of no PFC payments. Then, PFC payments are added to the model. They are presumed to be permanent, annual lump-sum transfers from non-land-owning households to land-owning households, and are assumed to be tied to land ownership. Two versions of the model are used in this report. In one, the arbitrage condition between assets is presumed to hold. From the household's perspective, returns to its savings are maximized when the income from one unit of income invested in capital is equal to the return of a unit of income invested in land. Because preferences of both household types are assumed to be identical and homothetic, the negative effects on urban household consumption are just offset through the positive effects on rural households. In the first experiment, therefore, the only variable with aggregate effects is the price of land.

In the second scenario, or sensitivity experiment, the market for agricultural capital can clear at a rate of return different than the capital employed in the manufacturing and services sectors of the economy. Effectively, this assumes segmented capital markets in which the non-land-owning urban households do not invest in agricultural capital over the period of analysis, and the land-owning households are restricted to investment in agricultural capital. In the agriculture sector, PFC payments initially increase investment in agriculture, but declining returns causes households to increase their consumption relative to savings over time and reduce their agricultural investment.