Maize adoption and poverty in Mexico

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III) Abstract

Poverty reduction, hunger eradication, and technology transfer are among the issues high on the global agenda on sustainable development after approval of the Millennium Declaration by General Assembly of the United Nations (UN, 2000). This declaration resulted in formulation of eight Millennium Development Goals (MDG): a set of goals and targets to guide international policies. Some of the most important issues of MDG are poverty, hunger and technologies transfer. These, in developing countries, are strongly linked to agricultural sustainable development at national, regional or local level.

The empirical evidence shows that, on one hand, there is a general consensus between economists and social scientists that technology change contributes to poverty alleviation. That is, benefits from new agricultural technology have influenced the poor reduction directly, by raising incomes of farm households, and indirectly by raising employment, wage rates of functionally landless laborers and by lowering the price of food staples (De Janvry and Sadoulet, 2002; Evenson and Gollin, 2003; Bellon et al., 2006; Minten and Barrett, 2006; Adato and Meinzen-Dick, 2007; Mendola, 2007). The

Mexican experience is: after 40 years of different initiatives, programs and efforts to transfer improved maize germplasm by public and private institutions, in 1996 only about 25% of the total area (7.9 million ha) were planted with modern varieties –maize hybrid and open pollinated varieties (OPV)–, most of this area is located in the commercial production zones of central and northwestern (Morris and López-Pereira, 1999).

On the other hand, maize production represents the primary source of food and income for millions of rural households, however, the productivity of small-scale farmers' maize-based cropping system remain low by global standards (Morris, 1998). Additionally, in 2000 more than 28% of the rural households were considered extreme poor, who lives under poverty line of US$ 53.13 (per-capita/month) (CTMP, 2002). Furthermore, according to FAO (2005) a considerable number of undernourished people live in Mexico, approximately 5.3 million of the total population (100 million) in 2002-2004.

Twelve villages were studied: six in the Coast of Oaxaca and six in Frailesca of Chiapas, both in southern Mexico. The survey was carried out in 325 households, 27 in each village. The small-scale farmers interviewed managed a total of 504 plots with maize. The two regions analyzed are quite different in socioeconomic terms, but the agro-ecological conditions are similar, i.e., the environment is not a determinant of the performance of improved maize varieties. Poverty is persistent in both regions; the headcount index (Foster et al., 1984) shows that 67% and 57% of the small-scale farmers live under the food poverty line of about US$ 36 based on a food basket in Oaxaca and Chiapas, respectively.

This research analyzes the role of improved maize germplasm adoption on per-capita expenditures (as a measure of poverty status) in twelve villages. Since it was not possible to observe a small-scale farmer "before" and "after" maize technology adoption, the research was unable to identify the causal-effect on poverty using a standard methodology. The research then follows a propensity score matching (Rosenbaum and Rubin, 1983; Becker and Ichino, 2002) approach that allows it to compare maize adoption farmers with farmers that do not adopt modern maize varieties. The empirical results show that overall improved germplasm adoption in Chiapas

through the Nears-Neighbor-Matching (NNM) and Kernel-Based-Matching (KBM) procedures had a positive and significant impact on per-capita-monthly expenditure in the range of US$ 14.63 to US$ 11.05. This corresponds to the average per-capita expenditure difference between similar pairs of farmers but belonging to a different technology status. In the same way in Oaxaca, the overall causal-effect of improved germplasm adoption on households' per-capita monthly expenditure is also statistically robust and significant differences in the range of US$ 18.46 to US$ 14.57 for NNM and KBM results respectively.

The empirical results strongly suggest that adoption of improved germplasm is an important mechanism to help rural households to get out of poverty, through enhancement of small-scale farmer's per capita expenditure. The study is well suited to shed light on the discussion of whether maize adoption helps the poorest farmers or not.

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