

# **ROLES AND CHALLENGES FOR SMALL FARMERS**

**And a proposition to study small farmers based on the experience of Mexico under market oriented reforms**

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# Purposes

- To discuss
  - the role, behavior, productivity, efficiency and challenges small farming face to contribute to food security and livelihoods of emerging and other LDCs with reference to Mexico
- I add a proposal to analyze small farmers responses to policy and other exogenous shocks based on:
  - disaggregated economy-wide models (DREMs), and applications of them to rural Mexico

# Trends and small farmers

- Poor performance in agricultural growth since the reforms and NAFTA (early 1990s)
  - However, production of some grains (considered non-competitive under NAFTA) has not decreased, and that of maize has continuously grown
    - this in spite of lower producer prices of basic non-competitive crops until 2006
  - Yields have grown in all farm sizes
- Average farm size has not increased
- “*Collective*” rural land property prevails

# Small farming and rural households

Most of Mexican small farmers are formed by rural households

- producing and consuming food in small plots for self-consumption and the market,
- involved in other economic activities as shown in

**Net Annual Income of Rural Households by Source**  
(2002-2007 average in constant 2002 pesos)\*

<b>Income Source</b>	<b>Average</b>	<b>Distribution</b>
Field crops	6,842	11.95%
Livestock	628	1.10%
Services	10,849	18.94%
Extraction of Natural Resources	793	1.38%
<i>Procampo</i>	2,754	4.81%
<i>Oportunidades</i>	985	1.72%
Remittances U.S.	4,821	8.42%
Remittances Rest of Mexico	1,608	2.81%
Other private&public transfers	1,304	2.28%
Wages, Agriculture	7,716	13.47%
Wages, Non-Agricultural	18,970	33.12%
Total Income	57,270	100%

\* Exchange rate, around 10 pesos per U.S. dollar

Source: National Rural Households Survey (ENHRUM)

# Small farming in Mexico

- Small farmers producing “non-competitive” crops –including subsistence farmers--have prevailed, notwithstanding
  - Producer price reduction and
  - That policy-wise, they have been left largely to fend for themselves
- So, small farming have contributed to food security
- In addition ...

# Roles of small farmers and rural households

- If we consider that small farming is part of a rural household, we can say that as well as producing food, rural households also:
- Provide workers to rural and urban labor markets and to the U.S.
- In addition international migration and remittances provide, respectively,
  - cheap labor to the U.S. economy and
  - hard currency (i.e. U.S. dollars) to the Mexican economy)

# Productivity-Efficiency and farm size

Using panel data of a representative rural household survey for Mexico we found in an econometric study that despite:

- An increasing importance of households' off-farm income,
- policy biases against small farmers, and
- transformations in the supply chain,

Small farmers in Mexico continue to enjoy both, productivity and efficiency advantage

**So our results support the argument that small farmers have helped sustain basic crop production in Mexico.**

**However we this advantage has been eroding**

# Modeling Rural Households Behavior

- We need to understand, and model, how small-holding agriculture behaves and functions, in order to
  - inquire about its resilience,
  - to study its roles and
  - to evaluate appropriate policies for small farming to further contribute to food security.
- It is surprising that the fact that, typically, rural farm households in Mexico (and in other LDCs) take jointly production and consumption decisions is still ignored in policy making and missing in some academic research of LDCs' rural economies.



# Disaggregated Economy-Wide Models

## DREMs

- Proposition: DREMs are an adequate approach for policy design for agriculture and the rural economy
- DREMs are inspired by and extensions of farm household models (HHM)
- DREMs are superior to HHM because they move beyond a microeconomic focus on households and analyzing household-farms' behavior in the context of external market and nonmarket economic relationships in which agricultural households are embedded.
- DREMs are also superior to aggregated CGE since DREMs capture:
  - the double character of rural households
  - the diversification of their income sources
  - Transaction costs/missing markets

# What DREMs capture?

- High transaction costs from outside markets in product and factor may *isolate* some rural households or entire rural local economies that lack access to markets, *limiting or blocking the transmission of price changes* arising from policy reforms.
- However, it is unlikely that a household or a village will be *isolated from all markets*. So policy reforms are likely to affect *directly or indirectly* households' production and consumption decisions through the markets affected by the policy change.
- It is an *empirical question* to evaluate the direct and indirect effects of exogenous shocks in the typical context of
  - heterogeneous rural household,
  - income diversification and
  - high transactions costs in some markets prevailing in most LDCs.

**This has been done building DREMs that combine the strengths of aggregate CGEs and micro, agricultural household models.**

# DREMs applied to rural Mexico

- We have build DREM to evaluate the effects on rural Mexico of various exogenous shocks during economic reforms and NAFTA, as well as to simulate policies aimed to discuss interventions relevant to the development of rural Mexico
- Our simulations highlight how rural market constraints and heterogeneous household responses shape the outcomes of price changes and policy interventions; our experiments also help to make inferences about the roles of rural households under different scenarios
- We calibrate these DREMs with micro ENHRUM survey data for Mexico's rural economy and for its five rural regions.

# DREMs applied to rural Mexico

- The basic model consists of separate micro, agricultural household models integrated into a CGE model of the rural economy.
- The micro models are of household-farms engaged in a variety of economic activities, using diverse technologies.
- The households in our rural DREM include:
  - **commercial farms** on large landholdings (5 has of land or more), integrated in staple markets;
  - **net-surplus producing family farms** on medium and small holdings (2 to 5 has of land), typical of small owner-operated farms of medium productivity;
  - **subsistence household farms** (less than 2 has of land), typical of small-scale, low productivity agriculture, frequently operating under marginal conditions and incomplete markets; and
  - **landless rural households.**

**In our disaggregated model, each household type has its own production technologies and access to outside markets (i.e., transaction costs), as well as its own consumption demands.**

# DREMs applied to rural Mexico

- The disaggregated model includes four different technologies to produce maize, from subsistence farmers using ox-and-plow technology to relatively capital-intensive commercial farmers.
- The DRME also include the facts that
  - households also are engaged in other production and labor market activities that vary from one household to another.
  - households have different access to domestic and/or international migration.
  - In addition, we consider that while commercial maize farmers are integrated with staple markets, subsistence farmers are isolated from markets by high transaction costs for their grain.

# DREMs Applied to rural Mexico:

- Households are assumed to maximize their utility from consumption goods, both home-produced and purchased, subject to cash income, technologies, time, access to migration, and self-sufficiency constraints that set consumption equal to production for subsistence maize households.
- The solution yields a set of demands for labor and land inputs into each activity, including migration, and consumption demands.
- For commercial maize households, the price of maize is given by outside markets.
- For subsistence households, maize production and demand are guided by an internal shadow price that follows from the subsistence constraint.

# DREMs applied to rural Mexico

- General-equilibrium closure equations at the household and village or rural levels determine the (net) *marketed surplus of tradable commodities* as the difference between supply and demand.
- Prices for village tradables are exogenous (marketed surplus from the rural sector is endogenous), *determined by markets outside the rural economy or by policy*.
- Prices of village non-tradables are *endogenous*. If village markets exist, these prices satisfy local market-clearing conditions (marketed surplus is zero), and *individual households are price takers within the village* (household marketed surplus is endogenous).
- For households that *do not participate in village or outside markets*, prices are unobserved household *shadow prices* (household marketed surplus is zero).

# DREMs applied to rural Mexico

## *Effects of a negative maize price market shock*

We built a SAM and a DREM for rural West-Central Mexico to unravel the effects of the reduction of maize prices experienced by Mexico during the first twelve years if NAFTA implementation

- The experiment consisted in simulating a 10% decrease in the market price of maize.

Disaggregated Rural Economywide Impacts of a 10% decrease in Maize Price in Rural Mexico				
Variable	Household Group (Hectares of Landholdings)			
	0	<2	2 to 5	>5
<b>Production</b>				
Maize	0.09	0.12	0.17	-11.76
Cash crops	2.21	0.51	0.48	0.50
Livestock	0.63	0.82	0.62	0.78
Nonag	0.34	0.20	-	0.20
<b>Prices</b>				
Maize	-0.28	-0.24	-0.22	-10.00
Cash crops	0.00	0.00	0.00	0.00
Livestock	0.00	0.00	0.00	0.00
<b>Factors</b>				
Wages			-0.19	
Land rents			-0.42	
<b>Migration</b>				
Domestic			0.20	
International			0.22	

Source: Taylor, Yunez and Dyer, 2005



# ***Effects of a negative maize price market shock***

- Commercial households are directly affected and their production of maize contracts sharply.
- The contraction in commercial maize output decreases the demand for land and labor in this activity.
- As commercial production falls, land rents and wages also decrease
- Lower wages reduce subsistence households' incomes.
  - Other things being the same, the subsistence household demand for consumption goods, including maize, would fall, and with it, the shadow price of maize in subsistence households.
  - This would reduce subsistence production, along with commercial production.
- *However, because land and labor are inputs, lower rents and wages stimulate subsistence production, including maize production.*

# ***Effects of a negative maize price market shock***

- The result is what might appear to be a *paradoxical* positive subsistence supply-response to lower market prices of maize.
- Subsistence production of maize and of other agricultural goods that benefit from cheaper land and labor inputs, as well as activities (primarily livestock) that use maize as an input.
- *The results of our experiment are opposite to those of earlier Nation-wide CGEs used to predict the consequences of NAFTA.*
- They are consistent with the increase in maize production observed in Mexico during the years of NAFTA. Though.

# ***Effects of current maize price surge***

- The cushioning of small household farmers to price shocks also applies to the recent price surge of maize.
- Using a DREM for the whole rural and agricultural economy of Mexico to estimate the effects of recent world maize-price increases on land use and income, Dyer and Taylor (2011) conclude that:
  - Subsistence activities allowed agriculture to absorb the shock, limiting the benefits of higher prices for rural households while keeping deforestation pressures low.
  - The imperfect price transmission, subsistence demands and increased labor costs could limit the surge's impact on land rents in the highly deforested South-Southeast region of Mexico, keeping de-forestation pressures in check.

# ***Effects of improving access to credit***

- Using a DREM built for South-Southeast rural Mexico we simulated the effects of credit penetration for rural household” productive activities.
- We found significant positive effects on rural households welfare even under high interest rates scenarios
- These positive effects would have been higher if *technical change* were incorporated in the physical capital acquired through credit.
- As well as access to financial intermediation, adoption of technical change and innovations by small farmers and rural households is a major pending effective policy requirement in Mexico.

# ***R&D and innovation in agriculture***

## Major facts and problems

- The fiscal effort in R&D is relative low, and poor the effects of these programs
- Lack of systemic linkages between research and farmers (FAO evaluation)...and even more with small farmers
- For small farmers and as for other productive programs, public efforts in promoting technology and innovation adoption is practically ruled out by design, because,
- For example: small farmers often do not have:
  - the characteristics, information and knowledge required to participate in government programs on Tech&Innovation
  - the capital to finance partially the innovation projects

# Final remarks

## The persistence of small farming

Several phenomena explain the persistence of small farming in Mexico (and in other Emerging Countries), notwithstanding market oriented policies and globalization.

- Some of them are interlinked as the following
  - Most of small farmers are part of a bigger decision and heterogeneous making units: rural households with diversified income sources
  - These features, together with transaction costs in the rural economy at the regional and/or national level cushions the effects of external shocks on staple production of subsistence households farms.
- Other phenomenon explaining the resilience of small farming are the agro-ecological conditions of countries like Mexico with high biodiversity (e.g. small farming is located in mountains and in the tropical south-southeast).

# Challenges and future options for small holding agriculture

However, small farming prevalence in Mexico is not granted

- Intensive land use for agricultural production presses forests coverage
- Rural farmers are aging
- Increasing market access of rural households' agricultural production without innovations and technical change can reduce its participation in staple production.

# Policy suggestions

- Based on the 2001 Law for Sustainable Rural Development, Mexico has a legal framework to conduct policies to promote rural-agricultural development
- The Law can be the basis to apply policies
  - from “bottom-up” (i.e. policies designed regionally and locally),
  - based on the provision of public goods,
  - policies that promote research and use of appropriate innovations and technical change,
  - Interventions that extend the coverage of payments for the preservation of forests, etc.
- However these measures have yet to be put into practice, and this requires political will, beginning with that of the actors that intervene in the development decision making processes in Mexico



**Many thanks!**