Introduction

The Ingreso Objetivo program in Mexico pays producers of program crops the difference between the government-set target price and a government forecasted market price established at planting time. The program benefits are available only to producers who sell eligible crops through registered handlers. The program was designed in part to compensate for losses of commercial growers associated with competition with imports and provides no benefits for subsistence growers and those who sell in casual markets.

This research, which was developed explicitly to assist the Mexican government in their review of agricultural policy, simulates the impacts of removing the policy on prices and quantities and welfare of producers, consumers and taxpayers.

The simulations depend on assessments of market supply and demand parameters, but also on modeling carefully some particular features of the multi-commodity program. We consider impacts under market conditions that prevailed in 2005. Clearly, if market prices continue as high as have occurred in 2008, the program has no market or welfare impact.

Figure 1 depicts the textbook analysis of a hypothetical commodity deficiency payment. In the absence of the policy, market clearing price and quantity are p0 and q0. Under the policy regime, the target price, TP, becomes the producer incentive price, inducing production of q1 and a market-clearing price of p1. The payment rate is TP – p1, and the shaded triangle represents the deadweight cost of the policy.

The Ingreso Objetivo policy departs from the textbook treatment in a few important ways. Salient details include the following:

Eligible Crops: maize, cotton, sorghum, wheat, safflower, rice, soybeans, canola, forage wheat.

Eligible producers: only commercial growers of eligible crops who sell through registered handlers—substance growers and those outside mainstream marketing channels cannot participate.

Payment rate: the difference between an administratively determined target price and an administratively determined “market-based price.” The market-based price is the forecasted local, harvest-time cash price as of the beginning of the crop year, and is not subsequently adjusted. Thus the policy reduces to an annually adjusted fixed payment; the incentive price for supply decisions by participating producers fluctuates with market prices, but may be higher or lower than the target price.

Table 1 shows quantities, prices, and policy parameters for the Ingreso Objetivo policy in year 2005. Notably, the payment rate for cotton is in excess of 100% of the market price, and the payment rate for maize is 24% of the market price. Of the supported crops, maize is the most important in terms of government outlays. Also of note, a significant portion of each crop is not supported by the program; only one third of maize production (and much less than one third of maize market price) is supported. The policy has very different implications for supported and nonsupported growers. Thus, it is important in any analysis of the Ingreso Objetivo to evaluate these differences.

Model Details

Supply of Crop j: $Q_j = a_j + \sum \alpha_j P_{MP} + \frac{1}{2} \sigma_j$

Demand for Crop j: $Q_j^d = \beta_j + \sum \beta_j^d P_{MP} + \frac{1}{2} \gamma_j$

Producer Price for Crop j: $PP_j = \left( P_{MP} + P_{MP} \right) f_{eligible\ producers} + \left( P_{MP} - P_{MP} \right) f_{otherwise}$

We model the incentive price (IP) as the actual market price (MP) plus a forecast error; at planting, the incentive price is equal to the expected harvest-time market price, but the actual market price at harvest typically differs from the incentive price due to unexpected supply and/or demand shocks (ZS and ZD) that occur throughout the growing season. In this stochastic setting, the Ingreso Objetivo policy reduces to a fixed payment, but thus does not reduce price variability for participating producers.

Simulated Policy Scenarios to Evaluate Economic Impact

We simulate the model to quantify the effects of the Ingreso Objetivo policy on prices, quantities, and welfare in Mexican crop markets. In particular, we address two questions:

How does the policy affect prices, quantities, and welfare on average (i.e., ignoring supply and demand shocks), and assuming the government-determined incentive price is equal to the harvest-time market price?

How does the policy affect variability of producer prices and revenue in a stochastic setting (i.e., allowing for unexpected supply and demand shocks during the growing season, and allowing the incentive price to differ from the harvest-time market price)?

We calibrate the model to data and economic parameters representing the 2005 situation (Table 1). We simulate the effects of removing the Ingreso Objetivo program on Mexican production, consumption, and farm prices of crops covered by the program and other relevant crops.

Key Findings

Table 2 shows the average annual effect of removing the policy on prices and quantities for the most important supported crop, maize, and for a key non-supported crop, frijoles. Eliminating the policy results in lower maize prices and lower maize production for eligible producers. As a result, market prices for maize rise, inducing increased maize production from non-participants. Some land previously dedicated to corn shifts to non-supported crops, causing a reduction in market prices of these crops.

Simulation of Mexican Crop Markets

We simulate the effects of the Ingreso Objetivo program on Mexican markets for grains and oilseeds covered by the program as well as other relevant crops.

We model supply and demand for maize, cotton, sorghum, wheat, other supported crops as a group (including safflower, rice, soybeans, canola, and forage wheat), and frijoles. All other crops and other agricultural uses of land, either as pasture or fallow land, is in the omitted category that we do not explicitly model. We also distinguish between two types of producers: those who receive Ingreso Objetivo payments and those who do not. We infer cross-price elasticities of supply from observed land use, assuming that the total supply of cropland is fixed and changes in land use are proportional to changes in production. Demand for each crop is specified as a linear function of the market price, with no cross-price effects. We close the model with market clearing conditions on quantities and prices.

Table 1. Ingreso Objetivo Policy Parameters for Selected Crops, 2005

<table>
<thead>
<tr>
<th>Crop</th>
<th>Quantity Produced</th>
<th>Quantity Marketed</th>
<th>Quantity Supported</th>
<th>Market Price</th>
<th>Target Price</th>
<th>Payment Rate</th>
<th>% of Market Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>12,564</td>
<td>1000 MT</td>
<td>65</td>
<td>6,326</td>
<td>33</td>
<td>50</td>
<td>1,136</td>
</tr>
<tr>
<td>Cotton</td>
<td>40,100</td>
<td>1,000 MT</td>
<td>100</td>
<td>141</td>
<td>35</td>
<td>35</td>
<td>4,569</td>
</tr>
<tr>
<td>Sorghum</td>
<td>1,199</td>
<td>89</td>
<td>1,983</td>
<td>38</td>
<td>43</td>
<td>1,096</td>
<td>1270</td>
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<tr>
<td>Wheat</td>
<td>1,014</td>
<td>3,008</td>
<td>12</td>
<td>2,356</td>
<td>78</td>
<td>78</td>
<td>1,607</td>
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</tbody>
</table>

References and Further Reading
