Chapter 5.

Agricultural policies and commodity markets

Introduction

This chapter deals with agricultural policies and their impact on the evolution of the commodity markets in Mexico between 1995 and 2005. The aim is to assess how the different policy reforms undertaken in Mexico may have affected the markets of key agricultural products by identifying the contribution of policies to key market outcomes: production, consumption and trade. First, a brief overview of agricultural markets in Mexico is presented. Then, analysis based on simulations carried out with the Mexican module of the OECD AGLINK model is provided to show how policy changes have affected commodity markets.

The specific policies in question are those that are considered to have affected the evolution of commodity markets most directly, namely the phasing out of price supports and consumer subsidies and the concurrent introduction of PROCAMPO and of payments provided by ASERCA under the Marketing Support Programme and output support schemes mostly via Target Price and Target Income. The focus of the analysis is on certain important commodities in Mexico: coarse grains (including maize and sorghum), dried edible beans,[1] wheat, pigmeat and beef. This analysis does not cover all policies, nor all effects of these policies. Programmes that address rural poverty, market infrastructure and input markets are addressed in later sections of this report. The previous chapter describes the implications of policy changes in terms of economic welfare and of the efficiency of the overall policy mix in increasing the net incomes of farmers.

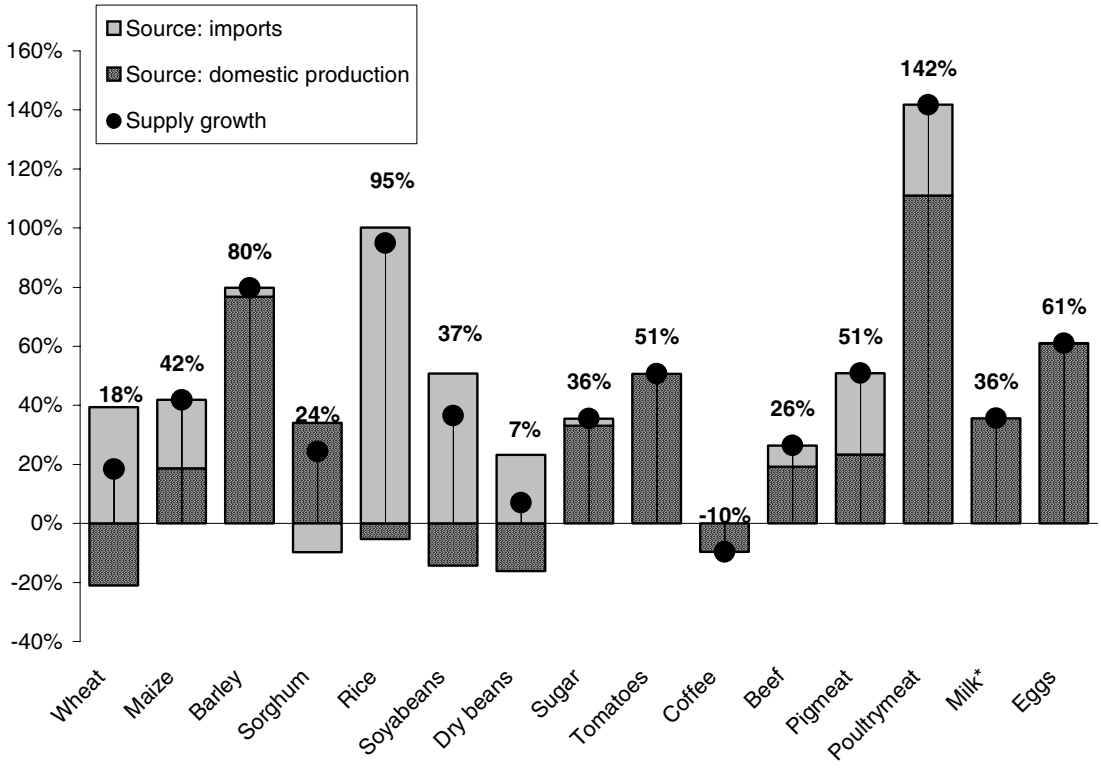
Brief overview of commodity production and consumption

Commodity production and consumption in Mexico were mirror images of one another in the early 1990s. This may have been the intended outcome of policies that prevented substantial trade, or the inevitable outcome for a country where subsistence farming accounts for a large share of agricultural activity. In any case, maize and beans, the primary staples in Mexico, were the principal crops grown, as well as consumed. Nor have these conditions changed fundamentally as a consequence of the reforms, as discussed below. Maize was and is the main agricultural commodity in terms of production, value and crop area. Throughout the 1990s and up to 2005, more area was allocated to maize production than to the sum of other coarse grains, wheat, beans, rice, oilseeds and sugar. Between 1995 and 2005, consumption of many crops and livestock products increased (Figure 5.1). This increase in consumption was met in many cases by

both an increase in domestic production and in imports as for maize, barley, beef, pigmeat and poultrymeat. Over this period, domestic production decreased for wheat and beans. However demand was met by increasing imports.

Commodity trade data over the period shows an increasing role of imports and exports following liberalisation. Of the commodities considered here, large changes were often observed, and often in the direction of greater imports of crops and livestock products. For some commodities, such as tomatoes and sugar, exports increased over the reform period.

Figure 5.1. Contribution of production and imports to the growth in supply of main Mexican agricultural commodities between the periods 1992-1994 and 2003-2005



* Data for milk (fluid milk) include only domestic production.

Mexico's shares of maize, beans, sugar cane and beef production in world production are mostly below 5% and often much smaller (Table 5.1) Beans are the exception: Mexico accounted for 7% of world bean production, on average, between 1990 and 2005. Nevertheless, for all the commodities discussed here, Mexican production levels probably are not large enough to strongly influence world market prices.[2]

Table 5.1. Share of Mexican commodities in world production

	1990-2005	2001	2002	2003	2004	2005
Production						
Sugar cane	3.7%	3.7%	3.4%	3.3%	3.4%	3.5%
Dry Beans	7.1%	6.4%	8.0%	7.5%	7.6%	7.3%
Maize	3.1%	3.3%	3.2%	3.1%	3.0%	3.0%
Wheat	0.6%	0.6%	0.6%	0.5%	0.5%	0.5%
Beef	2.5%	2.6%	2.5%	2.6%	2.6%	2.6%
Pork	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%
Poultrymeat	2.5%	2.7%	2.8%	2.8%	2.9%	3.1%

Source: FAOSTAT.

Looking at food consumption for some important commodities, the importance of maize in the Mexican diet stands out (Table 5.2). Maize consumption per person is more than six times higher than the world average and is slowly rising, whereas in most other countries maize consumption has fallen. Another particularity in Mexico is that per capita consumption tends to be substantially higher for beans and lower for wheat than is the case at the world level. Whereas pork per capita consumption at world level exceeds that of beef, their shares are reversed in Mexico. Beef and pork consumption per capita in Mexico were together about the same as elsewhere in 1992-94, but rose by 4 kilograms by 2001-03 faster than in the world generally. Poultry meat consumption in Mexico, which was already 5 kilograms higher than elsewhere in 1992-94, rose by 75% by 2001-03 versus 35% elsewhere. Mexican fluid milk consumption was about 50% higher than is the case at the world level, both over the period 1992-94 and the period 2001-03, and it increased between 1992-94 and 2001-03 by 6.5 kilograms.

Table 5.2. Food consumption per capita (kg per person)

	Mexico		World	
	1992-94	2001-03	1992-94	2001-03
Maize	122.6	126.4	19.1	18.5
Beans	10.9	10.8	2.5	2.4
Wheat	43.0	37.0	72.4	69.8
Sugar	0.5	0.5	3.9	4.5
Beef	15.9	18.0	10.2	9.9
Pork	10.7	12.7	14.2	15.8
Poultrymeat	13.8	24.3	8.8	12.1
Eggs	11.8	15.8	7.0	8.8
Milk	85.8	92.3	55.1	59.9

Source: FAOSTAT.

Analysis

Using simulations, it is possible to compare the actual evolution of Mexican commodity markets with "hypothetical" ones had agricultural policies evolved differently. This leads to an *ex post* evaluation of the effects of policies on commodity markets. This chapter focuses on explaining the difference between a "No Reform" scenario and the actual "Historical" scenario by looking at the contribution of the different elements of agricultural policy reform introduced by the Mexican government over the period on key market outcomes. The total difference between these two scenarios can be explained incrementally by analysing the outcomes of different scenarios.[3]

Box 5.1. White and yellow maize

Maize is often treated as a single good in commodity models, based on the assumption that varieties can be substituted as relative prices change. While a generally accepted practice for studies of most policies and international trade, the prevalence of white maize in Mexico, rather than the more common yellow maize, calls into question this assumption.

Zahniser and Coyle study the degree to which white maize and yellow maize are substitutable. These authors observe that white maize has softer starch that is more suitable to traditional methods of tortilla production – the maize is first soaked in water and lime, then worked into a wet mass of dough from which tortillas are formed for baking – and can be used for contemporary methods of drying the dough into flour that can be more easily shipped. In contrast, yellow maize is more appropriate for animal feed. However, they find scope for substitution at the margin: white maize can be used as feed, and some yellow maize is of suitable quality to serve as an input into products for direct human consumption, such as chips, flakes and beer.

A succinct description of the four policy scenarios underpinning the analysis of the present chapter is presented below. The scenarios are ordered from a hypothetical "No Reform" scenario to the "Historical" scenario that reflects actual market developments. The focus in the present analysis is on the impact on commodity markets of Mexican agricultural policy reforms. Subsistence agriculture is taken into account for maize but the impact of policies on subsistence farming is not the central point of the analysis. Policies that are not directly linked to agriculture, such as PROGRESA and *Oportunidades*, are not included in the analysis. Finally, any impacts on the prices of goods in foreign markets that might be caused by reforms in Mexico are ignored, which is a reasonable assumption in view of the small share of world production that is directly affected.

The analysis presented in this chapter is organised around a stepwise approach. A "No Reform" scenario has been constructed to reflect what would have happened had certain policy reforms not taken place. Then reform elements are added one after the other to finally reflect the "Historical" scenario, *i.e.* policies that were actually in place during the period 1995-2005. The three intermediate scenarios each corresponding to the introduction of one of the reform elements are the following: "Reduction of Market Intervention", "Progressive Termination of Consumer Subsidies", "Introduction of payments under PROCAMPO". All the scenarios are presented in details below.

Box 5.2. A brief description of AGLINK (model used for analysis in this chapter)

The OECD AGLINK model was used for all subsequent analysis in this chapter. AGLINK is a partial equilibrium model that focuses on the medium-term dynamics of main commodity output markets (of which, wheat, coarse grains, rice, oilseeds, oilseed meals and oils, beef and pork are discussed here) in OECD countries: Australia, Canada, European Union (25), Japan, Korea, Mexico, New Zealand and the United States and in four non OECD countries: Argentina, China, Russia and Brazil. It is a dynamic supply-demand model with special emphasis on how government policies affect the evolution of prices and quantities. Changes in supply and demand decisions because of changes in prices and other factors are determined by elasticities.

Starting from an equilibrium where markets are completely determined by world prices and existing policies in a base period, the model is solved by returning all markets to an equilibrium after the introduction of a policy shock (scenario). The present study focuses on the impact of agricultural policy reforms in Mexico between 1990 and 2005 on agricultural commodity markets. Several changes and improvements to the Mexican module have been undertaken to get a better representation of the Mexican agricultural sector during the period 1990-2005 (See the technical document) and thus to calibrate the model on what actually happened over the period 1990-2005 ("Historical" baseline later called "Historical Scenario"). Several policy shocks in Mexico were carried out to understand the impacts of agricultural policy reforms on Mexican domestic commodity markets.

The results of the experiments presented in this chapter must be interpreted carefully. The historical facts are clear: there is no real dispute about how production, consumption, trade and prices have evolved since 1995. Model-based analysis allows researchers to experiment with counter-factual policy environments in the sense that a certain policy or policy set is imposed in the model that did not occur in fact. All other explanatory factors, such as macroeconomic variables and weather-induced variability in yields, are held at their true, historical values. Thus, the model simulation results can be compared to what actually did occur to estimate the effects of that policy or policy set, without incorrectly attributing the effects of other factors to these policies. In this analysis, the observed historical outcomes are compared to counter-factual simulations with different policy sets to identify the contribution of each component of commodity policies studied here, resulting in comparative statements about the evolution of production, consumption and trade.

Scenario 1: "No reform"

In general, this scenario assumes that elements of the 1992 policy system in place that intervene most directly in specific commodity markets are continued through 2005. This scenario is the most extreme counterfactual case. The market outcomes generated within this policy framework constitute the basis for the comparison for the other four scenarios. In particular:

- Continuation of the system of market intervention with tariffs, import quotas and guaranteed or concerted prices used to maintain domestic prices above world prices, thus generating producer price support.[4]
- Continuation of the system of CONASUPO consumer subsidies for maize, beans, feed products and milk powder.
- No PROCAMPO payments.
- No Payments provided by ASERCA under the Marketing Support Programme and output support schemes, namely Target Price and Target Income.

Scenario 2: "Reduction of market intervention"

When compared to the "No Reform" scenario, this experiment assumes that the system of agricultural policies based on market intervention with price support generated through tariffs, import quotas and guaranteed or concerted prices is progressively reformed according to what actually happened over the period 1995-2005.

Scenario 3: "Progressive termination of consumer subsidies"

When compared to scenario 2, this scenario assesses the impact of a progressive termination of the system of consumer subsidies for maize, beans, feed products and milk powder according to what actually happened over the period 1995-2005. As in previous chapters, only those consumer subsidies associated with agricultural policies are included in this analysis; PROGRESA and *Oportunidades* are not agricultural policies and are not assessed here (see next chapter for a comparison).

Scenario 4: "Introduction of payments under PROCAMPO"

The change in this scenario relative to the previous one involves the introduction of payments under PROCAMPO.[5]

Scenario 5: "Historical"

Finally, scenario 5 assumes the introduction of payments provided by ASERCA under the Marketing Support Programme and output support programmes (Target Price and Target Income). This scenario included all policy changes associated with the reforms that are considered in this chapter – namely reductions in support prices and subsidies to consumption, and introduction of PROCAMPO, Marketing Support Programme and output support. Thus, the market outcomes are those that actually prevailed during the period 1995 to 2005.

After a brief overview of Mexican commodity markets, the remaining part of the chapter will discuss the impacts on different commodity markets of policy reform. First, crops (coarse grains, beans and wheat) will be presented. Second, the evolution of livestock markets (beef and pork) will be reviewed. The contribution of each policy reform to the evolution of key market determinants is described for each commodity.

Crop markets

Coarse grains

Historically, coarse grains have been Mexico's leading commodity both in terms of production and consumption. Coarse grains consumption went up by almost 3% per annum between 1995 and 2005.[6] Two-thirds of rising demand was met by increased production and one-third by imports. Over this period, producer prices fell in real terms for all coarse grains, on average per annum by about 6% for sorghum and almost 8% for maize.[7]

Agricultural policy changes over the period 1992 to 2005 have resulted in lower support to maize production than would have been the case in the absence of reform. The analysis suggests that in 2005, maize production would have been more than 10% higher in the absence of reforms (Figure 5.2.A).[8] The bulk of the difference is explained by the

termination of the producer price support system of border protection and guaranteed producer prices, which eliminated the additional incentives to produce which are inherent in such a system. However, as underlined in the previous chapter this supply response occurs in a context of positive overall welfare implications for Mexico of the elimination of this type of policy. The termination of producer price support had particularly noticeable effects from 1997 onwards. In fact, in 1995 and 1996, actual producer prices were at relatively high levels due to bad weather conditions and the effects of the economic crisis, so the supported producer prices assumed for this experiment would have been below market prices and consequently would have had little effect.

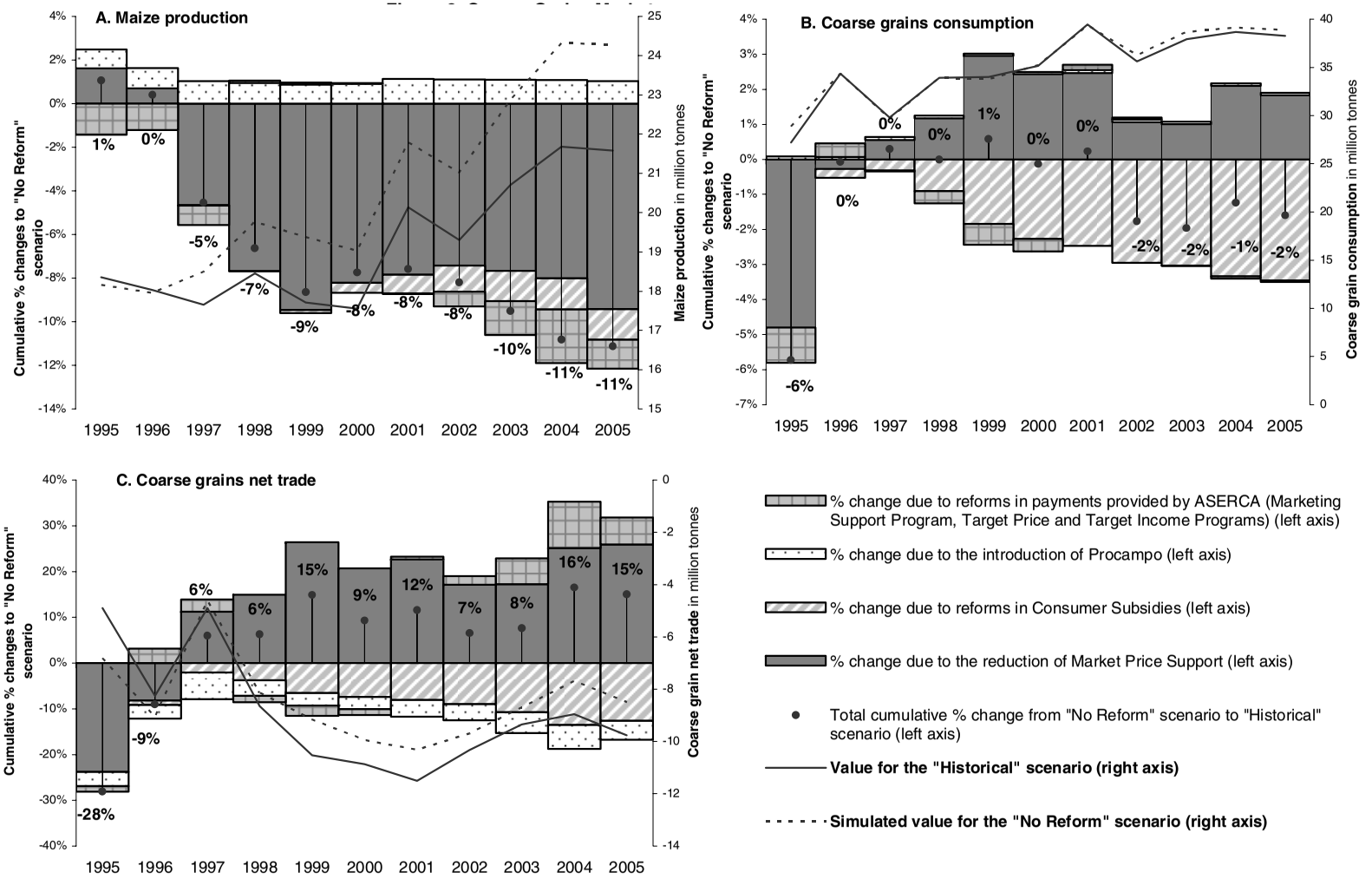
Coarse grain production is estimated to have declined further when the progressive abolition of CONASUPO consumer subsidies is added to the elimination of price support (scenario 3) in comparison with a situation of no policy reform. This is because withdrawing maize consumer subsidies reduces coarse grain demand[9]. The progressive reduction of consumer subsidies at the end of the 1990s implied an incremental decrease in maize production of about 2% in 2005 relative to actual historical performance (Figure 5.2.A).

In 1994, PROCAMPO payments were introduced. These are based on the historical area planted to a specific list of crops, which includes all coarse grains. The effect of PROCAMPO payments is estimated to have been relatively stable and tending towards an increase in production over the period 1994 to 2005. The increase however was relatively small as noted in previous chapter, about 1.5% on average. Whereas other reforms removed incentives to produce maize, PROCAMPO reintroduces at least some incentive and, hence, offsets part of the effect on production.

The Marketing Support Programme run by ASERCA until 2000 provided payments to the first buyers of many crops contingent on their paying a minimum price to producers. The analysis suggests that this programme was more advantageous to other crops than to coarse grains. Thus, according to simulation results, coarse grains demand was reduced slightly. After 2001, payments provided by ASERCA took the form of output support programmes. The Target Price programme was introduced in 2001, and in 2003 was revised and renamed Target Income.[10] Payments under this programme were made not only to coarse grains but also to wheat, oilseeds and other crops. The analysis suggests that their net impact was to reduce maize production. Payments made to other commodities are larger and hence more attractive than the payments to maize. The simulation results suggest that the output support policy has provided an incentive for farmers to move some land into other crops (such as wheat).

According to the analysis, the effect of agricultural policy reforms on total coarse grains consumption (Figure 5.2.B) remains small. The largest impacts are an increase due to the lower prices brought about by lowering tariffs and eliminating the guaranteed prices, and a more or less offsetting decrease due to the gradual abolition of the system of consumer subsidies. Payments under PROCAMPO and output support do not have a direct impact on consumption as they are not consumer-financed. The results of the scenarios suggest that consumption growth over the period 1995 to 2005 would have been relatively similar when compared between the "No Reform" and the "Historical" scenarios. Another reason for the small consumption impacts of policy reforms is that subsistence consumption is an important part of Mexican coarse grains consumption in total. Its response to these policy changes is uncertain and, here, is held unchanged as the focus is on commercial markets. This share is assumed to represent almost one fifth of domestic production over the period.[11]

Figure 5.2. Simulated impacts of the main agricultural policy reforms between 1995 and 2005 on coarse grains market



Reforms are estimated to have increased coarse grains imports over the period 1995 to 2005, reflecting the underlying changes in domestic supply and demand (Figure 5.2.C).[12] Most of the increase in imports is due to the termination of the system of producer price support. The negative effects on coarse grains supply resulting from output support lead to a further small increase in imports between 2002 and 2004. The progressive reduction of CONASUPO consumer subsidies and the introduction of PROCAMPO payments somewhat offset the tendency towards greater imports resulting from other reforms.

To sum up these simulation results, the reforms of agricultural policies have had consequences for the evolution of the coarse grains markets and especially for Mexican domestic coarse grains production. Maize production increased over the period 1995-2005, but is estimated to be more than 10% lower in 2005 than what it would have been in the absence of reform. Again this point has to be seen in the context of the overall beneficial welfare effects of the policies and their reform. On the demand side, coarse grains consumption increased substantially over the same period and reforms did not change this tendency by very much. As a consequence of these trends in supply and demand, Mexico has increased coarse grains imports.

Beans

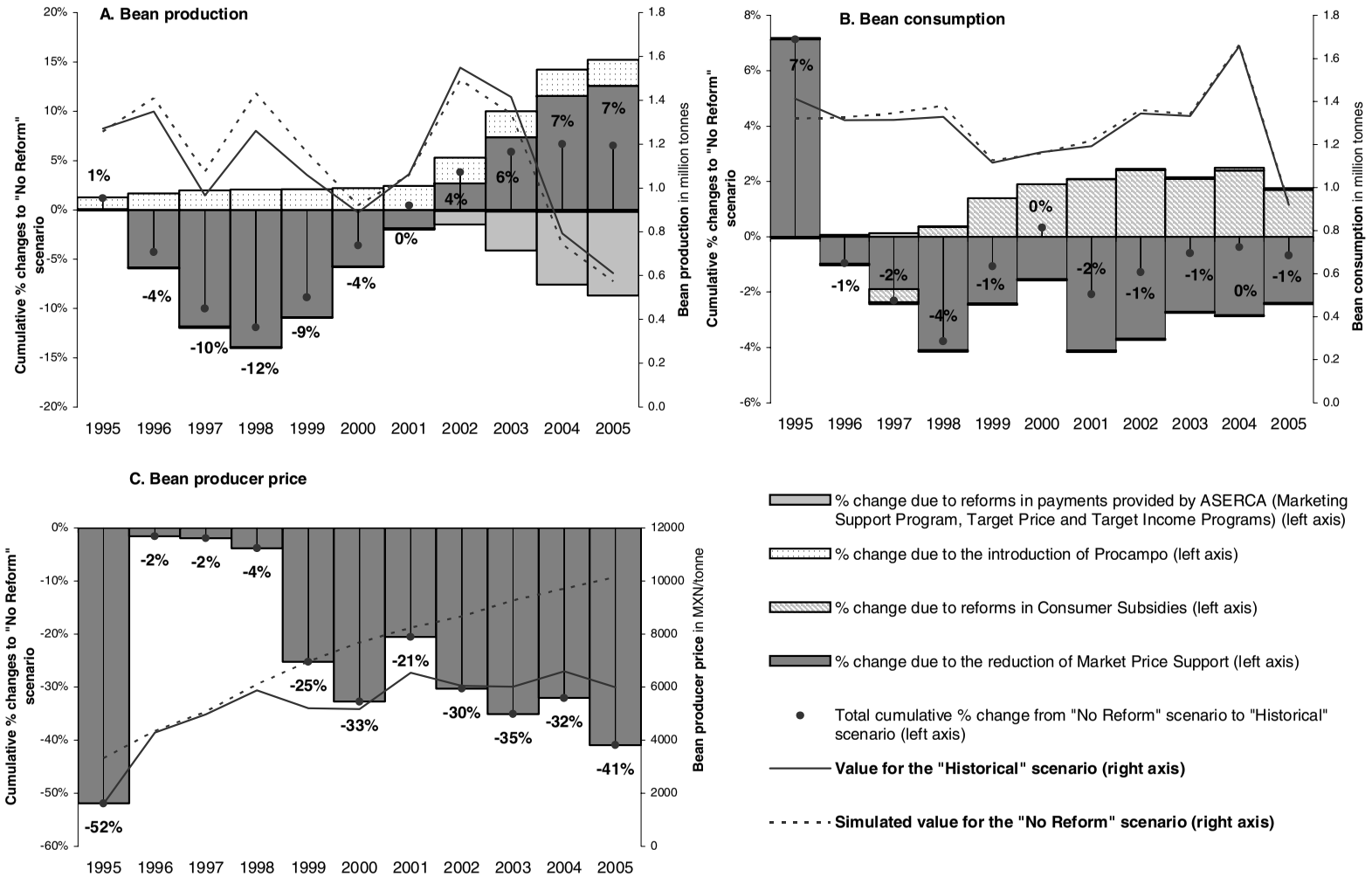
Like maize, beans are a basic element of the Mexican diet, and are widely grown for subsistence consumption.[13] Bean consumption and production between 1995 and 2005 decreased respectively by 1% and almost 4% per annum. Historically, bean trade has been small.

The simulations suggest that agricultural policy reforms initially lowered bean production compared to what would have been the case in the absence of the various policy changes, but had the opposite effect in later years (Figure 5.3.A). Interactions among commodities in terms of changes in production incentives due to the reforms are the main factors behind these results.

Farmers' decisions to produce beans or other commodities are influenced by expected relative returns per hectare, and thus by the evolution of prices among commodities. The reform reduced real crop prices overall, but initially the drop was larger for beans than for other commodities like wheat, drawing resources out of bean production. But as time went by the relative price changes between beans and cereals were reversed and from 2002 onwards, bean production has become relatively more attractive compared to wheat (see Figure 5.3.C for the evolution of bean prices). Thus, according to simulation results, the termination of price supports had the effect of reducing bean production up to 2001 relative to what would have occurred otherwise but, from 2002 onwards, the opposite effect occurred.

The simulated effects on bean production of the historical entitlements payments resulting from the introduction of PROCAMPO are similar to those for coarse grains. These payments give some incentive to increase production, which rises by about 2% on average compared to what would have occurred in their absence. As beans are not included in the commodities covered by the output support schemes, the Target Price and Target Income programmes tend to lower bean production.

Figure 5.3. Simulated impacts of the main agricultural policy reforms between 1995 and 2005 on bean market



The simulation results indicate that bean consumption was not significantly influenced by policy reforms (Figure 5.3.B). The total cumulative impact is estimated to be slightly negative for almost all years in the period 1996 to 2005. In 1995, the important positive differential between bean consumption in the "Historical" case and in the "No Reform" case reflects a particularly strong drop in producer prices in the first year of the reform. For all other years, bean consumption is actually at a lower level than what it would have been without the reforms. Prices of substitutable products like maize remain more attractive even if consumer subsidies are gradually removed.

To sum up, the estimated effects of policy reforms on beans are very much related to the impacts of these same reforms on other crops due to the substitutability in production and consumption. As far as bean trade is concerned, it is difficult to assess the effects of reforms as most of the consumption tends to be produced domestically. In the given policy context, the changes in cereal markets have been bigger that those in the beans market.

Wheat

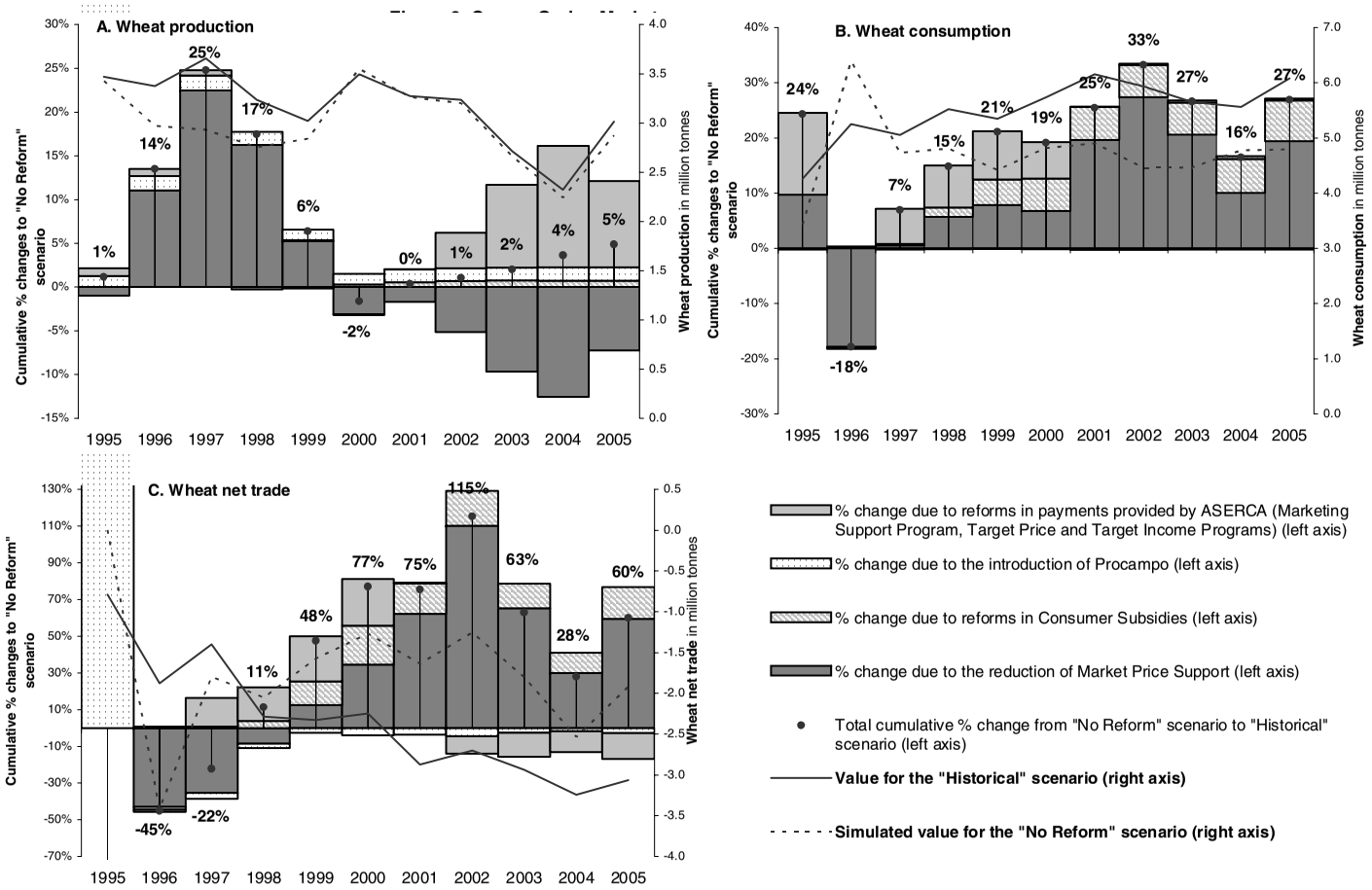
Wheat products are mainly consumed by urban households as an alternative to maize tortilla. Between 1995 and 2005, in context of a fall in prices, wheat consumption increased by more than 2% per annum, while wheat production declined by almost 3% per annum. Most of the consumption increase was thus met by increasing imports. Over the same period, real prices declined by more than 8% per annum.

Reforms are estimated to have slowed the decline in domestic wheat production, but did not eliminate the long term downward trend (Figure 5.4.A). In these simulations, the overall effect of all the policy reforms, in most years, is to increase production. Although the elimination of producer price support reduced returns to wheat production from 2000 onwards, wheat production levels in Mexico have been higher relative to what they would have been in the absence of reforms. To explain the main driving forces behind that result, it is necessary to distinguish two periods: the period from 1995 to 1999 and the period from 2000 to 2004.

In the first period, until 1999, the termination of producer price support meant that growing wheat became more attractive than growing coarse grains. This is because wheat prices were less affected than maize prices in the first years of reform. The introduction of historical entitlement payments under PROCAMPO is estimated to have had small effects, similar to those for other commodities in that it pushed production about 1.5% higher. In the second period, from 2000 onwards, the simulated decrease in wheat producer prices was almost as high as that for maize, and relative returns to growing wheat fell.

According to the simulations, the progressive elimination of CONASUPO consumer subsidies for maize and beans caused demand for wheat to rise, which led to a small increase in wheat production relative to what would have taken place without these subsidies (Figure 5.4.A). The output support under the Target Price and the Target Income programmes are very favourable to wheat relative to other crops, and explain why the total impact on wheat production of all policy reforms remains slightly positive. Indeed, these payments more than offset the decreasing impact on wheat production of the elimination of producer price support.

Figure 5.4. Simulated impacts of the main agricultural policy reforms between 1995 and 2005 on the wheat market



For net trade, the values for the cumulative % changes for the different policies from “No Reform” scenario to “Historical” scenario for 1995 are out of scale.

On the consumption side, reforms are estimated to have an even larger impact than on production, and in any case an impact that is much larger than that for consumption of coarse grains and beans (Figure 5.4.B). Indeed, because of the reduction of producer prices, the elimination of consumer subsidies given to products substitutable with wheat and the Marketing Support Programme until 2000, domestic wheat consumption was almost 20% higher on average for all years over the period 1995-2005 in comparison to a "No Reform" scenario. This effect, in turn, is reflected in growing imports of wheat over the period 1998 to 2005 to meet the increase in demand (Figure 5.4.C).

Overall, the simulated impacts of agricultural policy reforms on wheat markets have been large. This is due to the fact that wheat is a substitute for other crop products and that the relative price differentials, due to reforms, between wheat and these other products has been in favour of substantial adjustments in Mexico's wheat markets.

Crops at the aggregate level

So far the simulated effects of the main agricultural policy reforms on some important Mexican crops have been underlined. This section is intended to extend the analysis by looking at a broader set of crops.[14]

The total value of production for certain crops (coarse grains, wheat, beans, rice, oilseeds and sugar), expressed in real 2000 MXN, is estimated to be on average more than 35% lower during the period 1995-2005 than what it would have been in the absence of reforms (Table 5.3). The main factor behind this result is the end of the system of producer price support brought about by reductions in multilateral tariffs and phasing out bilateral tariffs, as well as the end of the guaranteed price system. The average decrease of prices expressed in real term of at least 30% for all crops lowered the value of production relative to what would have been observed without the reforms although, as discussed in the preceding chapter, the effect on net farm income was smaller. Reforms did not change much the total area devoted to crop production according to these simulations; on average, over the period 1995-2005, area planted to these crops was 2% lower than what it would have been in the absence of reforms. In fact most of the changes in production took place through the reallocation of land between different crops: the area harvested for wheat, sugar and other coarse grains grew at the expense of maize and beans. Thus, not only were farmers compensated by more effectively targeted transfer payments as discussed in the last chapter, but the direct effect on production decisions through output prices did not cause agricultural output to fall.

The termination of the system of producer price support decreased prices paid by consumers for crops while the progressive elimination of consumer subsidies for some crops had the opposite effect. As a result, according to the simulation results, the total value of consumption for crops was on average, over the period 1995-2005, 20% lower due to reforms as compared to what would have occurred otherwise. For some crops, policies offset each other and thus consumption levels for maize, beans, rice and sugar are simulated not to have changed. For others, like wheat and oilseeds, reforms implied a noticeable increase in consumption. These simulated results for crop demand show how the consumer welfare effects of policies examined in the previous chapter were manifest in individual commodity markets; lower costs to consumers allowed them to buy at least as much of each crop as they would have without reforms, but at a vastly lower total cost.

As a consequence of trends in supply and demand for all crop commodities, Mexico was likely to be a net importer of these crops. According to the simulation results agricultural policy reforms increased Mexico's imports of all the crops analysed, except sugar, compared to the levels that would have been imported if the old policy regime had continued.

Table 5.3. Simulated impacts of the main agricultural policy reforms between 1995 and 2005 on the level of production, area harvested, consumption and net trade for certain crops

Maize				Other Coarse Grains				Wheat				Dry Beans				Rice				Oilseed				Sugar				Crops			
Average				Average				Average				Average				Average				Average				Average				Average			
95-05	1995	2000	2005	95-05	1995	2000	2005	95-05	1995	2000	2005	95-05	1995	2000	2005	95-05	1995	2000	2005	95-05	1995	2000	2005	95-05	1995	2000	2005	95-05	1995	2000	2005
PRODUCTION																												**VALUE OF PRODUCTION ***			
Mio tonnes				Mio tonnes				Mio tonnes				Thousand tonnes				Thousand tonnes				Thousand tonnes				Mio tonnes				Billion real 2000 Mxn			
20,6	18,2	19,0	24,3	6,18	4,62	6,09	6,08	2,97	3,43	3,55	2,88	1 132	1 256	921	574	236	239	249	281	128	197	92	131	5,29	4,60	5,15	6,33	**91,2**	**82,2**	**86,1**	**96,7**
19,2	18,4	17,6	21,6	6,78	4,69	6,59	6,88	3,16	3,47	3,49	3,02	1 111	1 271	888	611	223	242	250	201	133	200	103	141	5,28	4,67	5,24	5,97	**58,4**	**73,2**	**48,3**	**43,6**
AREA HARVESTED																															
Mio ha				Mio ha				Thousand ha				Mio ha				Thousand ha				Thousand ha				Thousand ha				Mio ha			
8,1	7,9	7,7	8,0	2,00	1,61	2,04	1,79	654,5	918,7	719,5	556,2	1,68	2,02	1,54	0,70	79	77	83	80	82	133	73	71	589	573	570	592	**13,08**	**13,14**	**12,68**	**11,71**
7,5	8,0	7,1	7,1	2,19	1,64	2,21	2,03	697,1	929,3	707,8	583,3	1,63	2,04	1,48	0,74	75	78	84	58	85	136	80	76	626	573	618	639	**12,76**	**13,28**	**12,24**	**11,16**
CONSUMPTION																												**VALUE OF CONSUMPTION**			
Coarse Grains								Wheat				Dry Beans				Rice				Oilseed				Sugar				Crops			
Mio tonnes								Mio tonnes				Thousand tonnes				Thousand tonnes				Mio tonnes				Mio tonnes				Billion real 2000 Mxn			
35,3	28,9	35,2	38,9					4,73	3,43	4,82	4,79	1 288	1 320	1 160	926	798	574	884	884	2,26	2,40	1,36	1,52	4,89	4,49	4,82	5,00	**98,8**	**89,6**	**92,7**	**102,2**
34,9	27,2	35,2	38,3					5,50	4,26	5,74	6,08	1 282	1 414	1 164	919	797	570	888	885	4,73	3,00	5,11	5,11	4,88	4,44	4,68	5,11	**77,7**	**77,1**	**75,2**	**69,2**
NET TRADE																															
Mio tonnes								Mio tonnes				Thousand tonnes				Thousand tonnes				Mio tonnes				Thousand tonnes							
-8,4	-6,8	-9,9	-8,5					-1,75	0,00	-1,27	-1,91	-113	136	-19	-352	-565	-347	-598	-615	-2,13	-2,21	-1,26	-1,40	311	467	36	199				
-8,9	-4,9	-10,9	-9,8					-2,34	-0,79	-2,25	-3,06	-128	57	-56	-308	-577	-336	-614	-698	-4,59	-2,80	-5,01	-4,98	319	467	21	324				

* The value of production and consumption for crops is the aggregate value of production and consumption of all crops presented in the table.

The value of production is computed as the sum of quantities multiplied by producer price plus eventual output support payments (from the Target Price and Target Income programmes) for each commodity.

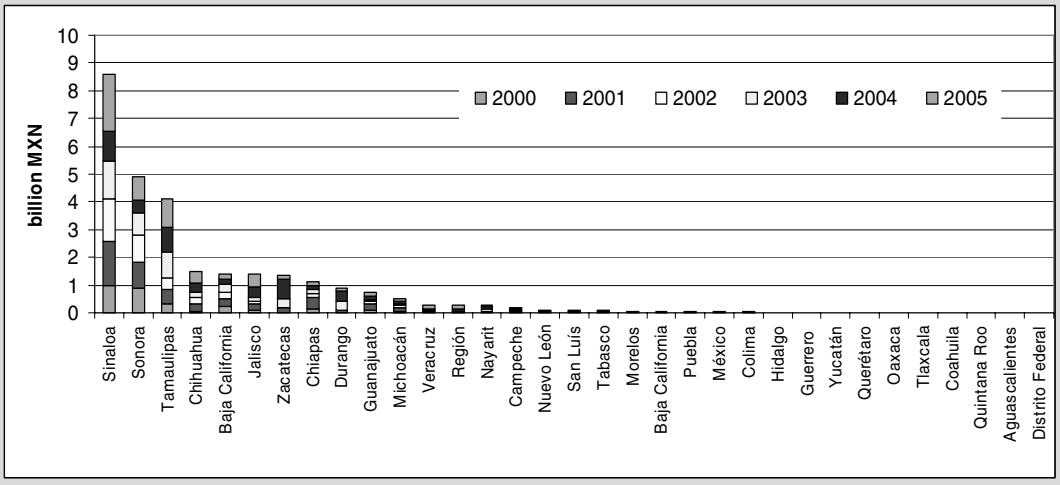
The value of consumption is computed as the sum of quantities multiplied by producer price minus eventual consumer subsidies for each commodity.

Box 5.3. Regional commodity market effects of agricultural policies

The analytical results presented here are based on national data that represent the national markets for these commodities. The results at the regional or state level may differ from these national effects. In some cases, differences are likely because agricultural policy provides greater or lesser subsidies to agents in different parts of the country.

The policy regime in place at the start of the 1990s imposed higher costs on consumers in rural areas who were forced to pay the higher prices caused by tariffs but who did not benefit from the subsidies. Moreover, the interventionist regime of that era tended to harmonise prices among regions despite differences in transportation costs. The Target Income programme in place now differentiates by region only to a limited extent. This programme provides a payment equal to the difference between the announced policy price and the estimated regional price, if any. The nine regions are broadly defined, and the degree to which the estimated price reflects the situation in each area may be questioned. More importantly, the policy price for each commodity is the same everywhere. The benefits are skewed towards a handful of states. Sinaloa received 30% of the total payments between 2000 and 2005. Of the total payments, 62% went to this state, Sonora or Tamaulipas. The ten states receiving the greatest amount of payments accounted for 92% of the total. Thus, the benefits provided by this programme tend not to be equally distributed, and they also mask the price signals that might otherwise encourage better infrastructure linking regional and national markets.

Direct support to producers under marketing support, target price and target income



Fiscal year data.

Source: SAGARPA.

Livestock markets[15]

For the main types of meat consumed and produced in Mexico, no system of purchasing at guaranteed prices was in place in the 1980s and 1990s. Producer prices were mainly influenced by border measures which took the form of import licenses (in the 1980s) and later of import tariffs leading to market price support, as noted in the preceding chapters. The reductions of barriers to trade and of subsidies to feed purchases and to final consumers have changed the evolution of markets for beef and pigmeat over the period from 1994 to 2005.

Beef

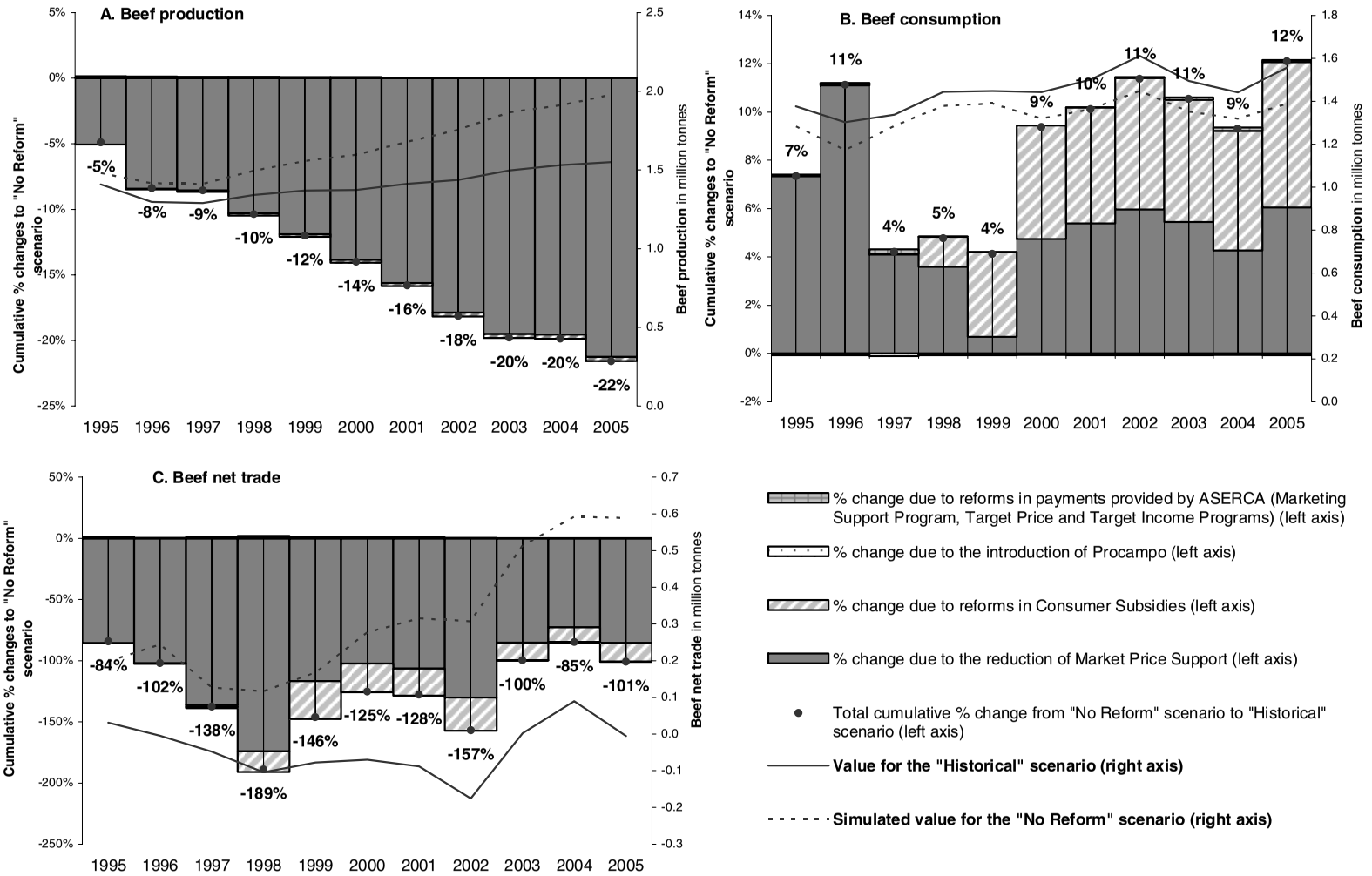
Beef production increased by more than 1.5% per annum over the period 1995 to 2005, while over the same period, beef consumption increased by almost 1.5% per annum. Real market prices decreased by almost 3% per annum.

The difference in beef production between the "No reform" scenario and the "Historical" scenario since 1995 can be explained incrementally by the same elements of the policy reforms (Figure 5.5.A).[16] The reduction of market price support and the progressive reduction of consumer subsidies have cumulative downward effects on beef production relative to what would have occurred without these policy changes, according to the simulation results. In 2005, actual beef production was 22% lower than what it is estimated to have been without reforms. The decrease in market price support, and thus in beef market prices, explains most of the production differential. Subsidies were given until 1999 for feed: this policy was intended to offset some of the higher input costs livestock producers faced as a consequence of the high crop prices These subsidies were gradually eliminated from 1995 to 1999, and their removal explains a further small decrease in beef production when compared to the "No reform" scenario (a further reduction of 0.2%, on average, over the period 1996 to 2005).

Beef consumption during the period 1994 to 2005 has also been strongly influenced by the change in the policy package, according to these results (Figure 5.5.B). Reforms have increased beef consumption on average by more than 8%, relative to what would have occurred without the policy reform, as the reduction of market price support lowered costs to consumers. As maize and beef are substitutable products, the elimination of consumer subsidies for maize creates further incentives to increase beef consumption, although own-price effects are more important.

In the absence of reform, the simulations suggest that Mexico would have remained a net beef exporter and that in any case beef trade would have stayed small in comparison to total production (Figure 5.5.C).[17] Imports would have been lower over the entire period. Ending price support was the most important policy change for beef markets of those considered here. The reduction of consumer subsidies on other agricultural products like maize had the effect of increasing beef demand because prices of substitutable products were higher as a result. As a consequence of these elements of the policy reforms, Mexico is estimated to have increased beef imports relative to what would have been imported if the earlier policies had been maintained.

Figure 5.5. Simulated impacts of the main agricultural policy reforms between 1995 and 2005 on the beef market



Pigmeat

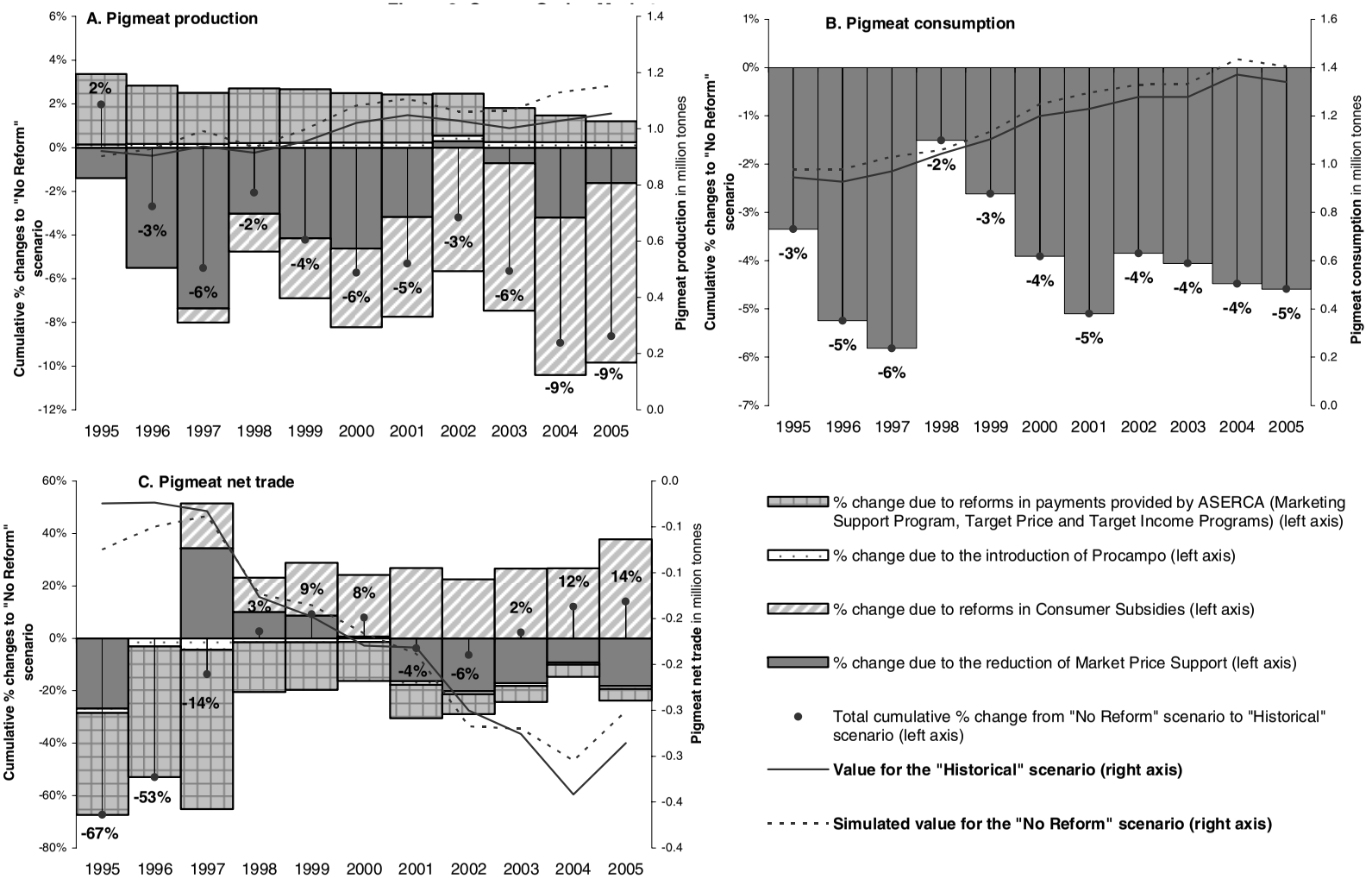
In the past, pigmeat prices for producers and consumers were controlled through border measures and retail price ceilings. Real pigmeat market prices decreased by more than 3% per annum over the period 1995 to 2005. Pigmeat consumption and production increased by more than 4% and 1.5% per annum, respectively, over the same period with imports more than tripling to meet the increasing demand.

The growth in pigmeat production in the period 1995 to 2005 was lower, by about 10%, than what is simulated to have happened in the absence of reforms (Figure 5.6.A). The main contributors were the decrease in market price support and the progressive termination of feed subsidies, with the latter becoming the most important factor over time. The progressive termination of subsidies given for the use of feed products increased costs of production, and reduced some incentives to pigmeat production. According to simulation results, the ASERCA run Marketing Support Programme in place until 2000 had the opposite effect. By decreasing the cost of feed during the transition period, it increased pigmeat production by 2.5% on average over the period 1995-2000. Even after the Marketing Support programme ended in 2001, pigmeat production was still slightly influenced by the programme because of lagged effects on production incentives.

The growth in pigmeat consumption was not affected fundamentally by reforms over the period 1995 to 2005 (Figure 5.6.B). However, the increase in consumption has been smaller than what it would have been without reforms. According to the simulation results, the reduction of market price support had the consequence of lowering consumption by 4%, on average over the period 1995-2005 in comparison to what would have been the case in the absence of reforms, reflecting the lower prices of substitutable products like beef and poultry that stimulated consumer demand for those types of meats.

Reforms are found to have lowered the actual production and consumption levels for pork over the period without changing established trends. Nevertheless, the gap between production and consumption tended to widen as a result of reforms. When compared to what would have occurred without the reforms, imports increased somewhat as a consequence over the period from 1995 to 2005 according to these results (Figure 5.6C).

Figure 5.6. Simulated impacts of the main agricultural policy reforms between 1995 and 2005 on the pigmeat market



Other commodities

The preceding analysis explores at length the effects of policy reforms on certain commodity markets but has not dealt with some other important commodities. The re-orientation of policies has also affected directly and indirectly the production, consumption and trade of these commodities which also compete for resources, including land and labour.

Sugar

There have been important developments in markets and policy for sugar. During the period from 1995 to 2005, sugar production has risen by more than 2% per year and exports have increased by more than 0.6% per year. In total, production is 18% higher and exports 6% higher in 2005 relative to 1995. Consumption has risen by almost 15% in total.

Sugar policy reform during this period has not been as profound as for other commodities. Market price support caused by barriers to trade continues to represent an important share of total gross farm revenue from sugar, and input support continues as well. There is no inconsistency between growing exports of this commodity and a domestic price in excess of world price levels: agreements to reduce bilateral tariffs have generated preferential opportunities for Mexican sugar exports to markets where prices are also supported.

Poultry and eggs

Poultry meat production has grown steadily since the currency crisis of the middle 1990s, rising by almost 7% per annum over the period 1995 to 2005. As noted earlier, Mexico has become an important producer in world terms, and almost all of production is consumed domestically. Consumption of poultry in Mexico has doubled from 1995 to 2005. Prospects for export growth may be significant if the final steps to meet standards of major foreign poultry markets are completed, as some observers expect. As in the case of sugar, poultry policy continues to provide some market price support and input subsidies, although the sum of these transfers represent a much smaller share of gross farm income.

Egg production has increased by more than 60% between 1995 and 2005. As in the case of poultry meat, eggs are produced mainly for domestic consumption. However, policies directed to producers are limited to some subsidies to inputs, without any contribution from market price support.

The reduction of producer price support for crops which, in turn, lowered the cost of feed, which is a key input for poultry operations affected the incentives of poultry and egg producers In light of the large decreases in real prices noted earlier, some part of the increase in production of these goods is attributable to the reforms to tariffs and guaranteed prices on feed products.

Fruits and vegetables

Production of fruits and vegetables in Mexico has grown over the period, as noted in Chapter 2. By 2005, fruit production had grown by more than 15% and vegetable

production by more than 35% relative to 1995, corresponding to 1.5% and almost 3% growth per year. Also noted in Chapter 2, the value of exports of certain fruit and vegetable products is large – tomato, fresh and frozen vegetables, avocado and pepper are all in the top ten exports in recent years – likely in part a result of multilateral and bilateral tariff reductions. Other than barriers to imports, fruit and vegetable policies were limited even before reforms took hold: CONAFRUT support to the industry ended in 1993, but was largely restricted to disseminating information by that time in any case; and until 1990 exports of most fruits and vegetables required permission from the National Confederation of Horticultural Producers (CNPH) which sought to control quality of exports and quantities sown. Policy reforms relating to other commodities may also have indirectly encouraged fruit and vegetable production. Whereas lower trade barriers for these products may not have had very strong effects on domestic prices, the larger price reductions caused by reform to more distorted commodity markets may have encouraged producers to shift resources towards fruits and vegetables.

Impacts further down the food chain

Chapter 2 noted that the growth in the primary commodity sector is less than growth in the agro-food sector, indicating stronger growth in food and drink processing. The links between reforms to commodity policy and that growth are not explored here.

Conclusion

Results of this chapter identify the effects of the main elements of the agricultural policy reforms on selected commodity markets. The policies examined are the lower producer price support brought about by the reductions to barriers to trade and termination of the guaranteed price system, the elimination of consumers subsidies and the introduction of payments run by ASERCA (the marketing support programme and output support programmes, namely Target Price and later Target Income, and PROCAMPO). The main conclusions that can be drawn from this chapter are the following.

Without these elements of the reforms, the evolution of production and consumption would have been similar to those that actually prevailed during the period 1995 to 2005. According to estimated results, reforms changed the actual levels of Mexican production and consumption for most commodities, but not the directions.

The overall effects of these agricultural policy reforms have been to lower production levels for most commodities when compared to what they are estimated to have been without reforms. These lower levels of production have to be seen in the context of the positive welfare implications of policy reforms underlined in Chapter 3. The reform of the system of market price support is the main contributor to the overall impact of policy reforms. This element of the reform decreased incentives to plant maize and beans, and to produce beef and pork. In contrast, the effect on wheat production was positive on average because of the smaller effect of reforms on wheat producer prices compared to other crops between 1995 and 1999; or, alternatively, because wheat prices were less distorted by the pre-reform policies. The progressive withdrawal of consumer subsidies under CONASUPO has mostly had an effect on pigmeat production because some of these subsidies were actually feed subsidies. By increasing livestock costs of production, ending subsidies to feed use has decreased incentives to produce pork. Payments based on historical entitlements under PROCAMPO had small effects on increasing the level of

production of crops, the greater effect being on bean production. Finally, output support payments under the Target Price and Target Income provided the greatest support to wheat production; they thus skewed incentives towards wheat production rather than other crops.

These agricultural policy reforms had little effects on consumption of most commodities, except wheat, oilseeds and beef. Where consumption fell, as in the cases of coarse grains and beans, the quantity at the end of the period was less than 1% lower than it is estimated to have been without the reform. In these two cases, the reduction of market price support reduced prices, but the termination of the system of consumer subsidies under CONASUPO cancelled out this effect. Indeed, the end of the system of concerted prices has lowered prices of other crops substantially more than those for beans. But the resulting negative effect on bean consumption has been counterbalanced by the termination of consumer subsidies, which benefited maize consumption more than that of beans. Changes in agricultural policies caused an increase in wheat consumption: wheat prices fell relative to prices of other staples (due to the reduction of consumer subsidies in favour of other crops, due to the general reduction of market price support and due to the introduction of the Marketing support Programme that was favourable to wheat), and consumers responded accordingly. Consumption of beef was significantly greater than what it would have been without reforms whereas pork consumption was significantly smaller. This result once again reflects relative price movements and the substitutability of meat products in consumption.

The simulated changes in production and consumption levels due to agricultural policy reform have resulted in Mexico increasing net imports of most of these commodities relative to what would have otherwise taken place.

The analysis of this chapter focuses on policies that intervene most directly in commodity markets, but these results are not all inclusive: many policies are excluded from this analysis, as are many benchmarks of performance. The analysis of the previous chapter also assessed the effects of certain other important policies, such as input subsidies, and provided measures of welfare, including net farm income. Later chapters address policies relating to natural resource management and infrastructure development. Another measure of success, the distribution of benefits and the contribution of agricultural policy to rural poverty alleviation, is reserved for the next chapter.

NOTES

1. Dry edible beans are called beans in this chapter.
2. The analysis presented in this chapter therefore is based on the "small country" assumption.
3. In this chapter, as in the previous one, subsistence maize farmers are treated differently than commercial maize farmers. Subsistence farmers are not assumed to respond to prices when deciding their production quantity; a change in market prices is not necessarily transmitted to subsistence farmers, and it is difficult to know how these net maize buyers would adjust their production decisions in response. Thus, in the analysis of this chapter, subsistence maize production is held exogenous, or unchanging, with respect to market prices and policy signals.
4. Producer prices are maintained at their average 1990-1994 levels in real terms. Obviously this assumption on prices is not economically and politically realistic, but it is a proxy for what could have happened in the absence of reform of the system of market intervention in Mexico. The technical note to this document describes how the scenarios have been constructed.
5. Payments under PROCAMPO are classified as payments based on historical entitlement. As already mentioned it is important to note the problem of allocating payments based on historical entitlement to specific commodities. The technical document describes how this payment has been taken into account in AGLINK.
6. The growth rate used here and in the rest of this chapter is the least square growth rate. This growth rate, r, is estimated by fitting a linear regression trend line to the logarithmic annual values of the variable in the relevant period, as follows: $Ln(xt)=a+r*t$.
7. The source of all data presented in this chapter is the AGLINK database unless otherwise specified.
8. Figures 5.2 to 5.6 use the same template and focus on the evolution of a specific commodity outcome (production, consumption, net trade or price) over the period 1995-2005. The doted and full lines represent, respectively, the value of the outcome for the "No Reform" scenario and the actual value of the outcome ("Historical" Scenario). The bars indicate the contribution of policies (in percentage change) to the difference between the "Historical" scenario and the "No Reform" scenario.
9. As a result, over quota import demand through import licenses is also affected negatively.
10. As noted in Chapter 2, output support program per individual per crop is subject to certain limits. However, as in the previous chapter, the potential that these limits are binding is ignored. Should such limits effectively curtail the amount an individual is paid, then that individual's incentive to increase production of that crop further would be limited and the effects would be reduced.

11. See details in the technical note on the determination of the share of maize production that is used for subsistence. It is important to note here the paucity of data – as the 1991 census is the only source apart from various subsequent surveys – and that there is a range of legitimate definitions of "subsistence agriculture".

12. In this figure, a negative sign for the net trade number indicates a net importer situation.

13. An extensive variety of beans is grown across Mexico. The preferred varieties are the most commonly traded. In the present study, the different varieties of beans are aggregated in a single commodity. Consequences of policy reform could vary for different varieties to the extent that there is little substitution in production or consumption with other beans.

14. Model results for all coarse grains (including maize and sorghum), wheat, beans, rice, oilseeds and sugar are presented here. The evolution of certain other commodity markets, as well as the sugar market, is discussed in general terms later in this chapter.

15. Poultry and eggs are important livestock products for Mexico in terms of production and consumption. However, as the structure of the Mexican module of the AGLINK model does not permit the study of the consequences of the different reform scenarios on poultry and eggs trade and production, the impacts of policy reforms on poultry and eggs markets are not included in this analysis. However, the evolution of poultry and eggs markets between 1995 and 2005 is presented later in this chapter.

16. Land for which there is an entitlement to PROCAMPO payments may be used for pasture and retain eligibility, but there is little evidence that much conversion has taken place, as noted in the next chapter, and any positive effect is likely small, and ignored.

17. Trade of beef includes live animals and meat.

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