THE EFFECTS OF NAFTA IN A CHANGING ENVIRONMENT

by

Sherman Robinson
International Food Policy Research Institute

Karen Thierfelder
U.S. Naval Academy

November, 1996

1. INTRODUCTION

Agriculture was a difficult sector to liberalize under the North American Free Trade agreement (NAFTA) for a number of reasons. First, there was an interdependence between trade policies and domestic farm programs. While Mexico had initiated farm program reforms prior to NAFTA, it still used import quotas in conjunction with its guaranteed price support program for corn and beans. For Mexico, free trade therefore posed the possibility of a collapse of its corn sector in Mexico, and a migration of rural workers to both urban areas in Mexico and to the United States. The expansion of Mexican horticulture exports as the U.S. eliminated tariffs would stimulate this sector in Mexico, but it could not expand fast enough to absorb displaced corn labor.\(^1\)

In addition, there were sectors in both countries that were sensitive to competitive pressures under free trade. U.S. producers were concerned that Mexico's lower labor costs would mean a dramatic increase in some imports once U.S. tariffs were eliminated. As a result, there are safeguards under NAFTA for U.S. and Mexican imports of selected commodities, with 10-15 year periods for transition to free trade.

At the macroeconomic level, there were expectations that NAFTA would stimulate investment in Mexico. As a symbol of Mexico's commitment to free markets, NAFTA was expected to reassure both Mexican and foreign investors. In the short run, this was expected to create a current account deficit as the peso appreciated. As Mexico's income increased, there would be benefits to the U.S., Mexico's primary trade partner.

When NAFTA was initiated, there were a number of policies in place that helped to shape these expectations. The U.S. had a deficiency payment program to support grains and oilseeds. This program stimulated production and increased exports to Mexico, particularly in wheat and corn. The elimination of Mexican trade barriers would provide an additional outlet for U.S. production of program crops. Continuing its movement toward free markets in agriculture, Mexico was considering alternatives measures to support rural labor. In October 1993, it announced PROCAMPO, a direct income transfer program, that would replace its guaranteed price program. The program decoupled output decisions from government support, eliminating distortions that biased Mexican agriculture toward corn.

Recently, the policy environment for NAFTA has changed. In 1996, the U.S. adopted the Federal Agricultural Improvement and Reform (FAIR) Act, which eliminated its deficiency payment program. Under the new U.S. program, farmers receive a direct income transfer which is not linked to production decisions. Also, in 1996, Mexico announced

\(^1\) See Josling (1992) for a review of the anticipated effects of NAFTA on agriculture, and CBO (1993) and Ramirez (1992) for more general perspectives.
additional farm programs to improve overall efficiency and competitiveness in agriculture. Most of the programs under the new Alianza para el Campo (Alliance for the Countryside) relate to infrastructure and extension-type assistance, and are designed to improve agricultural productivity. Independently, the Mexican peso crisis of 1994 has encouraged an outflow, rather than an inflow of foreign capital.

In this paper we analyze the effects of NAFTA, given changes in the environment in which trade liberalization is being implemented. We use a computable general equilibrium (CGE) model of the U.S. and Mexico with detailed agricultural sectors and policies. The agricultural policies are modeled explicitly rather than as fixed \textit{ad valorem} price wedges. We also model migration flows within Mexico and between Mexico and the U.S. There are 25 sectors in the model, ten are farm sectors and eight are food processing sectors. The base data are for 1993.

To decompose the effects of each policy shock, we first consider each shock--NAFTA, PROCAMPO, and the FAIR act--independently. We describe the changes in agricultural output, trade, and migration that each shock introduces. Then we consider the policy shocks simultaneously to simulate the effect of NAFTA in the new, 1996 policy environment. Finally, we consider the sensitivity of our results to alternative assumptions about gains in Mexican agricultural productivity under the Alliance program, and to changes in the world price for grains and oilseeds.

The remainder of the paper is organized as follows. In section two, we describe the farm programs currently operating in each country. We describe the core CGE model in section three. Our simulation results appear in section four and the conclusions follow in section 5.

2. AGRICULTURAL POLICIES IN MEXICO AND THE U.S.

\textbf{Mexican Domestic Farm Programs}

Mexican agricultural policies have undergone fundamental change during the 1990's. In the past, Mexico supported its agriculture through an extensive and complex system of subsidized inputs, guaranteed producer prices, subsidized retail food sales, and high import barriers. Beginning in 1991, Mexico began to reduce its support to the agricultural sector, and the direct role of the government in purchasing, storing and distributing agricultural commodities. Government subsidies to millers and import barriers, which were jointly used to maintain high producer prices, remained in place only for key commodities, including corn, beans, and wheat (table 1).\footnote{Note that price support in table 2 is not actual government expenditure, but is calculated indirectly, using the standard PSE approach of measuring the difference between}
Mexico’s accession to NAFTA in January 1994 meant that import barriers could no longer be used as one of its main instruments of farm support. Yet, because of the large proportion of the Mexican labor force employed in farming, the immediate exposure of its agricultural sector to market forces was undesirable. In response, Mexico adopted the PROCAMPO program in October 1993. PROCAMPO is a 15-year long support program designed to provide a transition from a system of guaranteed producer prices to an open market. PROCAMPO replaced high support prices for crops with direct payments to producers. The effect is that crop allocation decisions are a function of relative market prices, rather than government policies. PROCAMPO provides direct income support payments based on historical acreage planted to nine eligible crops: corn, beans, wheat, cotton, safflower, soybeans, sorghum, rice, and barley. The program was phased in during 1993-1995, while some guaranteed price support was maintained. In spring, 1996, the Mexican government declared the full implementation of PROCAMPO. The 1996 level of direct payments is fixed in real terms through the 10th year of the program (in 2006), and will be gradually eliminated in years 11 through 15. In 1996, PROCAMPO paid farmers 484 pesos per hectare, totaling 7.075 billion pesos ($943 million) on 14.9 million eligible hectares (table 2).3

In 1996, Mexico announced various additional programs targeted toward upgrading the physical and technical resources and improving the overall efficiency and competitiveness of Mexican agriculture. The Alliance for the Countryside is an umbrella grouping of several programs, including PROCAMPO, PRODUCE, and others. Most of the other programs under the Alliance program relate to infrastructure and extension-type assistance, and are designed to improve agricultural productivity.

The “PRODUCE Capitaliza” is a five-year program composed of three main elements: a fertigation program, mechanization of the countryside; and a program to improve pasture quality for livestock producers. The program for fertigation—a high-tech system of using the irrigation canals for delivering liquid fertilizer—is aiming to equip 95,000 hectares in 1996, the first step in a six-year goal of nine million hectares. Areas with high salinity levels will be

world and domestic prices adjusted for transportation, marketing, and CIF margins, multiplied by domestic output (USDA, 1994).

3 ASERCA, the government price-setting agency, continues to announce guaranteed government purchase prices for corn, wheat, sorghum, and beans. These prices have been below market prices, so farmers have not relied on government purchases. CONASUPO, the government agency for the purchase and distribution of crops, has paid more than the announced government prices, in order to compete with the private sector to purchase commodities used in subsidized food programs and for strategic stocks. In 1996, when sorghum prices fell, CONASUPO also purchased sorghum at above the announced guaranteed prices, to provide limited market support.
targeted, with 35 percent of the costs covered by the Federal government, 10% more by the state, and the remainder by producers. The mechanization programs will support the purchase of 4,500 new tractors, repairing another 9,000 and buying precision planting equipment. The government is offering a 20 percent subsidy for purchase and 30 percent for repairs, with the state government contributing a further 10 percent, although there is a limit of 20,000 pesos ($2,666) per farm. The pasture project seeks to improve the nutritional capacity of Mexican livestock operations, by digging new wells, improving the varieties of forage grown, and other small infrastructure projects. The goal is to improve 125,000 hectares in 1996 and up to nine million total over six years, using a 40 percent Federal government subsidy and 10 percent more from the state. Within the next five years, PRODUCE Capitaliza could have a very important effect in raising crop yields and production efficiency in the livestock sector.

A technology transfer program will provide education, equipment, and extension services for producers of coffee, rubber, dual-purpose cattle, and oilseeds. For supporting coffee production, nearly $100 million in credit will be made available in 1996. The oilseeds program will seek to convert up to 400,000 hectares currently planted to corn and dry beans to higher productivity oilseed crops.

Two sector-specific programs--one for meat and one for milk--will operate simultaneously with PRODUCE. The program to promote meat production will also fund the establishment of pastures, including seeds, fencing, watering troughs, with 50 percent paid for by the Federal and state governments. Purchase of dual-purpose cows will receive a subsidy of $100 per head on up to five cows for producers with a herd size of 50 cows. Artificial insemination will be supported for about $13 per animal. The milk production program aims to boost national milk output by 10 percent, through new animals and better feed supplies. The Federal and state governments will support 45 percent of the costs of fertigation for fields dedicated to sowing forage and feed grains, and 45 percent of the cost of new dual-purpose cows. A further $11 million will go toward improving milk collection and distribution plants and the basic structure to improve marketing.

Two new technical assistance programs have been initiated for grains. One program will hire 10,000 extension agents with the goal of improving the planting density (number of seeds sown per hectare), the varietal selection, and the control of disease. The “Kilo por Kilo” program will exchange 3,500 tons of certified seed for a similar quantity of lower-yielding native seed, benefiting 200,000 hectares in 1996. Over six years, the program could cover all 2.5 million hectares of good dryland corn area (out of eight million total hectares). However, Kilo por Kilo is a one-time exchange designed to show Mexican corn farmers the benefits of using certified seed. The program will be rotated to new area each year. Certified hybrid corn seed cannot be saved and used the following year, so many farmers will likely revert back to the lower-cost native seed. As of yet, no provisions have been made to provide farmers with credit or subsidies to buy certified seed year after year, although they could of course use the PROCAMPO payment for that purpose. These one-time aspects of Kilo por Kilo will limit its effectiveness in raising corn output. Eventually, the program will also be
extended to dry beans and wheat, although in a much more limited fashion.

The ongoing drought throughout northern Mexico has prompted a number of actions to shore up the water distribution system and reduce loss of that scarce but necessary resource. In April, the Mexican government announced a $150-million Drought Action Plan, up 55 percent from 1995’s assistance level, mainly to assist livestock producers with feed costs. The National Water Commission has about $21 million, of which half comes from states and producers, to rehabilitate 1,260 wells and improve water management for 13,720 hectares. In the state of Sinaloa, where drought prevented any planting on irrigated land in the Spring/Summer 1996 season, the $4.4 million in PROCAMPO payments are being used to modernize Sinaloa’s irrigation system by lining the canals with cement, re-equipping wells, and drilling new wells for livestock producers.

**U.S. Domestic Agricultural Policies**

As in Mexico, agricultural policy in the U.S. has undergone dramatic change over the past decade. Beginning with the 1985 Farm Act, and continued in the 1990 legislation, government support levels were reduced, and the link between production decisions and market price signals strengthened. In 1985, important measures of the Food Security Act were the reduction of target prices and freezing of payment yields. In the 1990 legislation, payment acres were reduced, and planting flexibility was increased with the introduction of up to 25 percent of producers’ base program acreage as “flex acres.”

In April 1996, the U.S. adopted the FAIR Act. The Act marks a fundamental shift in U.S. farm policy, from coupled support, to a decoupled payment to farmers in a more market-driven agricultural sector. The FAIR Act replaces the deficiency payments/supply management program that in 1995 covered wheat, rice, feedgrains, and upland cotton, with a program of fully decoupled payments that are not related to farm level planting decisions or to market prices. The payments, capped at about $36 billion over 1996-2002, will decline over the 7-year program. The direct payment expenditure in 1996 is set at $5.8 billion, declining to $4 billion in 2002 (table 3).

---


5 Under the normal flex acreage provision of the 1990 Farm Bill, payment acreage was reduced 15%. Producers could not receive deficiency payments on this acreage, but could plant any crop on the acreage, except fruits and vegetables. Under optional flex acreage, producers could also plant up to an additional 10 percent of their program base acreage to other crops, again excepting fruits and vegetables, without a reduction in crop acreage bases on the farm. Optional flex acreage was eligible for deficiency payments when planted to the program crop.
Under the FAIR Act, funding on export promotion programs is reduced, with more emphasis placed on targeting markets with the greatest potential for U.S. exports, and on high value and processed agricultural products. Also under the Act, support for sugar and peanut producers are reduced, and dairy price supports are phased out.\textsuperscript{6}

Two important elements of the U.S. price support program were the Acreage Reduction Program (ARP), and the Conservation Reserve Program (CRP). The ARP Program was a voluntary land-retirement system under which farmers idled contractually specified shares of their crop acreage base. The ARP is discontinued under the FAIR Act, bringing about four million acres back into production. Under the CRP program, farmers agreed to convert environmentally sensitive lands to approved conserving uses in exchange for government payments. The CRP, which held 36.4 million acres out of production in 1995, is continued under the FAIR Act.

\textit{Trade policies Under NAFTA}

The NAFTA agreement in agriculture provided for immediate elimination of tariffs and other restrictions for many commodities. For certain other products, a 5-10 year phase out period was permitted. A few commodities are subject to a 15-year phase-out of trade barriers. Extended protection over the 5-15 year time period is in the form of tariff rate quotas (TRQs). Under NAFTA, TRQ’s permit a specified quantity to be imported duty free, with quantities above that quota to be assessed a tariff equal to the tariff equivalent of the pre-NAFTA quota. Commodities covered by TRQ’s for the full 15-year period are U.S. imports of selected fruits and vegetables, and Mexican imports of dry beans, corn, dry milk, orange juice, and sugar.

3. \textbf{CORE 3-COUNTRY CGE MODEL}

\textit{Model Structure}

We develop a 25-sector, multi-country computable general equilibrium model composed of two single-country models linked through trade and migration flows.\textsuperscript{7} The

\textsuperscript{6} See Young and Shields (1996) for detailed description of the changes in the sugar, peanut, and dairy programs.

\textsuperscript{7} Our model is an extension of the CGE modeling undertaken at the USDA, which began with a single-country model of the United States to analyze the effects of changes in agricultural policies and exogenous shocks on U.S. agriculture. See Robinson, Kilkenny, and Hanson (1990). See Kilkenny and Robinson (1990) and Kilkenny (1991) for an extension of that model to include detailed U.S. farm programs. See Hinojosa and Robinson (1991) and Burfisher, Robinson, and Thierfelder (1992) for earlier versions of the U.S.-Mexico model used in this paper.
model follows the standard neo-classical specification of trade-focused CGE models. Robinson, Burfisher, and Thierfelder (1992) provide a detailed description of the CGE model specification. Only the agriculture-related features of that model are described here.

The model has seven factors of production: capital, two land types, and four labor types. Land is disaggregated into irrigated and dryland in Mexico. Each crop uses both land types in production and it is assumed that the land types are poor substitutes. Both irrigated and dryland are perfectly mobile across crops. In the United States, each crop is grown using one land type, but there are two land types. One land type is used to produce either fruits/vegetables, cotton, or other agricultural production. The second land type is assumed to be perfectly mobile among wheat, corn, other feedgrains, and oilseeds production. Capital is sectorally mobile. Labor is mobile across sectors, but it is segmented into four labor categories. There is some labor mobility between labor categories due to labor migration. We assume full employment and constant factor supplies.

Three types of labor migration are modeled. Mexican rural workers can migrate to urban unskilled labor markets in Mexico and to rural labor markets in the U.S. Mexican urban unskilled workers can migrate to the urban unskilled labor market in the United States. The net supply of urban unskilled workers in Mexico reflects the inflow of Mexican rural workers and the outflow of urban unskilled workers to the United States. Domestic factor supply in each country incorporates the migrant labor flow. Migration flows generated by the CGE model refer to changes from a base flow of zero. They should be viewed as additional migration flows due to the policy change, adding to (or reducing) current flows.

Migration is assumed to depend on wage differentials. In equilibrium, migration maintains a fixed wage differential in a common currency across the three migrant labor markets. The average wage, upon which labor bases its migration decision, includes labor income plus a share of the dryland income for rural workers in Mexico.

**Modeling Agricultural Policies**

We model Mexican and U.S. agricultural trade and domestic farm programs explicitly as either price wedges, which affect output and labor migration decisions, or lump-sum income transfers. The wedges and transfers are either specified exogenously or determined endogenously, depending on the institutional characteristics of the program being modeled.

---

8 We assume an elasticity of substitution between land types in Mexico of 0.3 in all sectors.

9 This treatment, whereby Mexican rural income in the migration equation includes both wages and a share of land income, differs from that in Robinson, et al. (1991). This specification is closer to that of Levy and van Wijnbergen (1991), who describe migration as a function of income or utility differentials.
The various programs and how they are treated are summarized in table 4.

We include in the model the agricultural policy regimes in effect in the U.S. and Mexico in 1993, which is the model base year. Most of these policies are “coupled” in that they influence producers’ decisions. In our model scenarios, we update the agricultural policies to the decoupled programs that have been implemented in both countries since 1993.

Coupled agricultural policies affect the producer’s value added price. The value added price is essentially the payment to primary factors; it is the unit value of production net of indirect taxes and payments to intermediate goods. Government subsidies are calculated per unit of output and are included in the producer incentive equivalent which is added to the value added price. When the producer incentive equivalent is positive, it increases the payment to factors, pulling factors into the subsidized sector and increasing output. The components of the producer incentive equivalent vary by sector and by country. In the Mexican farm sectors there are input subsidies on credit, fertilizer, irrigation, and feed. In the U.S., it includes the deficiency payment.

In the food processing sectors, the producer incentive equivalent includes price support subsidies. The Mexican government also provides processors with an input price subsidy that compensates them for high prices of imported and domestic inputs and enables processors to sell in the domestic markets at the controlled retail price. The initial value of the price subsidy is calculated from data on government expenditures on price subsidies per sector and domestic sales. Price subsidies increase the domestic sales price that the producers perceive. In effect, the processors' supply curve shifts to the right in response to the price subsidy. The per unit price subsidy varies to maintain the fixed retail price.

In the U.S., we model the target price/deficiency payments program for feed grains, food grains, and cotton; the Export Enhancement Program (EEP), and export subsidy programs. Deficiency payments are determined endogenously, and are not treated as fixed *ad valorem* wedges. Following Kilkenny (1991), and Kilkenny and Robinson (1990), we model the U.S. deficiency payment as per unit of output as the difference between a fixed target price and the market price. We calculate the initial unit value of the deficiency payment from data on total government expenditure on deficiency payments (including direct deficiency payments and marketing loan deficiency payments), base output, and participation rates. The unit value of the deficiency payment is a component of the producer incentive equivalent. We fix the eligible production at the base year levels. The total payment a farm receives is the payment rate multiplied by eligible base production. Planting flexibility introduced under the 1990 Farm Bill is captured by treating 50% of deficiency payments as direct payments, or income transfers.

---

10 Alternatively, the participation rate can be made endogenous, and changes in deficiency payment expenditures would result from both changes in the deficiency payment and from changes in base acreage.
In both countries, direct payments are modeled as income transfers to the household, and are decoupled from producers’ decision-making. In Mexico, the direct payment also supplements the rural wage, thereby influencing the rural migration decision. In the U.S., the direct payment is capitalized in returns to land.

Both countries impose tariffs and quotas on farm and food processing sectors. These border policies indirectly affect the producer value added price through their effect on the price of domestic output. Since we treat imports as imperfect substitutes for domestic goods, we insulate the domestic price from the full effect of border price shocks. Tariffs and quotas raise the price of imports, increasing demand for the domestically produced variety, and raising its price. Since the producer price is a weighted average of the prices of output sold on the domestic market and in each export market, it, too, will increase. Tariffs are measured as an ad valorem rate. They increase the domestic price of the imported good relative to its world price.

In the model, we assume endogenous ad valorem tariff equivalents of quotas. The initial rates are calculated as the wedge between the world price and the domestic price, adjusted for transport costs and any tariffs that are used in combination with the quota. In the model, these tariff equivalent rates adjust to maintain a specified level of imports.

Under NAFTA, import quotas are converted to tariff rate quotas (TRQ). Under this system, a specified volume of a commodity may enter at low or zero duty, and quantities above that level are taxed at a higher rate. In the model, TRQ rates are invoked endogenously when imports exceed a specified quantity threshold.

For each country, net farm program expenditure is computed by summing government expenditure and revenues arising from the various programs. In the model, it is included in total government fiscal expenditure and any increase in the net farm program expenditure will increase the government budget deficit.

4. MODEL RESULTS

Scenarios

As summarized in table 5, we specify three scenarios that are designed to explore the separate effects of three policies: the NAFTA agreement, the PROCAMPO farm program in Mexico, and the FAIR Act in the U.S. In the first scenario, we describe the effects of free trade on U.S. and Mexican agricultural output and on their bilateral trade. In Mexico’s policy environment in 1993, high import barriers provided much of the domestic price support for key crops, particularly for corn. We analyze the competitive pressures that increased exports from the U.S. exert on Mexican agriculture, and the consequent effects on the migration of
rural labor to urban Mexico and the U.S.

Mexico had dual motives for adopting the direct payment PROCAMPO program. One reason was its recognition of the potential for the severe dislocation of its farm sector under NAFTA. A second was to provide transitional support as the government reduced its role in all parts of the farm and food system. In scenario two, we analyze the impact of PROCAMPO only. The elimination of input subsidies and subsidies to food processors create pressures to migrate. We analyze the ability of the direct payment program to mitigate this migration pressure, and the program’s effects on the crop mix.

In the third scenario, we analyze the effect of the U.S. FAIR Act on agricultural output and bilateral trade in the two countries. The impacts of the decoupled program on U.S. farm output affect Mexico through trade, and make U.S. agriculture more responsive to price signals from shocks such as NAFTA, PROCAMPO, and world demand growth.

In scenario four, we combine the three policy shocks, and show the net effects of NAFTA in a new farm program environment. We use this scenario as a realistic base scenario for two sensitivity experiments. First, we analyze the interaction of Mexico’s peso depreciation with agricultural adjustments to the policy shocks. In the second sensitivity experiment, we assume Mexican agricultural productivity increases by 25% in five increments of 5%. There are several potential sources for such productivity shocks in Mexico. One is the Alliance program, whose objective is to increase Mexico’s agricultural productivity. Also, Mexican recovery from the peso crisis is anticipated to restore investment and productivity growth. Finally, Mexico’s extensive dryland agriculture is vulnerable to weather conditions and significant yield variability.

In the second sensitivity experiment, we simulate the recent strengthening of world grain markets, and explore how this interacts with trade and domestic policy reforms in Mexico and the U.S.

**Results of Policy Shocks**

Under NAFTA, total farm output in Mexico declines 1%, but there are large sectoral shifts within Mexican agriculture (table 6). The removal of high import barriers in some farm sectors (corn, wheat, beans) causes their output to contract, while Mexico’s improved access to the U.S. stimulates production of fruits and vegetables. Production of corn in Mexico declines 31.9% under NAFTA. Corn is a major crop in Mexico. It employs one-third of the base year rural labor force, and accounts for 22% and 42% of dry and irrigated land use, respectively. The dramatic shift of labor and land out of corn drives much of the impact on the rest of Mexican agriculture.

As corn output contracts, output in all other farm sectors (except wheat) increases
because of the availability of resources leaving corn, particularly crops such as feedgrains, which are intensive in the use of dryland. The large increase in fruits and vegetable output (16.0%) is also stimulated by the removal of the U.S. tariff under NAFTA. The expansion of most other farm sectors as corn contracts is insufficient to absorb the rural labor leaving corn production. 515,000 rural workers migrate out of rural Mexico, most entering Mexico’s urban unskilled labor force (table 7). In total, 417,000 workers migrate from Mexico to U.S. rural and urban unskilled labor markets.

The combination of lower prices for agricultural inputs, and lower barriers in its U.S. export market stimulates a small expansion of Mexico’s food processing sectors. Exports by these sectors to the U.S. is initially quite small, however, and most of the stimulus comes from the reduction of input costs.

In the U.S., NAFTA stimulates only a small (0.2%) expansion of farm output, reflecting that export growth to Mexico of nearly 70% represents a relatively small share of total U.S. farm exports. U.S. corn output increases 3.4% as exports to Mexico increase nearly fourfold. U.S. feedgrain output falls 6.2%, because the increase in Mexico’s own production of feedgrain reduces its demand for imports (table 8).

In scenario two, we implement PROCAMPO alone. PROCAMPO removes input subsidies and the price supports operating through price subsidies to millers. Price supports operating through import barriers are maintained.

The effect of PROCAMPO is to remove the distortion of production decisions that stem from domestic government subsidies, and to maintain employment in agriculture by raising the relative rural wage through direct payments. 11 By decoupling production decisions, factors now move to sectors in response to price signals. Disregarding the dramatic price shocks of NAFTA, an important effect of PROCAMPO alone is that factors move out of the heavily subsidized, and relatively low productivity corn sector, and into sectors characterized by higher factor productivity.

In the farm sectors, PROCAMPO reinforces the impacts of NAFTA on the output of corn and wheat. Corn and wheat had both received a combination of input subsidies, and subsidized demand from millers. In contrast to NAFTA effects, production of oilseeds and feedgrains contracts under PROCAMPO because of their relatively large input subsidies. Production of fruits and vegetables, which had received no input subsidies, expands 5.5% due to PROCAMPO.

Unlike the case of NAFTA, the increase in farm input prices under PROCAMPO

11 Burfisher, Robinson, and Thierfelder (1994) analyze the effects of alternative assumptions about the share of the direct payment that supplements the rural wage, and influences the labor migration decision. In this scenario, we assume a central value of 40% for the share of direct payment that supplements the migration wage.
In this scenario, we conduct a counterfactual analysis of the effects of changes in the incentive structure based only on removal of deficiency payments and expansion of crop area. See Young and Westcott (1996) for a projection of the anticipated effects of the FAIR Act, in which they incorporate other components of the FAIR Act, as well as projected changes in world demand conditions. In particular, they assume weaker export demand during 1996-99 due to lower export promotion expenditures, but strong world demand conditions in the longer term.

PROCAMPO payments are assumed to supplement the rural wage in Mexico. The increase in the relative rural wage in Mexico under PROCAMPO causes a back-migration of workers into the rural labor force (or, a reduction of the equilibrium flow out of the rural labor force) of 249,000 workers. This labor is used in sectors that have relatively high productivity. In turn, the reduction of rural-urban migration in Mexico reduces pressures for Mexico-U.S. migration, which declines by 235,000 workers.

PROCAMPO has a smaller effect on U.S. output compared to NAFTA, and the mix of sectoral effects is different. U.S. corn contracts very slightly despite rising exports to Mexico, because of the increase in feed grain output (0.5%) and exports to Mexico. U.S. production of fruits and vegetables declines slightly (-0.6%) due to the increased production in, and U.S. imports from, Mexico. The back migration of rural workers from the U.S. to Mexico also contributes to lower U.S. production in all farm sectors, particularly the labor-intensive sectors.

In scenario three, we implement the major component of the U.S. FAIR Act. Deficiency payments for grains and cotton are eliminated, and decoupled direct payments are introduced. The aggregate land for program crops (wheat, corn, feedgrains, oilseeds, and other agriculture) is increased by 15 million acres, or 5.3% of initial crop acreage. As in the PROCAMPO scenario, we assume no changes in trade policies. The change in incentive structure in the U.S. results in a small expansion of total farm output, with changes in the sectoral mix. There is a decline in U.S. production of wheat (-7.4%), feedgrains (-7.0%), and other agriculture (-5.3%), which includes rice and cotton. Production of all other crops and of livestock increases. U.S. exports to Mexico of wheat, feedgrains, and other agriculture decline as output in these sectors contracts.

In Mexico, the effect of these provisions of the FAIR Act is to reduce total farm output slightly. Output of the three crops that contract in the U.S. expand in Mexico as the U.S. export supply falls and drives up import prices facing Mexico. Corn output declines 2.1% as expansion in these sectors competes with corn for resources, and because of the increase in U.S. corn output and exports. Livestock and poultry production in Mexico decline because of

\[ \text{12 In this scenario, we conduct a counterfactual analysis of the effects of changes in the incentive structure based only on removal of deficiency payments and expansion of crop area. See Young and Westcott (1996) for a projection of the anticipated effects of the FAIR Act, in which they incorporate other components of the FAIR Act, as well as projected changes in world demand conditions. In particular, they assume weaker export demand during 1996-99 due to lower export promotion expenditures, but strong world demand conditions in the longer term.}\]
the rising feedgrains price. Mexican fruit and vegetable production contracts in this scenario, because of the increased output in U.S. horticulture production, and the decline in U.S. demand for horticulture imports.

Migration effects from the elimination of U.S. deficiency payments reflects cross migration flows. The FAIR Act reduces migration pressure in the rural labor markets, but increases pressure in the urban markets. The net effect of these changes is to increase Mexican labor migration to the U.S. by 206,000 workers, going primarily to the unskilled U.S. labor market.

The combined impacts of the three experiments is to increase the total agricultural output and bilateral exports of both countries. Under the combined policies, the migration pressures of NAFTA are reduced, with lower migration from Mexico to the urban U.S. market, and back migration from the rural U.S. to the rural Mexican labor market.

**Sensitivity Experiments**

The joint implementation of NAFTA, PROCAMPO, and the FAIR Act will occur in an environment characterized by “noise” from their domestic and the global economies. We analyze the sensitivity of our analysis of the joint effects of NAFTA, PROCAMPO, and the FAIR Act to two developments: an increase in Mexican agricultural productivity anticipated under the ALLIANCE program, and stronger world demand with higher world prices for grains and oilseeds. In both sensitivity experiments, we begin with a base scenario (scenario 4) in which the three programs are jointly implemented. We then introduce the sensitivity experiment in five equal increments. In the Mexican agricultural productivity experiment, we increase total factor productivity in agriculture by 25% in five-5% increments. We increase total factor productivity in nonagricultural sectors at half of that rate. In this experiment series, we assume that there is greater scope for productivity increases in Mexico’s agriculture relative to the non-agricultural sectors. We thereby also allow for increased agricultural demand growth from the rest of the economy.

Even small productivity gains in Mexican agriculture can offset the contractionary pressures of the combined policy shocks, and result in increased farm output (fig. 1) With a 25% gain in agricultural productivity, Mexican farm output increases by 23% from pre-NAFTA levels. Mexico’s corn output still declines relative to the pre-NAFTA base, but by a much smaller amount (-11% compared to -40% under the combined policy shocks).

An increase in agricultural demand, both through domestic demand growth and export penetration, is crucial in maintaining farm prices, and increasing rural factor returns as farm productivity increases. By simulating productivity growth in Mexico’s nonagricultural sectors, we assume the domestic market will absorb much of the increase in farm output envisioned by the Alliance program. The importance of export penetration is illustrated in figure 2. Horticulture is Mexico’s main farm export crop, and exports to the U.S. represented
29% of Mexican horticultural output in 1993, and 96% of its horticultural exports. When the U.S. maintains its TRQ on Mexican horticulture, output in this sector increases only 41%, compared to 50% when the TRQ is removed (fig. 2).

Mexican productivity gains raise returns to rural factors, and reduce migration of rural workers to urban Mexico (fig. 3). In turn, the combination of lower urban-rural migration in Mexico, and increased productivity and wages in urban sectors reduce the pressures for labor to migrate to the U.S. (fig. 4). Reflecting that horticulture is an important export crop, and that the U.S. is its major market, the use of a U.S. TRQ on Mexican horticulture matters to both migration flows. When the U.S. maintains its TRQ, Mexico’s rural-urban migration and Mexican-U.S. migration is higher by nearly 100,000 workers, compared to the case of no TRQ. In the latter case, Mexican horticultural expansion is not limited by U.S. import restrictions.

In the world demand growth experiments, we increase world demand for U.S. grains and oilseeds by 10% in five-2% steps. The export prices of the rest of the world are also increased incrementally, to a total 10%. In the U.S., even this relatively small increase in world wheat demand is sufficient to offset the contractionary impacts of deficiency payments removal. Wheat output increases by nearly 4%, compared to a decline of 7% in the base policy scenario (fig. 5). Corn output declines slightly because of a shift toward wheat production, and total U.S. farm output increases slightly more than in the base policy scenario.

Higher import prices slightly ease Mexico’s agricultural adjustments, compared to the policy base. Mexico’s wheat production declines only 10%, compared to 14% in the policy base, and corn output declines 38% instead of 40%. Maintaining resources in these sectors reduces output of fruits and vegetables slightly, compared to the policy base. As in the U.S., total agricultural output increases slightly as world demand strengthens (-7% vs. -9%). Stronger world markets for grains and oilseeds leads to a decline in rural-urban migration in Mexico (fig. 3), and in labor migration to the U.S. (fig. 4), but are not sufficient to eliminate these migration flows.

5. CONCLUSIONS

NAFTA has been implemented in an environment that is different in important respects from that in which the agreement was initially envisioned. Since the countries’ intent to negotiate bilateral free trade was formalized in 1991, both Mexico and the U.S. have adopted fully decoupled farm programs for most commodities, the peso crisis slowed Mexican economic growth and accelerated Mexican export penetration in the U.S., Mexico adopted the Alliance program to aggressively increase its agricultural productivity, and strong world grain markets have eased both countries’ transitions to a market-driven agricultural sector.
In this paper, we analyze the separate and combined effects of three policy shocks -- NAFTA, PROCAMPO, and the FAIR Act, on agricultural output, bilateral trade, and labor migration in the U.S. and Mexico. We use the combined effects of the three policies as a base against which to analyze the sensitivity of the policy impacts to Mexican agricultural productivity growth, and world demand growth for wheat, feedgrains, oilseeds, and corn.

Our key conclusions are:

- NAFTA creates strong competitive pressures on Mexican agriculture as high import barriers are removed, and causes large labor migration flows from rural to urban Mexico, and into the U.S.

- The PROCAMPO direct payments program can be an effective transition policy for Mexican agriculture, by creating an incentive for factors to remain in Mexican agriculture.

- The FAIR Act results in a small increase in total U.S. farm output. There is a change in the U.S. production mix that reflects the decoupling of farm subsidies, with small complementary effects on the Mexican farm output mix.

- The three policies combined stimulate agricultural output and bilateral exports of both countries. Changes in the sectoral structure of their agriculture under the combined removal of trade and domestic distortions result in migration flows from Mexico to the U.S., but they are smaller than under NAFTA alone.

- Productivity growth in Mexican agriculture raises farm output, and reduces migration pressures. Gains from productivity growth will depend on increased productivity in, and demand from Mexico’s nonagricultural sectors, and Mexico’s ability to expand its farm exports.

- Relatively small changes in world demand conditions can offset the impacts of free trade and domestic program reforms on some U.S. farm sectors, and ease both countries’ transition to a new policy environment.

- The decoupling of farm programs eliminates their farm policy interdependence: farm program changes in one country no longer affect its partner’s trade, output, or farm program expenditures.

REFERENCES

Unpublished data.


