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# Impacts of Trade Liberalization on Poverty and Inequality in Argentina

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## **Abstract**

Using the most recent estimates of agricultural price distortions, this chapter studies the economic, poverty, and income inequality impacts of both global and domestic trade reform in Argentina, with a special focus on export taxes. Argentina offers an interesting case study as the only large agricultural exporter that has, at many points in its history, applied export taxes to several of its agricultural products. The chapter combines results from a global economy-wide model (World Bank's Linkage model), a national CGE model, and microsimulations. The results suggest that liberalization of world trade (including subsidies and import taxes, but not export taxes), both for agricultural and non-agricultural goods, reduces poverty and inequality in Argentina. However, if only agricultural goods are included, indicators for poverty and inequality do not improve and even deteriorate somewhat. This is particularly the case if export taxes are eliminated. The chapter discusses the possible reasons for those results, offers some caveats, and suggests some lines for further research.

**JEL codes:** D58, F13, I30, O54, Q18

**Keywords:** Poverty, trade liberalization, agricultural policy, Argentina, export taxes.

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# Impacts of Trade Liberalization on Poverty and Inequality in Argentina

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Using the most recent estimates of agricultural price distortions, this chapter studies the economic, poverty, and income inequality impacts of both global and domestic agricultural and total trade liberalization in Argentina, with a special focus on export taxes. Argentina offers an interesting case study because it is the only large agricultural exporter that at many times in its history has applied export taxes to several of its agricultural products. The most recent episode started after the large devaluation of early 2002 when export taxes, which had been abolished during the 1990s, were reinstated and have been kept in place ever since.<sup>1</sup>

Export taxes have been defended by the Argentine government on the grounds that they are needed for reasons related to poverty alleviation, fiscal consolidation, and inter- and intra-sectoral balance of production, among others. Critics have argued that such taxes reduce growth and even increase poverty (see, for example, Nogués *et al.* 2007 and Nogués 2008). This chapter looks at those conflicting claims using a general equilibrium approach, in an attempt to present a more integrated evaluation of those national measures. In doing so the chapter also examines the impact on Argentina of the rest of the world's agricultural and trade policies, with a particular focus on the effects on poverty and inequality in Argentina.

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<sup>1</sup> Thus, this policy was unrelated to the sharp increase in world prices in 2007-08, when numerous agricultural-exporting developing countries introduced temporary export controls to reduce domestic food price increases.

More specifically, the analysis combines results from a global economy-wide CGE model, a national CGE model, and microsimulations. The World Bank's global Linkage Model (van der Mensbrugghe 2005) is used to analyze the impact on the Argentine economy of trade policy interventions by the rest of the world. That model uses the GTAP version 7 database which is calibrated to 2004 (Badri Narayanan and Walmsley 2008), except that the agricultural distortions in developing countries are taken from the new World Bank database as summarized by Valenzuela and Anderson (2008). The impacts on the terms of trade and export demand faced by Argentina of rest-of-world policies, which are simulated using the global Linkage model (see Anderson, Valenzuela and van der Mensbrugghe 2010), are transmitted as exogenous shocks to a national CGE model of Argentina. The results from the country CGE simulations – in terms of changes in employment, factor prices, and prices of goods and services – are linked to a microsimulation model for Argentina, which makes possible the analysis of the impact of these various changes on household poverty and inequality according to household survey data. The chapter analyzes and compares the effects on Argentina's economy of removing rest-of-world distortions and Argentina's own import tariffs and export taxes. In addition, the analysis distinguishes between agricultural reforms only, and those which include both agricultural and non-agricultural trade policies.

The rest of the chapter is organized in four sections. The first section provides background information, including the economic context in which export taxes were implemented by Argentine authorities in response to the economic collapse of 2001-02, and the evolution of poverty and inequality indicators. The second section summarizes the methodology and data for both the national CGE and microsimulation models. This is followed by the core section that discusses the model simulations and results, while the final section offers some conclusions.

## **Background**

In 2001-02, Argentina experienced one of the most severe crises in its history. Amid social unrest and street riots that led to more than 30 deaths and hundreds of injuries, the country plunged into a state of institutional disarray. GDP declined 10 percent in 2002, on top of the previous 3 consecutive years of decline that involved an accumulated GDP loss of another 10 percent. Formal unemployment jumped to more than 25 percent, and almost 60 percent of the population was considered to be below the national poverty line.

The collapse was the result of a combination of factors. First and foremost, there were the policy rigidities of the Convertibility Plan, established in 1991 during the Menem Administration, which had linked the peso to the dollar in a (quasi) currency board arrangement at the exchange rate of 1 peso = 1 dollar. With inflation continuing at a high rate for about two years after fixing the exchange rate, the peso became overvalued, affecting the production of tradables. The fixed peg also forced Argentina to follow the US dollar appreciation that started in the mid-1990s, further punishing production, employment, and the fiscal accounts. Doubts about the sustainability of the peg also led to a generalized dollarization of the banking system, which eliminated the possibility of countercyclical monetary policy and increased the vulnerability of the domestic financial system to runs against the peso and/or the banks.

Second, Menem's government privatized a significant portion of the Social Security system by the mid-1990s, which generated a substantial transitional fiscal deficit that added to public indebtedness that was expected to take several decades to repay.<sup>2</sup>

Third, there was a sequence of negative exogenous shocks in the late 1990s and early 2000s, including Brazil's devaluation and the decline of agricultural prices. When the new government of President De la Rúa took office in late 1999, the economy was already decelerating and heading into outright recession after that combination of external shocks.

Fourth, the alliance of parties that constituted the De la Rúa government (the first coalition government for many years) broke down under the economic strains of the deepening recession. In the second half of 2000, the Vice President resigned and its party

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<sup>2</sup> Recently, the Argentine Congress approved a law that changed the retirement system back to a pay-as-you-go scheme, thus eliminating the middle-term transition deficit, but absorbing the longer term liabilities of the system,

left the coalition, further weakening the capacity of the government to manage the difficult economic situation.

At the end of 2001, with confidence waning, and a double run against the peso and the banking system, the situation was untenable. The administrative constraints imposed by the government on banking withdrawals to stop the run on the banks (which had basically dollarized deposits and therefore could not be helped by the Argentine Central Bank) finally led to widespread riots and the resignation of President De la Rúa. A period of turmoil ensued, in which the country had four additional Presidents in just a few weeks through early 2002.

By late 2001 and early 2002 it was clear that there were two separate but related fiscal and external problems of insolvency: a high public debt involving a non-financeable fiscal deficit, and a high external debt (private and public) involving a non-financeable current account deficit. The suspension of debt payments and the subsequent devaluation (abandoning the 1:1 peg to the US dollar) were desperate measures taken by the interim governments in early 2002 to try to cope with both problems. The exchange rate jumped to almost 4 pesos per 1 dollar (4:1) once it was allowed to float in the first half of 2002. It later declined to about 2.5:1 but by the end of 2008 the exchange rate was about 3.3:1.

In the middle of a deep recession, aggravated by the banking crises and the devaluation, and needing to shore up fiscal accounts, the government in early 2002 imposed export taxes on agricultural and several other products such as oil and other energy commodities. One of the objectives of those taxes was fiscal, in a moment when collection of more traditional income and value added taxes had dropped significantly due to the recession. Not only had tax receipts declined but the peso value of the public debt (most of it denominated in US dollars) had increased significantly with the devaluation. Under the 1:1 exchange rate, Argentina's GDP was valued at almost 300 billion dollars in the late 1990s, while the public debt was about 150 billion dollars (a ratio of debt/GDP of 50 percent). After the devaluation, the GDP was valued at less than 100 billion dollars, but the debt, yet to be renegotiated, remained the same, implying an unsustainable debt/GDP ratio of more than 150 percent. Through the imposition of export

taxes, the negative impacts of the devaluation on public accounts were partially compensated.

Export taxes helped increase fiscal receipts by 1.5-2.5 percent of GDP (Figure 1). They were only one component in a more general effort to consolidate fiscal accounts through better collection of all taxes. Figure 2 shows that overall tax receipts increased by 8-9 percent of GDP from 2002, compared with the 1990s, so export taxes accounted for less than one-third of the overall tax hike. There was also some adjustment in public expenditures, which during the period 2002-07 were about 0.8 percentage points of GDP below the average for the previous decade.

A separate and important objective of the government in imposing export taxes in the case of agricultural products (which include important food staples such as wheat, rice, beef, fruits and vegetables, and dairy products) was to moderate the upward impact of the devaluation on domestic food prices and thereby its impact on real wages and poverty. Very early in the development debate in Argentina it was argued that, since Argentina's exports are mainly "wage goods" (in Ricardian terminology), a devaluation would put upward pressure on wages and affect the competitiveness of domestic industry (Díaz-Alejandro 1963, Braun and Joy 1967). By increasing domestic food prices, devaluations would raise the poverty line (which is based on prices of a basket of mainly food items) which, for a given income, would also increase the number of people under that adjusted poverty line. Export taxes were seen as a way to reduce that impact of the devaluation by moderating the increase in domestic food prices.

The government has also maintained a moderate export tax differential (taxing somewhat more the primary products than the processed items), presumably to compensate domestic producers for the tariff escalation prevalent in the rest of the world.<sup>3</sup>

In addition, export taxes were imposed on other important export products such as oil and gas. That kept a lid on the domestic prices of energy, benefiting the different

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<sup>3</sup> Tariff escalation has been discussed at least since the Kennedy Round. The practice in high-income countries of imposing high import taxes on processed goods, and lower or no tariffs on primary products (thus granting a higher effective rate of protection to value added in the importing country), reduces significantly the processing capability of developing countries. This places agro-industrial production in developing countries at a disadvantage, tilting the export profile of developing countries towards raw materials (Balassa and Michalopoulos 1986, Díaz-Bonilla and Reca 2000).



productive sectors in proportion to their use of energy inputs. This is important for agricultural production because it lowered farmers' costs of fuel and fertilizers.

Since 2003, and until about the end of 2008, the country has experienced a strong and rapid recovery, growing at about 8.5 percent during that period. That high growth was based to a large extent on the reduction of macro vulnerability and high volatility, which had been the main reason for Argentina's dismal economic performance until recently.<sup>4</sup> The combination of a more realistic exchange rate (at approximately the real level – deflated by the US consumer price index – of the decades previous to the large overvaluation of the 1990s), fiscal consolidation (through increases in taxes and the debt renegotiation), and the accumulation of reserves in the Central Bank has reduced the main causes of macroeconomic vulnerability by sustaining surpluses in both fiscal and current accounts.<sup>5</sup>

This period of economic growth led to improvements in employment, poverty, and income distribution, at least through late 2007. The fourth-quarter 2007 unemployment rate of 7.5 percent was the lowest since the early 1990s, while during the 2001-02 crisis it had topped 25 percent. The levels of poverty and extreme poverty declined from 58 percent and 28 percent, respectively, in 2002, to 23 percent and 8 percent by the end of 2007. Income distribution also improved: the top-decile to bottom-decile ratio declined from 32 at the beginning of 2004 to 26 in the first quarter of 2007.

What has been the role of agricultural and other trade policies, particularly export taxes, in this performance? This is a policy question that can best be addressed using an empirical general equilibrium approach.

Before going into that analysis, it is useful to look at the evolution of agricultural prices and production in Argentina since the imposition of export taxes in 2002. Critics of

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<sup>4</sup> During the last half century the country had been in recession about 40 percent of the time, due to recurrent macroeconomic crises linked to overvalued exchange rates and fiscal and current account deficits that led to the accumulation of public and external debts.

<sup>5</sup> The overall fiscal surplus for the consolidated public sector (central government and provinces) during 2003-07 averaged 1.6 percent of GDP, compared to an average annual deficit of 4.2 percent of GDP during 1961-2002. The surplus of the current account of the balance-of-payments in 2007 was 2.8 percent of GDP, while from 1976-2002 the country experienced an average annual deficit of 1.7 percent of GDP. The trade surplus for 2007 was more than 4 percent of GDP, against 1.4 percent during 1976-2002. Boosted by high commodity prices in international markets, exports in 2007 increased to about US\$56 billion, nearly triple the 1990s average, while imports jumped to around US\$43 billion, double the 1990s average. One of the consequences has been that Central Bank reserves exceeded US\$50 billion by the end of the first quarter of 2008, or 16 percent of GDP.

this price-distorting policy argue that it reduces farmer incentives and adversely affects growth. The issue of farmer incentives, however, has to be analyzed in a broader policy context along with other measures, particularly the exchange rate.<sup>6</sup> Figure 3 shows that domestic producer prices in real terms<sup>7</sup> have been clearly above the 1990s values for a variety of farm products, suggesting that the negative impact of export taxes on domestic prices appears to have been more than offset by either the devaluation and/or a rise in international prices of farm products. Figure 4 shows another indicator of the incentives for agricultural production in Argentina, namely an index of domestic relative prices between the agricultural sector and the rest of the economy, along with an index of the real exchange rate in Argentina and an index of real international prices (see definitions in Figure 4). The significant improvement in the internal terms of trade for agriculture since 2002 was mainly caused by the adjustment in the real exchange rate, while only since the second half of 2007 do changes in world prices show a positive impact.<sup>8,9</sup>

In addition to the devaluation, there were other policies in Argentina that also benefited agriculture, such as normalization of the debt conditions for many producers affected by the 2001-02 macroeconomic collapse, lower energy prices through export taxes on those products (Argentina is a net exporter of energy), and the expansion of investments in technology and infrastructure. The combination of all those policies, plus rising international commodity prices, contributed to a strong supply-side response from farmers: Argentina's production of grains and oilseeds during 2003-07 was about 10 percent above the growth trend of the previous 45 years (see Appendix 1 for details).

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<sup>6</sup> After all, domestic producer prices (PD) result from the combination of export tax rates (TX), the nominal exchange rate (ER), world prices (PW) and marketing costs and margins (MCM):  $PD = PW * ER * (1 - TX - MCM)$ .

<sup>7</sup> Producer prices in pesos (as reported in FAOSTAT) deflated by the consumer price index (CPI) in Argentina. It should be noted that current controversies about the changes in the calculation of the Argentine CPI do not affect Figure 3, considering that the data reported in FAOSTAT currently ends in 2006.

<sup>8</sup> This behavior of relative prices is different from the period before 2002 when the Convertibility Plan maintained a fixed 1 peso=1 US\$ exchange rate, in which internal terms of trade for agriculture basically followed international prices downwards to the lows of 2001. Since this low point, real international agricultural prices recovered somewhat, improving significantly in the second half of 2007, and reaching by early 2008 levels about 60 percent above those in 2001; however, this only meant that they went back to the levels of the mid-1990s.

<sup>9</sup> There is a debate in Argentina as to what is the real level of inflation. The real exchange rate in Figure 4 is based on official statistics. However, even assuming that some of the more extreme estimates of inflation by private analysts are true, the real exchange rate would still be clearly above the level of 2001 by about 60 percent, instead of around 80 percent using official data.

While it is not evident from these recent data that export taxes are harming the agricultural sector, it could be argued that without export taxes agricultural growth rates would have been even higher. But it needs to be kept in mind that lower or no export taxes would have affected fiscal accounts and led to higher interest rates and possibly a weaker overall macroeconomic performance. Higher domestic prices may have led also to protests about domestic food prices, compromising social sustainability of the whole reform program. These possibilities are not explicitly explored in what follows. Rather, this chapter limits itself to disentangling the effects of agricultural and trade policies at home and abroad on poverty and income distribution in Argentina, with a special focus on export taxes.

### **Methodology and data**

To explore the effects of agricultural and trade policies abroad on poverty and income distribution in Argentina, the approach is to use simulation results from the global Linkage model (see Anderson, Valenzuela and van der Mensbrugghe 2010) as exogenous shocks that are fed into a national computable general equilibrium (CGE) model for Argentina, and those results, in turn, are used as inputs in a microsimulation model. The latter two impacts are then compared with the impacts of own-country agricultural and trade policies estimated using only the national CGE and microsimulation models. There are no feedback effects from the micro to the macro level, but the microsimulations are consistent with the aggregates generated by the national CGE model.

At the macro-level, the national CGE produces results for a given policy change including new levels of employment in each economic sector, new wages, and new relative prices. At the household level, the microsimulation model receives the changes in the macro-level variables and determines new individual wages and employment, a new distribution of household per capita income, and new poverty rates and inequality indicators.

### *CGE model for Argentina*

The national CGE model has similarities with Lofgren *et al.* (2002) and Lofgren and Diaz-Bonilla (2007). It is based on a 2005 Social Accounting Matrix (SAM) for Argentina with 24 activities and 26 commodities (Table 1). The disaggregation tries to match as closely as possible that of the global Linkage model. The national CGE model includes three institutions: a representative household, government, and rest of the world. There are 8 factors, including six labor categories: unskilled, semi-skilled, and skilled men and women. Land and capital are considered partly sector specific and partly mobile across sectors. Land only moves within the primary agricultural sectors. The model and database consider several tax instruments including export taxes, income taxes, and the value added tax. The modeling of the value added tax incorporates rebates for intermediate inputs and investment purchases, so there is no cascading effect on prices of taxes on intermediate goods.

While many CGE models are run under a full employment specification, here the modeling of the labor market allows for endogenous unemployment. This is described by a complementary-slackness condition for unemployment and wages. As the economy grows, if the factor market is below full employment then the unemployment rate is the clearing variable for the market; that is, unemployment decreases for the necessary labor types until a minimum unemployment rate is reached.<sup>10</sup> At full employment (i.e., when the minimum unemployment rate is reached), the economy-wide wage variable adjusts to clear the market.<sup>11</sup>

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<sup>10</sup> The model was run with two definitions of full employment, i.e. the level of unemployment below which any additional labor demands result in increases in wages and not employment. Those values are 2.5 percent and 5 percent. The results reported here correspond to the lower value of unemployment. The direction of the results does not differ much, although the employment multiplier effects are somewhat stronger under this (2.5 percent) than under the alternative (5 percent) definition of full employment.

<sup>11</sup> A reviewer argued that having employment as the adjustment variable is as “extreme” as the full employment assumption where wages adjust. The key point, however, is which labor closure better reflects the economic situation in Argentina, considering that in the base year unemployment was clearly above its frictional level. Also it must be noted that the complementary slackness condition allows the labor closure to switch towards wage adjustments once the frictional unemployment rate is reached. The model was also run with a full employment specification, and the results are qualitatively similar, with poverty being affected by lower salaries (instead of increases in unemployment) and higher food prices. Still, the two labor market closures are not completely symmetrical, considering that the unemployment closure allows for larger changes in GDP. Finally, the model can also be run with a wage curve but the simulations, which do not differ much, are not shown here.

Another modeling characteristic, resulting from the methodology of the World Bank project, is that the national model determines export supply behavior, but it takes rest-of-the-world demand changes from the global Linkage model, using an export demand curve based on parameters and results coming from that model (see Horridge and Zhai 2006). Therefore, we do not adopt the “small country” hypothesis on the export side. Regarding imports, however, the price shocks are taken directly from the global model, assuming that import supply functions for Argentina are flat (the small country assumption).

The closures for the model are as follows. In the case of the government, it is assumed that both government consumption and savings are fixed in real terms. This means that the level of surplus (or deficit) in the base year is maintained (Argentina had a surplus in 2005), and that one or more taxes are the equilibrating variables. Here all tax rates are kept at the base year level, except for the rate of direct taxes, which adjusts to equilibrate fiscal accounts, compensating the revenue lost from trade liberalization. Therefore, the simulations are fiscally neutral. For the rest of the world, foreign savings (broadly defined to include other non-traded items) are fixed exogenously while the exchange rate adjusts. That is, the level of trade balance that existed in the base year is maintained in dollar terms, with the exchange rate acting as the equilibrating variable. For the savings-investment balance, investment is driven by savings as in the global Linkage model. Since both public and foreign savings are fixed, investment comes from changes in the savings behavior of households (specifically, the marginal propensity to save/consume adjusts).

To better understand the effects of trade policy reforms it is helpful to be aware of the country’s trade structure and price distortions in the base year. The trade structure is summarized in Table 2: agricultural and agroindustrial products represent about 45 percent of all exports, with petroleum and related products adding another 15 percent. Export and import taxes (or subsidies) are reported in Table 3 for 2005, the base year for the simulations. To put that data in historical context, Sturzenegger and Salazni (2008) show that the lowering of export taxes in the 1990s was reversed in the present decade such that farm prices for those products during 2000-05 were about one-sixth below international prices; meanwhile, nominal assistance rates for manufacturing, which were

very high up until the 1970s, have since come down gradually (Sturzenegger and Salazni 2008).

### ***Microsimulation model***

The results in terms of poverty and inequality at the micro level are calculated by linking the CGE model with a microsimulation model. The two are used in a sequential “top-down” fashion: the CGE communicates with the microsimulation model by generating a vector of prices, wages, and aggregate employment variables such as labor demand by sector and the unemployment rate. The functioning of the labor market thus plays an important role, and the CGE determines the changes in employment by factor type and sector, and changes in factor and product prices that are then used for the microsimulations.

The Encuesta Permanente de Hogares (EPH), the main household survey in Argentina, is used to build the microsimulation model. The EPH is carried out by the Instituto Nacional de Estadística y Censos (INDEC 2006a). It covers 31 urban areas (all the urban areas with more than 100,000 inhabitants), which are home to 71 percent of the Argentine urban population. Since the share of urban areas in Argentina is 87 percent, the EPH sample represents around 62 percent of the total population of the country. The EPH gathers information on individual socio-demographic characteristics, employment status, hours of work, wages, family income, type of job, education, and migration status. There is no alternative source of household data to the EPH. No attempt was made to reconcile the household survey data with the national accounts. Instead, the results from the CGE are transmitted to the microsimulation model as percentage deviations from base values. The productive sectors in the EPH are divided into 10 categories (agriculture, mining, food/beverages/tobacco, textiles, petrochemicals, metals, machinery, vehicles, other manufactures, services) and the results from the CGE simulations are adjusted to the sectors of the EPH for the transmission of changes in the relevant variables.

INDEC (2006b) calculates the basic food basket and the total basic consumption basket that determine the indigence (or extreme poverty) line and the (moderate) poverty line, respectively. An Engel coefficient captures the relationship between the extreme and

moderate poverty lines calculated by the INDEC using the two baskets. Each CGE simulation generates a new level of economy-wide prices for commodities, which lead to changes in the cost of the basic food basket and therefore in the level of the extreme poverty line. The value for the new moderate poverty line is computed by assuming that the Engel coefficient remains constant. These changes in the poverty lines are captured in the last step of the microsimulations methodology (as explained below) and affect the final estimated poverty and indigence rates.

We introduce the labor market results from the CGE model into the microsimulations in order to produce a counterfactual labor income for each individual in the household survey. We then recalculate household per capita income, and compute the new poverty and income inequality results.

There are two broad approaches to capturing the labor market changes through microsimulations. In one case, the program selects at random (with multiple repetitions) from the corresponding labor groups the individuals who will change sectors and assigns wages to new workers according to parameters for the average groups. This approach is an extension of the earnings inequality methodology developed by Almeida dos Reis and Paes de Barros (1991).

The second general approach is based on econometric techniques. In this approach, the movement of workers across sectors is determined by econometrically estimated probabilities in a sectoral choice model while the workers' new wages are determined in an econometric model of wage earnings (see for example, Díaz-Bonilla 2005 and Díaz-Bonilla *et al.* 2006). In both approaches, the new wage and employment levels for each individual result in new household per capita incomes that are then used to determine the new poverty and income distribution results.<sup>12</sup>

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<sup>12</sup> The microsimulation model in Díaz-Bonilla (2005) and Díaz-Bonilla *et al.* (2006) has three main components: a sectoral choice model, a model of wage earnings, and a summation of the new wage and employment results for each household (from which follow the new poverty and income distribution results). Rather than random selection, the sectoral choice component is based on the estimation of a multinomial logit (MNL) model which determines a person's probability, given certain characteristics, of working in each of the productive sectors, and therefore ranks who will move first into a growing sector. The second component of the econometric microsimulation model estimates a wage regression model that determines the labor income received by a new worker. If the macro model instead determines that employment should decrease in a given sector, then those with the lowest probability of working in that sector exit first and the new unemployed lose the wages they had.

This chapter uses a combination of both approaches: the movement of workers across sectors is done by repeated sampling as in the first approach, while the assignment of wages depends on an econometrically estimated equation for the base year. Since the data do not record market wages for an individual who is not working, the human capital theory of Mincer (1962) leads to estimates of wages as a function of human capital variables (for example, experience and education). As in the second approach, a series of wage regressions estimates the sector-specific potential wage for each person according to his or her personal characteristics.

The labor market variables and procedures that link the CGE model with the microsimulations are as follows. *U* in the tables with the microsimulations results refers to the impact of changes in the unemployment rate. This effect is simulated by changing the labor status of the active population in the EPH sample based on the results from the CGE model. For instance, if according to the CGE simulations unemployment decreases at the same time that employment increases for, say, semi-skilled men in sector A, the microsimulation program “hires” randomly from the EPH sample among the unemployed semi-skilled men. As explained above, individual incomes for the newly employed are assigned based on their characteristics (e.g., educational level) by using the coefficients of a Mincer equation estimated for those individuals employed in the base year. If the CGE simulations indicate a decrease in employment for a specific labor category and sector, the microsimulation program “fires” the equivalent percentage from the type of labor and sector, and the counterfactual income for those newly unemployed is zero.

The impact of changes in the sectoral structure of employment is indicated as *S* in the tables below. This effect is simulated by changing the sectoral composition of employment. For those individuals that move from one sector to another, we simulate a counterfactual labor income based on their characteristics and on their new sector of employment, drawing on a Mincer equation estimated for the base year with sectoral dummies.

The impact of changes in relative wages is indicated by *WI*. Wages in a sector are adjusted according to the changes from the CGE simulations but keeping the aggregate average wage for the economy constant. The impact of the change in the aggregate average wage for the economy, *W2*, is simulated by changing all labor incomes in all



sectors, by the same proportion, based on the changes from the CGE simulations. Next, all the previous steps are repeated several times and averaged.

Finally, *PL* is the impact of changes in the poverty line. The official extreme poverty (or indigence) line is recalculated for each scenario using the changes in the CGE simulations for the prices of the commodities used to compute the extreme poverty line in Argentina (only food items). Then the value for the official moderate poverty line is computed (as stated earlier) by assuming that the Engel coefficient stays fixed at base year values.<sup>13</sup>

## **Model simulations and results**

This section describes the main simulations and presents first the overall economic effects of liberalization and then their impacts on poverty and inequality. Unless otherwise stated (for specific simulations), the closure rules for the government, rest of world, and savings-investment balance are the same across all simulations.

### ***Simulations***

As with the other chapters in this volume, this case study is interested in better understanding the impact of agricultural and trade policies on poverty and inequality in Argentina. In the base year, no global or domestic liberalization is imposed, rather the model is calibrated to the actual situation of the country in 2005. A model scenario involving global liberalization of all goods markets can provide estimates of the bottom-line impacts. On its own, however, such a simulation does not reveal the relative importance of various policies at home and abroad in generating that estimated impact.

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<sup>13</sup> We have also run the microsimulations with an additional effect resulting from other factor incomes (land and non-human capital), which we do not report here. The non-labor income data from the EPH is weak, and cannot be taken as appropriately representing the distribution of non-labor incomes and factors across households. In any case, given that the poor do not have much non-labor income, the introduction of this adjustment does not change the poverty impact, although it does have an impact on the income distribution results.

Such differentiated analysis requires disaggregating the results in various ways. The contribution of agricultural reform alone is thus also analyzed separately, since in trade negotiations it is negotiated separately from other products. Currently, export taxes are not subject to negotiation in the WTO, so a reform to all goods, as well as to only agriculture, but without reforming export taxes, is also studied (the related simulations are labeled “WTO” only because of that fact and not because they represent the specific negotiating alternatives being discussed). Next, the chapter looks separately at rest-of-world versus own-country policy reform, again with and without non-agricultural reform. Finally, since in Argentina’s case its agricultural (and mineral and energy) policies are dominated by export taxes, the chapter examines the effects of just removing unilaterally its export tax regime for all goods as well as for just farm products. In summary, a BASE scenario is calibrated for 2005 and the following ten simulations are then run:

- Sim 1, **GLOB**: removing all agricultural subsidies and all import and export taxes on goods trade in rest-of-world and Argentina;
- Sim 2, **GLOBag**: Same as Sim 1 except just agricultural reform (i.e., domestic, import and export taxes and subsidies removed only on agricultural products);
- Sim 3, **WTO**: Same as Sim 1 except not removing export taxes;
- Sim 4, **WTOag**: Same as Sim 3 except just agricultural reform;
- Sim 5, **ROW**: Same as Sim 1 except just in rest of the world, and because it does not include Argentina, export taxes in this country are operational in this simulation;
- Sim 6, **ROWag**: Same as Sim 5 except just agricultural reform;
- Sim 7, **ARG**: Same as Sim 1 except just in Argentina;
- Sim 8, **ARGag**: Same as Sim 7 except just agricultural reform;
- Sim 9, **ARG-ex**: Same as Sim 7 except only removing export taxes in all categories of goods and services, and again only in Argentina;
- Sim 10, **ARGag-ex**: Same as Sim 9 except just agricultural reform.

### ***Overall economic results***

To understand the poverty and income distribution results reported later, it is necessary to first take a look at the impact of the reforms on macroeconomic variables and factor markets. Various indicators are summarized in Table 4 for the baseline and for the ten scenarios outlined above. In particular it is important to look at the interaction of the changes in the poverty line and unemployment, as these can have opposing impacts on poverty.

The results show a negative effect on the poverty line for all simulations (i.e., the poverty line increases relative to the base year, due to inflation of consumer prices). Under a scenario of global liberalization that removes all import and export taxes and agricultural subsidies (GLOB and GLOBag), the poverty line increases by more than 6 percent over the base year. The poverty line impact is strongest for this simulation due to the combination of increases in the world prices of agricultural goods (from global liberalization) and the elimination of export taxes, which boost domestic food prices. Even though the real exchange rate (defined in the model as the price of tradables over non-tradables) declines strongly, this is not enough to compensate for the elimination of export taxes and, therefore, the domestic prices of food increase. On the other hand, the results show that the impact on the poverty line is smallest in those simulations where export taxes in Argentina are not eliminated (WTO, WTOag, ROW, and ROWag).

The GLOB and GLOBag scenarios also both show negative impacts in terms of GDP, as do the scenarios of unilateral liberalization by Argentina (ARG, ARGag, ARG-ex, ARGag-ex). The negative impact on GDP is stronger for the unilateral scenarios, but especially so when only export (not in combination with import) taxes are eliminated.<sup>14</sup> In addition, GDP decreases by 1.7 percent in the case of liberalization of all export taxes in Argentina (ARG-ex) and by 0.9 percent in the case of liberalization of only agricultural export taxes in the country (ARGag-ex). This is partly a result of the assumption that Argentina has some degree of monopoly power in its export markets, but also a consequence of our treatment of unemployment in the model. The scenarios without changes in export taxes, which do include the elimination of import taxes and rest of the

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<sup>14</sup> In the protection database used in the global model (and applied to the Argentina model), agricultural import tariffs for Argentina are negligible, and therefore results for the elimination of agricultural import taxes only are also small and are not reported. However, the direction of the results for the elimination of agricultural import taxes alone can be inferred by comparing the simulations where only export taxes are changed (ARGag-ex) with those where both export taxes and import tariffs are considered jointly (ARGag).

world liberalization, all appear to increase GDP, particularly the two simulations with more traditional scenarios of national and world liberalization focusing on import taxes only (WTO and WTOag). In all cases, the impact of liberalization of all goods, rather than liberalization of only agricultural products, generates a larger GDP increase (or a smaller decrease where relevant).

In order to better understand the sectoral changes, Table 5 disaggregates GDP, exports, and imports into agricultural and non-agricultural groups,<sup>15</sup> and also presents the value of food consumption by households.

The declines in GDP generated by the elimination of export taxes result from the negative impact on non-agricultural GDP outweighing the positive impact on agricultural value added following the change in relative prices. The shift of incentives towards agriculture affects production in other sectors through the usual general equilibrium effect of taking capital and labor (once the pool of employable but unemployed workers is exhausted) away from them. The largest positive impact on agriculture is when domestic prices are increased by both higher world prices from liberalization in the rest of the world and the elimination of export taxes. Likewise with agricultural and non-agricultural exports, the former expand and the latter decline except in the case when import tariffs are eliminated for all products (when non-agricultural exports also increase: simulations GLOB, WTO, and ARG). A consequence of this export orientation of agricultural products is that food consumption by households (bottom row in Table 5) declines in all scenarios when export taxes are eliminated.

Table 4 also shows that unemployment increases in most of the simulations that include the elimination of export taxes, with the exception of the scenario (GLOB) that combines complete own liberalization (i.e. elimination of export and import taxes) with liberalization in the rest of the world for all products (but not when that scenario covers only agricultural products, GLOBag). The worst impact on employment comes from unilateral elimination of all export taxes in Argentina.

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<sup>15</sup> Agricultural activities, defined in the World Bank project, include agricultural and lightly processed food, excluding highly processed food, beverages and tobacco, which are GTAP sectors 25 (Food products nec) and 26 (Beverages and tobacco products). In our model they correspond to the following sectors in Table 4: 1. Cereals; 2. Vegetables and fruits; 3. Oil seeds; 4. Other crops; 5. Sugar cane and beet; 6. Livestock, milk and wool; 10. Meat; 11. Oils and fats; 12. Dairy products, and 13. Sugar.

The negative impact on employment of eliminating export taxes appears more pronounced on unskilled and semiskilled labor, and more pronounced on female than on male workers. In general, these results are explained by the factor intensities of the sectors that expand and contract after a given policy change (see discussion below).

On the other hand, both total world liberalization not including export taxes (WTO and WTOag) and total liberalization for the rest of the world (ROW and ROWag, which do not eliminate export taxes in Argentina) reduce unemployment (particularly the simulation WTO). Liberalization in the rest of the world benefits more unskilled labor, and benefits male workers more than female workers.

To understand the negative results on employment of eliminating export taxes, one needs to look at the sectoral composition of export taxes (Table 3) and the supply side response. In terms of sectoral composition, the largest export taxes are on grains, oilseeds, and oil. The elimination of these taxes increases the supply of primary product sectors that are less labor intensive than other activities, that supply inputs into other sectors, and for which the outward orientation of their sales increases significantly when export taxes are removed. The consequences of those three factors are less employment in general, through different and cumulative channels, discussed below.

Without a full employment specification, the first characteristic (low labor intensity) leads to declines in employment directly. In the case of agriculture particularly, land is shifted from livestock, industrial crops, and other products that tend to be more labor intensive, to grains and oilseeds that are less so. This negative employment effect at the primary level is reinforced by the fact that, since the commodities from these sectors are inputs into other production activities,<sup>16</sup> the increase in prices also affects those other activities, which tend to shrink in production and employment because of higher input prices. Primary products that before were transformed locally are now exported as raw materials and the domestic industry declines. Oil in particular, once processed and refined, is an input to most other activities, which are negatively affected by higher oil prices. Finally, the outward orientation of the expanding activities appreciates the real

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<sup>16</sup> For instance, cereals and oilseeds are inputs to, among other sectors, flour mills, oilseed processors, beef and poultry producers and processors, bakeries, and so on; and-- oil is an input to the refining industry, transportation and a variety of energy and chemical industries that in turn are inputs to other downstream activities.

exchange rate (see Table 4) which generates a form of “Dutch disease” for the rest of the tradables.

Moving to the other simulations, the positive impact of liberalization in the rest of world both on GDP and employment is obvious: it creates more markets for Argentina’s exports, and with the specification of the labor market and the high unemployment that prevailed in the base year, the expansion in aggregate demand leads to more production and employment. In turn, the elimination of import taxes triggers a different mechanism: it leads to more imports that, because of the closure assumption of fixed foreign savings, also require more exports. Therefore, the real exchange rate depreciates, which increases the production of tradables and expands employment. In general, the elimination of import taxes increases imports and moderates the appreciation of the domestic currency in most simulations in which it happens, and, in the simulation “WTO” for all products, even leads to a small overall depreciation of the real exchange rate (Table 4).

Note that the terms of trade tend to move against Argentina when export taxes are eliminated (Table 4). This is particularly the case when export taxes are eliminated unilaterally. As indicated, the specification followed in this project is to treat countries as having a degree of market power. Therefore, the elimination of export taxes depresses the world prices of the products whose supply expands significantly with that policy change.<sup>17</sup>

### ***Poverty and income distribution results***

The main results in terms of poverty are shown in Table 6, based on both the national extreme poverty (or indigence) line and the moderate poverty line. Table 7 presents the results of the Gini coefficient for household per capita income and also for labor income. Each of the simulation results shows the observed base-year poverty (or inequality) results in the first row, followed by the poverty and/or inequality results under each of the

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<sup>17</sup> We also ran the scenarios with exogenously fixed world prices (i.e. with the “small country” assumption). The effects on unemployment and poverty are comparable, in their direction and interpretation, with those presented here. A tentative conclusion, which may require further analysis, is that it is the structure of the economy, and the development pattern that ensues from the elimination of export taxes, which drives the poverty and income distribution results discussed here, and not necessarily the “large country” assumption.

steps explained above in the microsimulation section. Therefore the second-to-last row shows the cumulative effect of all of the changes ( $U$ ,  $S$ ,  $W1$ ,  $W2$ , and in the case of the poverty line,  $PL$ ) on the poverty and inequality results. The last row shows the results in percent change from the observed base-year value.

In terms of poverty, world trade liberalization (excluding export taxes; simulation WTO) for all goods diminishes both moderate and extreme poverty in Argentina. As indicated, there are two opposite effects at work, but here the end result is a reduction in poverty. On the one hand, the increase in the poverty line increases (Table 4) affects the poor negatively. This increase is also the result of opposing forces: although the elimination of import taxes lowers domestic prices, increases in world food prices and the devaluation of the domestic currency work in the opposite direction. The negative impact of a higher poverty line, however, is more than compensated by a strong employment effect: Table 4 shows that the “WTO” trade scenario is the one that generates the largest decline in unemployment (2.6 percentage points). Therefore, poverty declines in this trade liberalization scenario. The same scenario of liberalization but only for agriculture, however, does not reduce poverty: the employment effect is far weaker, and is more than offset by the negative impact on poverty of the increase in the poverty line.

Liberalization in the rest of the world (ROW and ROWag) initially reduces poverty slightly through the employment effect, but then this is more than compensated by the increase in the poverty line (due to higher world food prices), resulting in a small increase in poverty overall (it is worse when only agriculture is liberalized, ROWag).<sup>18</sup> This suggests that the positive impact on poverty from the simulation that includes both the rest of the world and Argentina (WTO) is driven in good measure by domestic, and not international, liberalization in nonagricultural goods.

If both own liberalization (exports and imports) and liberalization in the rest of the world are considered (GLOB and GLOBag), poverty increases. In the case of liberalization of all products (GLOB), there is a positive employment effect on poverty (but not when only agricultural products are considered) that, again, is more than compensated by the increase in the poverty line.

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<sup>18</sup> In any case, given that, other than export taxes, Argentina does not have agriculture-related policies that are changed, the results of the simulations WTOag and ROWag are basically the same.

The main difference in policies in the scenarios GLOB and GLOBag compared to WTO and ROW is that now export taxes in Argentina are also eliminated. In fact, all simulations that include their elimination, either on all goods or only for agriculture, show an increase in the poverty headcount. Particularly negative for the poverty headcount is the unilateral elimination of export taxes by Argentina. The first negative impact comes from the unemployment effect, which, as indicated before, results from a combination of moving from the production of greater value added goods to primary products that are less labor intensive, and a form of “Dutch Disease” on the non-agricultural sectors. A second and additional negative effect, which is generally stronger in the simulations than the unemployment effect, results from the increase in the poverty line due to higher food prices (see the line “ $U + S + WI + W2 + PL$ ” in all poverty simulations). In general, the sectoral and wage effects do not make much of a difference in poverty terms.

Table 7 shows the results on income distribution. Simulations that include the elimination of export taxes increase income disparities slightly, both at the household level and considering only employed labor incomes. On the other hand, liberalization in the rest of the world and Argentina without changing export taxes (WTO and WTOag), and liberalization only in the rest of the world (ROW), produce small but positive effects, reducing inequality. Land receives important increments in factor incomes (not shown here) in all simulations involving the elimination of export taxes, which should increase income inequality (see footnote 13 above).

At least within the context of a static framework, the simulation results suggest that export taxes help to reduce poverty and inequality, generate additional employment opportunities that the production and exports of raw materials would not have provided, and help to support a more competitive exchange rate. Also, the simulations imply that (under the “large country” assumption) the elimination of export taxes negatively affects the country’s terms of trade.<sup>19</sup>

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<sup>19</sup> We also ran an “optimal trade tax simulation,” based on the notion that if a country has market power internationally, there must be a positive trade tax rate that maximizes some indicator of welfare for that country. Based on real GDP, the rates in the base year should be increased by about 80 percent, which would mean that, just giving some examples, the export tax rate for cereals should go from 24 percent to 43 percent, oilseeds from 29 percent to 52 percent, and oil products from 20 percent to 36 percent. If the objective is to maximize employment, export taxes should be somewhat larger than in the case of GDP



The simulations reported here differ from the results in Nogués *et al.* (2007) and Nogués (2008), who argue that poverty increases with the export taxes. The discrepancies in results are the consequence of the differences in methodological framework (see the discussion in Appendix 2).

### ***Fiscal and growth implications***

Two other important issues that the simulations raise are the fiscal and growth effects of the different liberalization scenarios. Regarding fiscal accounts, our model is run with a balanced budget, with increases in direct tax rates compensating for any change in trade tax revenues. Table 8(a) shows the collection of different taxes as a percentage of GDP in the various scenarios, focusing on trade and direct (income) taxes. The scenarios with the elimination of only agricultural export taxes still collect some export tax revenue from other products (about 0.5 percent of GDP, mainly from oil and energy commodities). The increase in direct taxes needed to close the fiscal gap is somewhat more than the direct revenues lost (2.2 percent of GDP) because government consumption is fixed in real terms which means that the nominal cost of running the government, and therefore the potential need to collect additional taxes, also changes with the simulations. Also, because GDP declines, taxes as a percentage of GDP increase somewhat (and vice-versa in the scenarios where GDP increases).<sup>20</sup>

It has also been suggested that, in order to counter the poverty effects of the export taxes, VAT taxes could be reduced to compensate the poor for higher food prices. In addition, it has been argued that more targeted safety nets, such as conditional cash transfers (like the “Familias” program in Argentina), or food stamps of some sort, could be utilized to counter the negative impacts on poverty of eliminating export taxes.

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maximization. These numbers must be viewed with extreme caution, however, because of the uncertainties about the shape of the demand curves assumed in the World Bank global model. Further work needs to be done on the impact of the large country assumption, which may be forcing a more extreme agricultural specialization than is warranted.

<sup>20</sup> This result is in contrast to that estimated by Nogués *et al.* (2007), who claim that a non-trivial portion of those revenues can be recovered by maintaining the rates of other taxes at their baseline level. Their partial equilibrium analysis still estimates a net loss of fiscal revenues, but a far smaller one than that suggested by the above simulations using a general equilibrium model. Given the high debt-to-GDP ratio and public debt payments in Argentina, the negative macroeconomic effects of a drop in tax revenues could be considerable.

However, both suggestions would entail even larger fiscal revenue losses, with their negative macroeconomic implications. Moreover, while those remedies would address the poverty line (PL) part of the poverty impact, they would not solve the employment issue (U). Another alternative, involving raising the indirect (VAT) tax rate (perhaps just on non-food items so as not to hurt the poor), again may adversely affect employment.

Another important issue is the growth effects of export taxes. It could be argued that, even if the actual effects are as reported here in the short term, in the medium to longer term the elimination of export taxes could generate stronger growth that may more than compensate for the immediate negative impact on employment, the poverty line and inequality. The simulations presented here can give some indication of the dynamics going forward, via the change in real investment in the different simulations relative to the base year (Table 8(b)). The simulations with the unilateral elimination of export taxes alone (ARG-ex and ARGag-ex) do increase real investment. Even though the increase is less than 1 percent, that would accumulate over time and could turn out to be significant. A counter-argument is that a more-diversified productive structure, with investments flowing to non-agricultural sectors, may have a better payoff in terms of higher economic growth and less poverty and inequality. Those are all legitimate claims worthy of empirical analysis,<sup>21</sup> and raise the question as to what type of development path would be more pro-poor in Argentina. Given this country's agrarian structure, with a bigger presence of large holdings than in many other developing countries, this issue has long been a matter of policy debate in the country, recognizing that export taxes generate a more diversified economic structure and that their elimination may undermine that goal.

## **Final comments**

This chapter has analyzed several scenarios involving trade liberalization at home and abroad, both for all products and only for agriculture, and has estimated their impacts on poverty and inequality in Argentina. Global trade liberalization for all products but not

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<sup>21</sup> Gómez Galvarriato and Williamson (2008) and Williamson (2008) provide historical perspectives on the wisdom of countries exploiting the positive terms of trade in primary products and further specializing in those products versus maintaining a more diversified structure.

including an elimination of export taxes (scenario WTO) reduces poverty and inequality. This result is due to strong employment effects that are not negated by the increases in the poverty line which take place. However, if the same liberalization scenario applies only to agricultural products, poverty and inequality do not improve, and even deteriorate somewhat, mostly because the smaller (but still positive) employment effect is now more than offset by the increase in the poverty line. All other simulations, particularly those that eliminate export taxes, affect poverty and inequality more negatively, not only because the poverty line increases with higher food prices but also because employment effects are small or negative.

Should one then conclude that export taxes, particularly in agricultural products, are always good for poverty reduction? Such a conclusion would be premature. First, any statements in this regard must be tempered by the fact that the coverage of the EPH household survey is tilted towards Argentina's urban locations. Although the results from the CGE model, which obviously includes all sectors and population, show declines in overall employment and increases in the value of the poverty line (all negative effects for the poor), it is not possible to glean from these results what may happen if the rural population not covered in the survey were to be included. Second, the simulations do not say anything about the impact on the rest of the world of higher agricultural prices, and the impact on poverty outside Argentina resulting from export taxes.<sup>22</sup> Third, the model used in this chapter has other limitations, particularly the fact that it does not include the medium- to long-term dynamic effects on production and technological innovation that may result from policy reforms. Clearly there remains plenty of scope for further empirical economic analysis.

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<sup>22</sup> It should be noted that in the case of Argentina, the devaluation and normalization of the real exchange rate in line with this country's history, even though compensated in part by export taxes, has delivered a strong production and export response, as argued above and in Appendix 1. Other things equal, the result of all policy reforms followed in Argentina this decade (notwithstanding the inclusion of new export taxes) should have reduced upward pressures on agricultural prices in international markets.

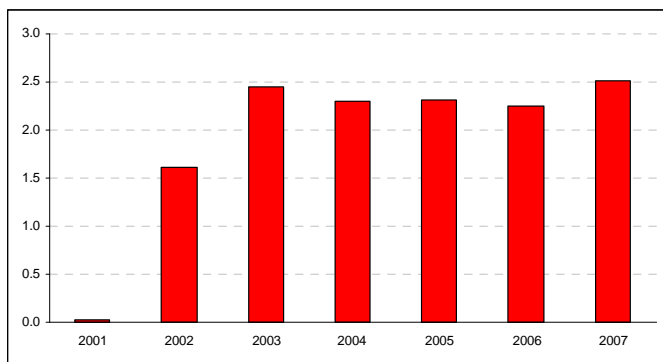
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Figure 1: Export taxes, Argentina, 2001 to 2007

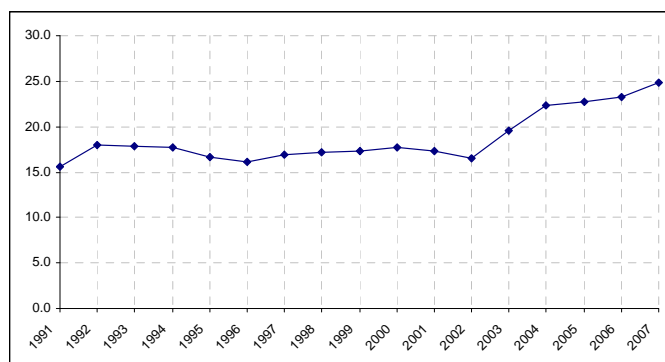
(percent of GDP)



Source: Ministry of Economy (2008).

Figure 2: Tax revenue, Argentina, 1991 to 2007

(percent of GDP)

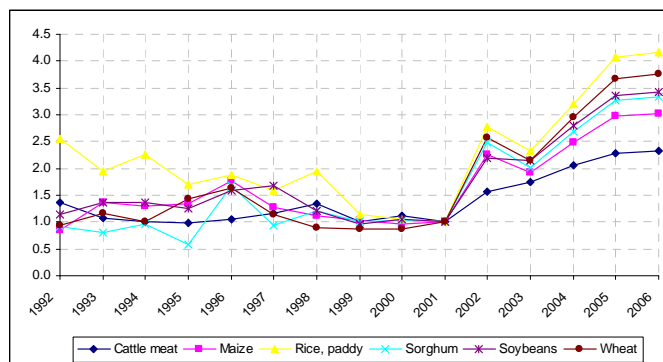


Source: Ministry of Economy (2008).



Figure 3: Agricultural producer prices indices, Argentina, 1992 to 2006

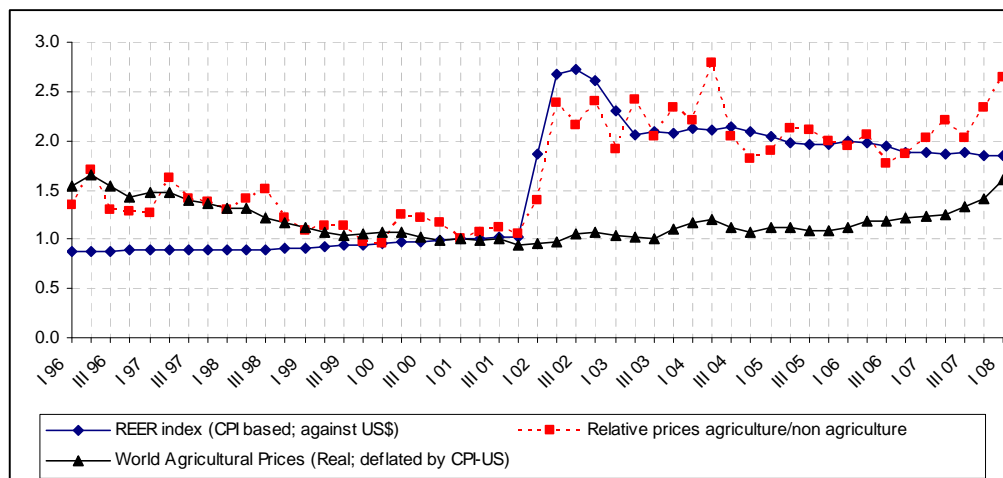
(Pesos deflated by CPI, 2001=1.0)



Source: FAOSTAT (2008) and Ministry of the Economy (2008).

Figure 4: Indices<sup>a</sup> of the international price of agricultural products,<sup>b</sup> relative domestic price of agricultural products,<sup>c</sup> and the real effective exchange rate,<sup>d</sup> Argentina, 1996 to 2008

(2001 Q1 = 1.0)



<sup>a</sup> All variables are normalized to 1 for the first quarter of 2001.

<sup>b</sup> An index of real prices for world agricultural prices (the weighted average of IMF indices for “Food,” “Beverages” and “Agricultural Raw Materials,” using IMF weights, deflated by the US Consumer Price Index).

<sup>c</sup> An index of domestic relative prices between the agricultural sector and total GDP (measured as the ratio of the deflator of agricultural value added in GDP at factor cost to the total GDP deflator at factor cost).

<sup>d</sup> An index of the real effective exchange rate (REER) of the Argentine peso against the US dollar, calculated using the average nominal exchange rate (pesos per US dollar), and the consumer prices indices of Argentina and the US.

Source: Authors’ calculations based on data from the Ministry of the Economy (2008).

Table 1: Components of the social accounting matrix, Argentina, 2005

<b>Sectors (26)</b>	<b>Sectors (26) -- (cont)</b>	<b>Institutions (3)</b>
Primary	Other manufactures	Household
1 Cereals	18 Textiles and apparel	Government
2 Vegetable and fruits	19 Petroleum refinery	Rest of World
3 Oil seeds	20 Chemical products	
4 Other crops	21 Mineral products	<b>Taxes (9)</b>
5 Sugar cane and beet	22 Metal products	Value added tax
6 Livestock, milk and wool	23 Machinery and equipment	Fuel tax
7 Other non-agr primary	24 Vehicles	Financial services tax
8 Mining	25 Other manufacturing	Export taxes
9 Oil	26 Services	Tariffs
		Turnover tax
Processed food	<b>Factors (7)</b>	Taxes on products
10 Meat	Unskilled labor, male	Income tax
11 Oils and fats	Unskilled labor, female	Factor tax
12 Dairy products	Semi-skilled labor, male	
13 Sugar	Semi-skilled labor, female	<b>Savings-Investment (1)</b>
14 Flour, bakery and pasta	Skilled labor, male	Savings-Investment
15 Feed products	Skilled labor, female	
16 Other proc food	Capital, specific and mobile	
17 Beverages and tobacco	Land, mobile bt agric sectors	

Source: Argentina 2005 Social Accounting Matrix prepared by the authors.

Table 2: External trade structure, Argentina, 2005

(percent)

Sector	Sectoral share of total goods exports	Sectoral share of total goods imports	Share of exports in sectoral production	Share of imports in domestic production
Primary				
Cereals	5.9	0.0	55.0	0.4
Vegetable and fruits	2.3	0.3	29.5	4.6
Oil seeds	4.8	0.5	30.9	3.8
Other crops	0.8	0.4	9.9	4.8
Sugar cane and beet	n/a	n/a	n/a	n/a
Livestock, milk and wool	0.5	0.1	1.8	0.2
Other non-agr primary	0.2	0.2	8.4	9.1
Mining	3.4	2.9	29.2	23.7
Oil	5.8	0.7	25.3	3.7
Processed food				
Meat	4.1	0.2	19.0	1.0
Oils and fats	16.3	0.1	86.8	4.0
Dairy products	1.5	0.1	13.7	0.6
Sugar	0.3	n/a	19.5	n/a
Flour, baking and pasta	0.7	0.1	4.1	0.7
Feed products	0.1	0.1	7.7	3.9
Other processed food	4.6	1.2	31.6	9.5
Beverages and tobacco	1.2	0.2	7.7	1.0
Other manufactures				
Textiles and apparel	3.7	4.2	18.5	18.5
Petroleum refinery	8.7	2.6	39.4	14.6
Chemical products	9.2	19.4	26.8	40.4
Mineral products	0.5	1.0	6.2	10.2
Metal products	7.2	7.1	21.5	19.4
Machinery and equipment	4.3	33.6	19.6	62.8
Vehicles	8.1	15.9	42.4	56.0
Other manufacturing	5.9	9.2	14.2	18.4
Total	100.0	100.0	11.8	10.8

Source: Argentina 2005 SAM prepared by the authors.

Table 3: Export taxes and import tariffs, Argentina, 2005

(percent)

<b>Sector</b>	Import taxes	Export taxes
Primary		
Cereals	0.0	24.0
Vegetable and fruits	0.0	7.0
Oil seeds	0.0	29.0
Other crops	0.0	6.6
Sugar cane and beet	0.0	0.0
Livestock, milk and wool	0.0	7.8
Other non-agr primary	1.0	0.9
Mining	1.0	0.9
Oil	1.0	30.0
Processed food		
Meat	0.0	4.4
Oils and fats	0.0	20.0
Dairy products	0.0	5.0
Sugar	0.0	2.0
Flour, bakery and pasta	9.7	0.0
Feed products	6.4	0.0
Other proc food	7.7	0.0
Beverages and tobacco	11.7	0.0
Other manufactures		
Textiles and apparel	13.2	0.3
Petroleum refinery	0.9	0.9
Chemical products	7.6	0.9
Mineral products	8.1	0.9
Metal products	10.0	0.9
Machinery and equipment	11.1	0.9
Vehicles	13.8	0.9
Other manufacturing	10.4	0.9

Source: Anderson and Valenzuela (2008) for export taxes, Argentina's SAM 2005 prepared by the authors for import tariffs.

Table 4: Aggregate simulation results for Argentina of prospective liberalizations

	<i>BASE</i>	<i>GLOB</i>	<i>GLOBag</i>	<i>WTO</i>	<i>WTOag</i>	<i>ROW</i>	<i>ROWag</i>	<i>ARG</i>	<i>ARG</i> <i>ag</i>	<i>ARG</i> <i>-ex</i>	<i>ARG</i> <i>ag-ex</i>
GDP factor cost (bn LCU) <sup>a</sup>	4,395	-0.2	-0.8	1.5	0.2	0.3	0.2	-0.4	-0.9	-1.7	-0.9
Household consumption (bn LCU) <sup>a</sup>	3,263	0.5	0.0	2.1	0.9	1.0	0.9	-0.5	-0.8	-1.7	-0.8
Poverty line <sup>a</sup>	--	6.3	6.0	2.1	1.2	1.3	1.2	4.9	4.8	4.1	4.8
Real exchange rate <sup>a</sup>	1.0	-4.6	-6.3	0.5	-2.9	-2.0	-2.9	-2.7	-3.5	-5.3	-3.5
Terms of trade <sup>a</sup>	--	0.1	1.6	1.0	2.0	2.3	2.0	-2.2	-0.6	-1.3	-0.6
Unemployment rate (%) <sup>b</sup>	12.3	-0.4	0.8	-2.6	-0.4	-0.6	-0.4	0.1	1.1	2.4	1.1
Unskilled labor, female	29.4	-0.4	0.7	-2.4	-0.3	-0.6	-0.3	0.1	0.9	1.9	0.9
Semi-skilled labor, female	18.8	0.1	1.0	-2.4	-0.2	-0.4	-0.2	0.4	1.1	2.4	1.1
Skilled labor, female	5.1	-0.4	1.0	-2.6	-0.1	-0.4	-0.1	-0.1	1.1	2.4	1.1
Unskilled labor, male	14.3	-0.4	0.6	-3.0	-0.6	-0.8	-0.6	0.2	1.1	2.5	1.1
Semi-skilled labor, male	9.4	0.0	1.0	-2.8	-0.4	-0.5	-0.4	0.4	1.3	2.8	1.3
Skilled labor, male	4.1	-1.1	0.5	-1.6	-0.5	-0.5	-0.5	-0.7	0.9	2.0	0.9
Returns to factors <sup>a</sup>											
Unskilled labor, female	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Semi-skilled labor, female	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skilled labor, female	--	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unskilled labor, male	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Semi-skilled labor, male	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skilled labor, male	--	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Land	--	62.4	59.3	20.6	12.1	12.9	12.1	46.2	44.6	37.3	44.6
Capital, specific agric	--	79.1	76.3	18.4	10.7	11.2	10.7	63.8	62.2	53.9	62.2
Capital, specific non-agric	--	2.6	-3.1	1.6	-0.7	-0.6	-0.7	3.5	-2.4	0.9	-2.4
Capital, mobile	--	5.4	1.4	2.7	0.1	0.2	0.1	5.1	1.2	2.4	1.2

<sup>a</sup> Percentage change from base<sup>b</sup> Percentage points difference from base

Source: Authors' Argentine CGE model simulations.

Table 5: Sectoral simulation results for Argentina of prospective liberalizations

(percent change from base)

	BASE (billion LCU)	GLOB	GLOBag	WTO	WTOag	ROW	ROWag	ARG	ARGag	ARG- ex
GDP, agriculture	434	16.5	16.1	9.6	6.6	6.8	6.6	10.4	10.4	8.0
GDP, non-agriculture	3,961	-2.0	-2.7	0.6	-0.5	-0.4	-0.5	-1.6	-2.1	-2.8
Exports, agriculture	470	44.0	43.8	15.3	11.4	10.9	11.4	34.4	34.6	30.4
Imports, agriculture	15	113.5	104.2	0.2	-3.0	1.0	-3.0	115.5	116.5	113.0
Exports, non-agriculture	894	0.6	-17.1	4.5	-7.1	-6.7	-7.1	7.4	-10.6	-4.0
Imports, non-agriculture	1,025	19.4	6.3	12.6	2.2	2.3	2.2	17.1	3.9	7.0
Food consumption (households)	641	-0.7	-1.1	1.5	0.6	0.7	0.6	-1.3	-1.6	-2.3

Source: Authors' Argentine CGE model simulations.

Table 6: Poverty effects for Argentina of prospective liberalizations<sup>a</sup>

(headcount percentage)

*(a) Official extreme poverty line*

Effect	BASE	GLOB	GLOBag	WTO	WTOag	ROW	ROWag	ARG	ARGag	ARGag
Observed	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
U	12.7	12.6	13.0	11.9	12.6	12.5	12.6	12.7	13.1	13.1
U + S	12.7	12.6	13.0	11.9	12.6	12.5	12.6	12.7	13.1	13.1
U + S + W1	12.7	12.6	13.0	11.9	12.6	12.5	12.6	12.7	13.1	13.1
U + S + W1 + W2	12.7	12.6	13.0	11.9	12.6	12.5	12.6	12.7	13.1	13.1
U + S + W1 + W2 + PL	12.7	13.7	14.2	12.2	12.8	12.7	12.8	13.6	14.0	14.0
change from base		8.5%	11.8%	-3.4%	1.1%	0.6%	1.1%	7.5%	10.9%	10.9%

*(b) Official moderate poverty line*

Effect	BASE	GLOB	GLOBag	WTO	WTOag	ROW	ROWag	ARG	ARGag	ARGag
Observed	34.2	34.2	34.2	34.2	34.2	34.2	34.2	34.2	34.2	34.2
U	34.2	34.1	34.7	33.0	34.1	34.0	34.1	34.3	34.8	34.8
U + S	34.2	34.1	34.8	33.1	34.1	34.0	34.1	34.3	34.8	34.8
U + S + W1	34.2	34.1	34.8	33.1	34.1	34.0	34.1	34.3	34.8	34.8
U + S + W1 + W2	34.2	34.1	34.8	33.1	34.1	34.0	34.1	34.3	34.8	34.8
U + S + W1 + W2 + PL	34.2	36.5	37.1	33.8	34.5	34.5	34.5	36.2	36.7	36.7
change from base		6.6%	8.5%	-1.3%	0.9%	0.9%	0.9%	5.7%	7.3%	7.3%

<sup>a</sup>The net impact is the sum of the impacts of changes in 5 variables, where *U* refers to those due to the unemployment rate changing, *S* to changes in the sectoral structure of employment, *W1* to changes in relative wages, *W2* to changes in the aggregate average wage for the economy, and *PL* to changes in the poverty line.

Source: Authors' Argentine CGE model simulations.



Table 7: Income inequality effects for Argentina of prospective liberalizations<sup>a</sup>

(Gini coefficient)

*(a) Household per capita income*

Effect	BASE	GLOB	GLOBag	WTO	WTOag	ROW	ROWag	ARG	ARGag	ARG-ex	ARGag-ex
Observed	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499	0.499
U	0.499	0.499	0.500	0.495	0.498	0.498	0.498	0.499	0.500	0.502	0.500
U + S	0.499	0.499	0.500	0.495	0.498	0.498	0.498	0.499	0.500	0.502	0.500
U + S + W1	0.499	0.499	0.500	0.495	0.498	0.498	0.498	0.499	0.500	0.502	0.500
U + S + W1 + W2	0.499	0.499	0.500	0.495	0.498	0.498	0.498	0.499	0.500	0.502	0.500
change from base		0.00%	0.20%	-0.70%	-0.10%	-0.20%	-0.10%	0.10%	0.30%	0.60%	0.30%

*(b) Employed labor income*

Effect	BASE	GLOB	GLOBag	WTO	WTOag	ROW	ROWag	ARG	ARGag	ARG-ex	ARGag-ex
Observed	0.472	0.472	0.472	0.472	0.472	0.472	0.472	0.472	0.472	0.472	0.472
U	0.472	0.472	0.472	0.471	0.472	0.472	0.472	0.472	0.472	0.473	0.472
U + S	0.472	0.472	0.472	0.471	0.472	0.472	0.472	0.472	0.472	0.473	0.472
U + S + W1	0.472	0.472	0.472	0.471	0.472	0.472	0.472	0.472	0.472	0.473	0.472
U + S + W1 + W2	0.472	0.472	0.472	0.471	0.472	0.472	0.472	0.472	0.472	0.473	0.472
change from base		0.00%	0.10%	-0.20%	0.00%	-0.10%	0.00%	0.10%	0.10%	0.30%	0.10%

<sup>a</sup>The net impact is the sum of the impacts of changes in 5 variables, where *U* refers to those due to the unemployment rate changing, *S* to changes in the sectoral structure of employment, *W1* to changes in relative wages, *W2* to changes in the aggregate average wage for the economy, and *PL* to changes in the poverty line.

Source: Authors' Argentine CGE model simulations.

Table 8: Fiscal and real investment effects for Argentina of prospective liberalizations

(a) Trade and income taxes (% of GDP)<sup>a</sup>

	<i>BASE</i>	<i>GLOB</i>	<i>GLOBag</i>	<i>WTO</i>	<i>WTOag</i>	<i>ROW</i>	<i>ROWag</i>	<i>ARG</i>	<i>ARGag</i>	<i>ARG-ex</i>	<i>ARG-ag-ex</i>
Import tax	1.5	0.0	1.5	0.0	1.5	1.5	1.5	0.0	1.5	1.6	1.5
Export tax	2.2	0.0	0.5	2.4	2.3	2.3	2.3	0.0	0.5	0.0	0.5
Direct (income) tax	7.5	11.2	9.2	8.4	7.3	7.2	7.3	11.3	9.3	10.1	9.3

## (b) Real investment

	<i>BASE</i>	<i>GLOB</i>	<i>GLOBag</i>	<i>WTO</i>	<i>WTOag</i>	<i>ROW</i>	<i>ROWag</i>	<i>ARG</i>	<i>ARGag</i>	<i>ARG-ex</i>	<i>ARG-ag-ex</i>
Billion LCUs, level and change from base	1,114	4.2	2.4	3.5	1.6	1.6	1.6	2.6	0.8	0.6	0.8
As % of GDP at market prices	20.8	21.4	21.3	21.2	21.1	21.0	21.1	21.1	21.0	21.0	21.0

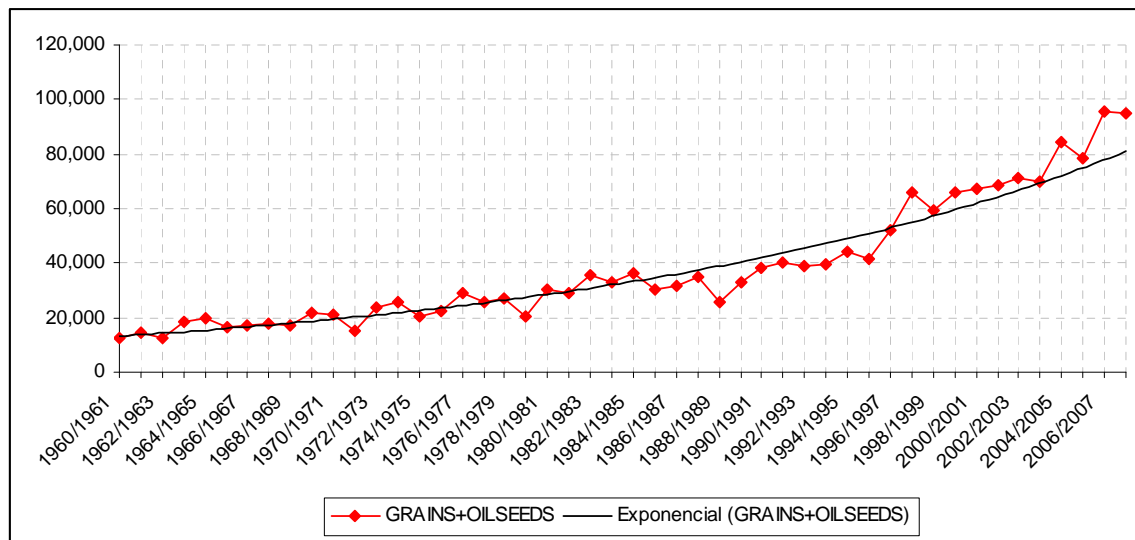
<sup>a</sup> The total tax revenue is kept constant at 29 percent of GDP.

Source: Authors' Argentine CGE model simulations.

### Appendix 1: Argentine recent agricultural production growth

Since 2003 the volume of crop production in Argentina has jumped significantly above trend, which itself has been accelerating. Compared to the (exponential) trend shown in Appendix Figure A.1, Argentina's production of grains and oilseeds during 2003-2007 has been about 10 percent above that trend, for an accumulation of almost 40 million metric tons (MT) of excess production during that period that would not have been available had Argentina stayed on trend.

Appendix Figure A.1: Grain and oilseed production, Argentina, 1960 to 2008  
(‘000 metric tons)



Source: USDA (2008).

Appendix Table A.1 presents a more disaggregated view for grains, oilseeds and byproducts, and beef. For each product the following five variables are shown: national production and exports, Argentina's share of world production and of world exports, and the share of Argentina's production that is exported (Argentina's imports of those products are negligible.) The main comparison is between the period 2003-07 and the 1990s. The period of the crisis, 1999-2002, is also included as a reference because,

usually, food exports tend to expand during economic crises mainly due to declines in domestic consumption. The data comes from the PSD database of the USDA (2008).

It is clear that the physical volume of production and exports increased noticeably during the period 2003-07 across all products shown, when compared to the 1990s or with the crisis period 1999-2002. How does that supply and export response compare to the world as a whole? The next two variables, which include Argentina's production and exports as a percentage of the respective world values, show that, in general, the participation of Argentina in the rest of the world also went up in 2003-2007. If the main reason for Argentina's increases in production were world prices, but this incentive effect was muted by export taxes, Argentina should have decreased its global participation, and not increased it, other things equal. This last effect is in line with the strong shift in domestic incentives shown in Figures 4 and 5 as a result of normalizing the real exchange rate up to Argentina's historical levels of 1975-1990, before the Convertibility program engineered a sustained overvaluation of the Argentine currency.

The last variable in Appendix Table A.1 shows that Argentina, on average and for most products, has been selling to the rest of the world a larger percentage of production. Even though there has been some rebalance in the last two years shown for animal products, the export orientation is stronger than in the past.

Appendix Table A.1: Grain, beef and oilseed production and exports, Argentina, 1990 to 2007

	Average 1990s	Average 1999- 2002	Average 2003- 2007	Average two last campaigns	Last campaign 2006/7
<b>GRAINS</b> <sup>a</sup>					
Production (1000 MT)	29,166	35,498	38,335	38,958	43,429
Total Exports (1000 MT)	16,404	21,845	24,065	23,915	27,764
Production Argentina/World	1.6%	1.9%	1.9%	1.9%	2.2%
Exports Argentina/World	7.4%	9.3%	9.7%	9.3%	10.7%
Exports/Production Argentina	55.0%	61.4%	62.5%	61.1%	63.9%
<b>BEEF</b>					
Production (1000 MT CWE)	2,657	2,765	3,086	3,150	3,200
Total Exports (1000 MT CWE)	393	306	567	542	532
Production Argentina/World	5.2%	5.1%	5.3%	5.3%	5.3%
Exports Argentina/World	6.6%	5.1%	8.0%	7.2%	7.0%
Exports/Production Argentina	14.8%	11.0%	18.3%	17.2%	16.6%
<b>OILSEED MEALS</b>					
Production (1000 MT)	10,639	17,123	24,531	26,986	27,364
Total Exports (1000 MT)	10,117	16,838	23,385	25,809	26,442
Production Argentina/World	10.7%	13.2%	16.0%	16.7%	16.5%
Exports Argentina/World	31.4%	41.1%	44.4%	45.9%	45.9%
Exports/Production Argentina	94.9%	98.3%	95.3%	95.6%	96.6%
<b>OILSEED OILS</b>					
Production (1000 MT)	3,770	5,141	6,960	7,593	7,637
Total Exports (1000 MT)	3,119	4,519	6,206	6,824	6,830
Production Argentina/World	13.1%	14.3%	16.0%	16.5%	16.2%
Exports Argentina/World	40.0%	45.4%	48.2%	48.4%	47.0%
Exports/Production Argentina	81.8%	88.1%	89.1%	89.9%	89.4%
<b>OILSEEDS</b>					
Production (1000 MT)	19,393	32,774	43,860	48,300	52,300
Total Exports (1000 MT)	3,272	6,721	8,338	8,446	9,597
Production Argentina/World	12.3%	16.0%	18.0%	18.6%	19.5%
Exports Argentina/World	9.5%	12.0%	12.6%	12.2%	13.2%
Exports/Production Argentina	17.4%	20.3%	19.1%	17.4%	18.3%

a. Grains (wheat, corn, rice, sorghum, oats, rye, barley, millet).

Source: USDA (2008).

## Appendix 2: Comparison with trade policy analysis by Nogués *et al.* (2007) and Nogués (2008)

While this paper follows a general equilibrium approach, Nogués *et al.* (2007) and Nogués (2008) use two separate partial equilibrium methodologies that they characterize as a macro and a micro approach. For the first one, they: (a) take the increase of agroindustrial value added (only) from Anderson and Valenzuela (2007); (b) then multiply that growth by the share of agroindustry in the Argentine economy, and assume that such product is equivalent to the impact on total GDP growth; and (c) then use a poverty-growth elasticity equation, estimated for the period 1998-2006.

Several points deserve mention. First, the right approach is to use total GDP growth from Anderson and Valenzuela (2007). Some of the tables in that paper, as well as the simulations presented here (Tables 4 and 5) suggest negative effects from export taxes on total GDP due to the negative impact on non-agricultural GDP. Therefore, it cannot be assumed that agroindustry grows while the rest of the economy stays the same. Second, the poverty-growth elasticity estimates should be viewed with caution: they are estimated over an unusual period in Argentina's economic history (that exaggerates the impact of growth on poverty, due to the deep crisis and recovery); show autocorrelation in the residuals (which invalidates the t-tests on the coefficients); and they are reduced-form equations subject to the Lucas critique (i.e., a regression is run with a policy framework in place with its associated poverty and income distribution effects, and then the same equation is applied for a totally different policy regime). The last point here is that the growth effect on poverty depends on income distribution too (see, for instance, Ravallion 2004), and the change in policy regime (i.e. the elimination of export taxes) also changes the underlying income distribution. Therefore, the estimated equation cannot be used without adjusting for income distribution effects under these two different policy regimes.<sup>23</sup>

In turn, the micro approach: (a) assumes a price transmission from the elimination of export taxes to only the products in the consumption food basket (i.e. there are no

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<sup>23</sup> See Ravallion (2004), where he adjusts the growth elasticity of poverty taking into account possible nonlinearities in the relationship between such elasticity and inequality. He concludes that "growth will be quite a blunt instrument against poverty unless that growth comes with falling inequality".

effects on other prices and the exchange rate, which, as shown in the present CGE paper, also adjust in a general equilibrium setting); and (b) assumes the transmission of higher prices to higher nominal incomes, but without considering possible employment effects of such increases in real wages. In other words, their simulations assume that nominal wages grow, over three years, so as to more than compensate for the price increases in the poverty consumption basket. But this increase in real wages, other things equal, should have negative employment effects, which would add to poverty. Their approach, however, assumes away general equilibrium effects on non-agricultural prices and employment that are crucial for poverty evaluation. In the simulations in the present paper, on the other hand, all those effects are captured in a general equilibrium model. It should also be noted that even with those assumptions, Nogués *et al.* (2007) and Nogués (2008) find that extreme poverty (indigence) increases, and that also non-extreme poverty increases on impact, and only declines after 2 years.