EXPORT TAXATION:

THE CASE OF ARGENTINA

by

William N. Dowd

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Approved: _____
Jeffrey B. Miller, Ph.D.
Professor in charge of thesis on behalf of the Advisory Committee

Approved: _____
Kenneth J. Campbell, Ph.D.
Committee member from the Department of Political Science and
International Relations

Approved: _____
John G. McNutt, Ph.D.
Committee member from the Board of Senior Thesis Readers

Approved: _____
Alan Fox, Ph.D.
Director, University Honors Program

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ABSTRACT

This paper uses a partial equilibrium method to determine the welfare-enhancing export tax level for Argentine soybeans, which is determined to be 25.29 percent. The actual export tax level on soybeans of 35 percent significantly exceeds the welfare-enhancing level, and the progressive export tax system that was in effect between March and July of 2008, due to a Presidential decree, set the rate even higher, at 44.1 percent. After examining the political and economic atmosphere in Argentina, I contend that the deviation between the optimal and actual tax rates can be explained by the government's desire to generate additional revenue and protect domestic industry. Furthermore, the current administration's policies clearly favor the industrial sector over the agricultural sector – two sectors of the economy that have historically been at odds with one another.

The election of October 2007 showed the administration that they could win handily without the support of the farmers. This realization prompted the Kirchner administration to increase export taxes on soy twice, from 27.5 percent in November to 44.1 percent by March. Néstor and Cristina Kirchner, each of which has held the presidency, are focused on staying in power through electoral politics. Néstor Kirchner's willingness to increase public expenditures at an abnormal rate during the election year to ensure his wife's victory is obvious evidence of that. Export taxation is just another tool the Kirchners use to maintain the favor of their constituents in the industrial sector of the economy.

Chapter 1

INTRODUCTION

This paper analyzes the market for soybeans and attempts to calculate the optimal export tax level for Argentina, a major producer of soybeans. Once the optimal export tax level is determined, I attempt to identify and explain the various political and economic forces causing the actual tax level to deviate from the optimum. This question is relevant due to the recent dispute between farmers and the government over export tax policy in Argentina, which culminated during the spring and summer of 2008 and continues to make headlines as this paper is written. After quietly accepting multiple export tax increases in recent years, Argentine farmers determined that the most recent tax hike, announced in March of 2008, went too far in redistributing their wealth, and they responded with widespread demonstrations. The farmers were ultimately pacified when the Argentine Senate voted down the measure in July of 2008 and export taxes returned to their prior levels. Today, facing both reduced demand caused by a global recession and a severe drought; farmers are demanding that the government decrease the export tax rate below 35 percent. Clearly, Argentina's experience with export taxation is important from an Argentine perspective, and furthermore, a thorough analysis of the experience may provide insights into the usage of export taxes, which can be applied to other situations. The remainder of this chapter provides some background information on export taxation. The following chapter discusses the recent history of export tax policy in Argentina. Chapter three focuses on the methodology used in the analysis, with discussions of

econometric problems encountered in estimating the supply and demand functions, and simplifying assumptions made in the analysis. Chapter four describes the model of the world soybean market, discussing the structure of world demand and fringe supply. Chapter five compares the actual export tax rate with the optimum and attempts to determine why they differ. Finally, chapter six attempts to draw some general conclusions.

1.1   Export Taxation in a Global Context

1.1.1   Justifications for Export Taxes

Export taxes are used by governments around the world for a number of reasons. Kazeki (2005, 178) cites raising government revenue and the restriction of exports in order to reserve supply to "protect" domestic industry as the two primary reasons for the utilization of export taxes. Kazeki also suggests that export taxes are relatively easy to administer as they can be collected through customs procedures and do not require a complicated tax collection scheme as do many domestic taxes (184). As a result, export taxation is most commonly used among less developed countries (LDCs)[1]. One could argue that export taxation is more politically tenable than other taxes, since it taxes international commerce rather than the economic actions of ordinary citizens. Regarding domestic industry protection, proponents argue that

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[1] Kazeki's analysis of WTO Trade Policy Reviews written between 1995 and 2002 show that ten out of the 15 less developed countries analyzed used export taxes, while only three out of 30 OECD countries used them. The same analysis also shows that export taxes are most commonly levied on agricultural, forestry, fishery, and mineral products (184).

export taxation put in place to enhance competitiveness in downstream industries is warranted to compensate for tariff escalation in developed countries. Opponents argue that this practice discriminates against foreign producers, reduces competition, and drives up prices. Environmental protection is also often cited as a justification for export taxation on commodities such as logs, but Kazeki questions its effectiveness as export taxation increases domestic consumption[2] of commodities and does not incentivize the development of new, less wasteful technology (185). Piermartini (2004, 11) asserts that export taxation can help reduce inflationary pressures, but only when the commodity is consumed domestically. She also suggests that a progressive export tax, one that varies directly with the price of the taxed commodity, can help to reduce export-earning variability by smoothing export industry revenue (10). Export-earning variability is an obstacle to development because it tends to disrupt investment decisions, negatively impacting economic growth (9). Finally, Piermartini suggests that export taxes can be enacted to offer temporary protection to so-called "infant industries" by making inputs inexpensive and creating a comparative advantage. In theory, the infant industry would grow and remain competitive when the export tax is eliminated. In practice, however, infant industry protection often leads to the development of inefficient industries that cannot compete in absence of protection (11-12).

1.1.2   International Opinions of Export Taxation

Jensen et al. (2002, 1) reveal that some analyses done in the 1980s suggest that export taxation is strongly biased against agriculture, since export taxes are

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[2] As I will explain below, an export tax acts as a subsidy on domestic consumption.

commonly levied on agricultural commodities, as explained above. As a result, World Bank structural adjustment programs sought to eliminate them. Kazeki (185) highlights a tendency in contemporary regional trade networks to abolish export taxation. However, Piermartini (2) points out that export taxation is not prohibited by the World Trade Organization (WTO), and that one-third of WTO members impose export taxes. Export taxation in general is a very important policy tool and one that is extremely vulnerable to political influence as the losses from such a policy are concentrated in a small group, and the gains are dispersed as the government sees fit.

The WTO has in fact considered various resolutions concerning export taxation. Kazeki (197) reviews the discussions of the Negotiating Group on Market Access[3] during the Doha Round in 2002. The Negotiating Group agreed to request that all WTO members notify the WTO of any export duties levied. However, parties disagreed over what constraints, if any, the WTO should place on export taxation. The EU sought to ban all export taxation of primary commodities, arguing that "a level playing field does…require the removal of export restrictions." India opposed that action, citing concern about removing "legitimate instruments that developing countries may use…for development of their industries." The Negotiating Group had not reached a consensus when it ended negotiation in October of 2002.

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[3] This group was comprised of the EU, the United States, New Zealand, Japan, Korea, Norway, Singapore, Canada, and India.

1.1.3 Welfare Effects of Export Taxation

Piermartini (3-4) discusses the welfare effects of an export tax in different situations[4]. She argues that efficiency losses, which are a product of distortions caused by the export tax, arise in both importing and exporting countries. Since the export tax acts as a subsidy to domestic consumption[5], too much of the commodity is consumed domestically and too little is consumed abroad[6]. At the same time, too little is produced domestically, and too much is produced abroad. Piermartini also points out that the exporting country enjoys improved terms of trade at the expense of the importing country, as reduced production in the exporting country as a result of the tax causes an increase in the world price. She calls export taxation a "beggar-thy-neighbor" policy, challenging the distinction between export taxation and other protectionist policies that are against WTO rules. To summarize, the exporting country can experience a positive or negative net welfare gain, but the world as a whole experiences a net decline in welfare, as the improvement in terms of trade for the exporting country is canceled out by an equivalent deterioration in terms of trade for the importing country. One can assume that governments consider only the welfare of their own constituents when making policy, and generally not world welfare as a whole, so the fact that an export tax can be welfare-enhancing for an exporting country is an important result.

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[4] This analysis will only consider situations where the exporting country has market power in the commodity, that is, it faces a less than perfectly elastic demand curve.

[5] The domestic price will fall so that the price received by producers is the same at home and abroad; i.e. $P_w = (1+\tau)P_D$, where P_w is the world price, P_D is the domestic price, and τ is the export tax level.

[6] To clarify, "domestically" refers to production or consumption in the country with the export tax, and "abroad" refers to any other country.

Piermartini (4-5) breaks down the gains and losses as a result of an export tax within the exporting country. Producers lose because although the world price increases, the producer price decreases by the amount of the tax. Domestic consumers gain because of the effective subsidy on domestic consumption resulting in a lower domestic price. Finally and most obviously, government revenue increases as a result of the tax. The latter is the variable, and a main problem with export taxation, as those who ultimately gain from the increased government revenue are determined by the government, and are likely selected for political reasons, such as securing political allegiance. It is important to note that firms that use the taxed commodity as an input to their production are also consumers. So if a tax is levied on a primary commodity, firms that process that commodity *domestically* benefit from an export tax on that commodity.

Clearly, understanding the benefits and drawbacks of export taxation is important in the field of development economics. Export taxation is most common among LDCs, for which these taxes are a potentially large source of revenue. Export taxation can alleviate the effects of commodity earnings variability in the short run, by reducing export-earning variability, and in the long run, by creating a downstream industry[7] and making the economy less dependent on primary commodity exports. In theory, this is achieved as a result of the subsidy on domestic consumption, although long run competitiveness of these infant industries is anything but certain. Nevertheless, export taxation is a concern because it can support a political spoils system by allowing governments to punish one sector of the domestic economy and to reward another. While a benevolent government could administer a welfare-

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[7] A downstream industry is one that adds value to primary commodities and to produce a more valuable good.

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enhancing export tax[8], the possibility of the creation of a spoils system cannot be

ignored.

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[8] It is important to note that the domestic problem with an export tax is not the distortion it causes in the free market, as an optimal tax actually maximizes the profits of the producers. The issue with the policy is that it has the potential to lead to clientelism, as benefits are directed at a defined group, in return for political allegiance, at the expense of another group. Further discussion about the optimal export tax can be found in chapter three.

Chapter 2

RECENT HISTORY OF EXPORT TAXATION IN ARGENTINA

2.1   The Convertibility Plan

Recent export taxation in Argentina began during the economic crisis of 2001-2002 that occurred with the end of the convertibility system. In 1991, Argentina introduced a policy of converting pesos to dollars on demand in a one-to-one parity, creating a "peg" to the dollar. As a result, severe inflation in Argentina disappeared overnight and restored confidence in the economy brought a renewed flow of foreign investment into the country. Argentina experienced healthy growth and stable prices throughout the remainder of the 1990s, and revenues from privatization allowed the government to maintain a fiscal surplus through the first two years of convertibility. Fiscal discipline was a vital part of the convertibility system as the government could no longer finance debt by printing money. Eventually, however, revenues from privatization dried up, and the government was forced to borrow to finance budget deficits. Substantial borrowing made Argentina vulnerable to external shocks, such as the Asian and Russian financial crises of 1998, which, through the contagion of fear, reduced confidence in the convertibility system and caused capital outflows. All the while, the peso steadily appreciated along with the dollar making Argentine exports less competitive[9]. Finally, the situation became drastic when in 2001 Turkey suffered

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[9] For example, Brazil, one of Argentina's major trading partners, depreciated its currency in 1999 (Kay and Quispe-Agnoli 2002).

a financial crisis. The Turkish crisis brought a great deal of pressure to bear on the already weak Argentine convertibility system, which could not withstand yet another round of speculative capital outflows. It became obvious that the convertibility system was unsustainable, and confidence plummeted. Domingo Cavallo, the architect of convertibility as finance minister in the early 1990s, was appointed finance minister once again in April of 2001 and was tasked with repairing the damaged system. Mr. Cavallo proposed replacing the peg to the dollar with a peg to a "currency basket" of the euro and the dollar. Under Cavallo's proposal, equal weights would be placed on both currencies. Cavallo felt that his plan would protect the peso from the dollar's steady appreciation – from which the Argentines desperately needed to disconnect. However, Cavallo's suggestion destroyed the credibility of the convertibility plan since observers saw the suggestion as confirmation that convertibility was unsustainable. Speculation that the peso would soon depreciate turned out to be a self-fulfilling prophecy, as the government could not continue to defend the existing one to one parity with the dollar in the face of rapidly declining demand for pesos. In January of 2002, in the midst of a severe recession and a national crisis, interim President Eduardo Duhalde, the fifth President in two weeks, repealed the Convertibility Law and the peso was set to an exchange rate of 1.4 pesos to one dollar. By February, the fixed exchange rate regime ended altogether and the exchange rate was allowed to float (Kay and Quispe-Agnoli 2002). By the end of May, the exchange rate was over 3.5 pesos to one dollar (Oanda). Figure 2.1 shows the drastic movement of the peso to dollar exchange rate.
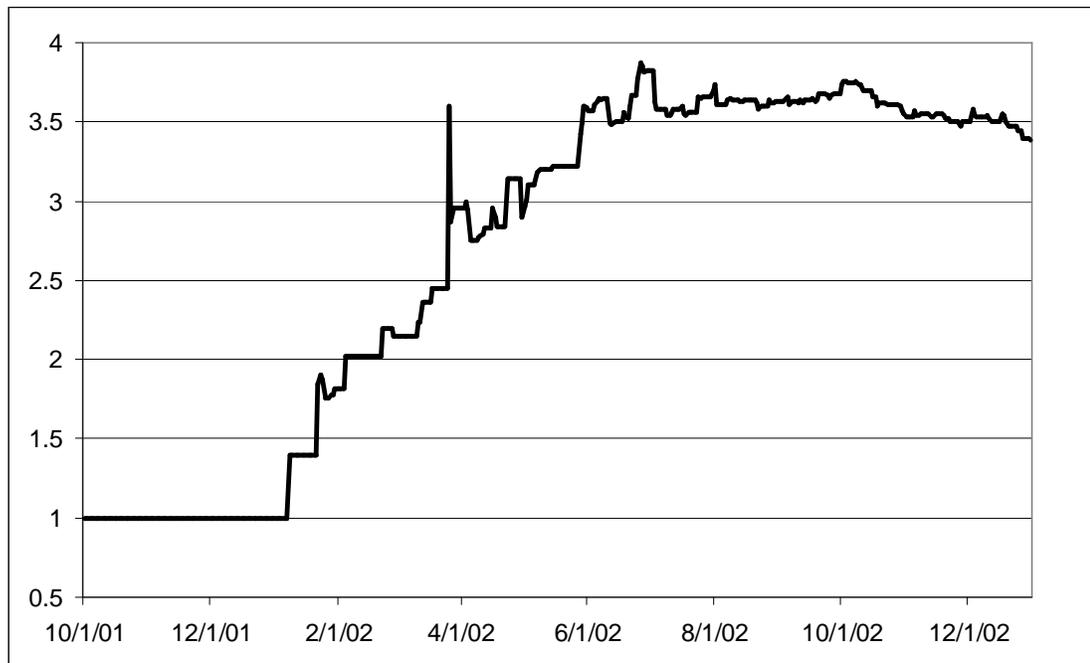
Figure 2.1   Peso to Dollar Exchange Rate

        As a result of the recession and the loss of external financing, government

revenues plunged. However, the export sector of the economy gained much from the

newly devalued peso. As Brad Setser and Anna Gelpern (2006, 480) point out,

"Farmers did particularly well: their dollar debts were pesified[10] just before the harvest

brought in an influx of dollar revenue." Since agricultural commodities are globally

traded and priced in dollars, farmers' dollar income remained relatively unchanged,

but their peso income increased by more than a factor of three.

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10 When repealing the Convertibility Law, the government converted all deposits and
loans denominated in dollars into pesos at a one-to-one ratio. This reduced the dollar
value of debts since the peso was depreciating. (Setser and Gelpern 2006, 478-9)

In order to support its plunging revenues, the government resolved to tax all exports at a ten percent rate[11] beginning in March of 2002. Commenting on the policy, minister of the economy Jorge Remes Lenicov remarked, "Clearly, when you take this type of measure, you do not do so with satisfaction, we do it in the face of the crisis which the country is experiencing." The government insisted that the export tax was temporary and in place to preserve social programs that were vital during the severe recession (Rohter 2002). Setser and Gelpern observe that part of the revenue raised by the export tax was used to subsidize basic necessities for the poor. They suggest that this policy "redistributed gains from devaluation to help those hurt the most" (481). In April, confronted by a continually depreciating peso, the government increased export taxes on various commodities, including an increase in the export tax on soybeans to 23.5 percent in order to generate more revenue and stabilize domestic prices (Richardson forthcoming).

2.2 Export-oriented Populism under Néstor Kirchner

In May of 2003, Néstor Kirchner ascended to the Presidency, bringing a new ideology to the Casa Rosada. Richardson argues that Kirchner ushered in an era of "export-oriented populism" to Argentina. He argues that since the soybean is not consumed by the working class[12], Kirchner could freely tax its exports and funnel revenue to his supporters. Unlike traditional populism in which export promotion and populism are in direct conflict, Richardson asserts that Kirchner was able to use an

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[11] In addition, a 3.5 percent tax on soybeans remained from the convertibility era (Richardson forthcoming). The total tax on soybeans was 13.5 percent during this period.

[12] The point that soybeans are not consumed in Argentina is made in section 3.3.

undervalued currency[13] to promote exports while raising export taxes and subsidizing production of wage goods[14].

Kirchner came to power with the support of major labor and industrial organizations, and therefore was politically obligated to please them when in office. Kirchner raised the export tax on soybeans to 27.5 percent in January of 2007 and used the new revenue to subsidize the production of wage goods[15]. This policy served to decrease domestic food prices by increasing domestic supply. True to traditional populism, Kirchner increased government expenditures as the 2007 elections approached, likely to enhance his party's chance of victory. To finance his spending binge, Kirchner drastically increased export taxes on soybeans to 35 percent in November of 2007 (Richardson forthcoming). According to an article in *La Nación*, federal government spending was 54.3 percent higher in 2007 than in 2006. The largest spending increases occurred in transfers to the public and private sectors, which increased by 70.7 percent and 66.4 percent respectively, social security benefits, which increased by 65.6 percent, and public works investments, which increased by 62.4 percent (Ruiz 2007). Although this information does not unambiguously identify the beneficiaries of the extra spending, public works investments, for example, are more

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[13] Richardson cites major foreign exchange purchases by the Argentine central bank beginning immediately after Kirchner took office as evidence of Kirchner's deliberate devaluation of the peso.

[14] Wage goods are goods consumed by the urban working class, Richardson gives beef and wheat as traditional examples in Argentina.

[15] Of the additional $400 million generated by the new tax, 30 percent went to the poultry industry, 30 percent to the dairy industry, and 15 percent to the wheat industry. Export tax revenue was also used to subsidize energy and transportation services (Richardson 2008).

likely to be focused in urban areas near Kirchner's constituents. Much more illuminating is the fact that the growth rate of federal spending of 54.3 percent in 2007 was followed by a much more moderate growth rate of 34 percent in 2008 (Newman and Volberg 2008). This suggests that the fiscal policy of 2007 was politically motivated and geared toward garnering votes.

2.3   The Introduction of a Progressive Export Tax System

With the help of her husband's spending binge, Cristina Fernández de Kirchner succeeded her husband as President of Argentina, taking office in December of 2007. Fernández de Kirchner wasted little time in again increasing export taxes on soybeans, this time imposing a progressive export tax system in March of 2008. Under the progressive system, soybean prices at the time corresponded to an export tax rate of 44.1 percent. Unlike previous export tax increases, the introduction of the progressive scale was met with heavy resistance by farmers (Richardson forthcoming). Farm groups supported strikes and launched major protests[16], characterized by roadblocks and the destruction of crops bound for market. The farmers vowed continual demonstrations until the export tax was reduced to 35 percent (Serrat 2008). Pablo Orsolini, vice president of the Federación Agraria Argentina – a group representing small farmers – complained that none of the export tax revenue collected by the federal government is shared with the provinces (Valente 2008).

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[16] The Kirchners responded to the strikes and demonstrations, publically referring to the farmers as "greedy" and "coup-plotters" (Barrionuevo 2008)

The fact that the federal government is not required to share export tax revenue with the provinces[17] is important (Richardson forthcoming), since the federal government has free reign to distribute the revenues in any way it pleases. As Richardson illustrates, the federal government's use of export tax revenue to subsidize wage goods effectively enhances the welfare of the industrial working class at the expense of the agricultural class. For the agricultural class, Fernández de Kirchner's introduction of the progressive export tax, the third increase in fourteen months, was the straw that broke the camel's back.

The government refused to capitulate to the demands of the farmers and defended its export tax hike by appealing to the urban working class, pointing out the recent, relative prosperity of the farmers and threatening the elimination of popular social programs if the taxes were rescinded. Alberto Fernández, a member of the President's cabinet insisted that high commodity prices had left farmers better off than most Argentines (Serrat 2008). The President herself stressed the importance of the new export taxes: "If they take away these export taxes, everything that you have gotten in these past six years will be lost… unemployment will return, prices will rise" (Neumann 2008). The President's claim that the removal of the export tax would cause a return of unemployment on the order of what was experienced in 2001 and 2002 is misleading. In a general sense, the removal of an export tax on a primary commodity like soybeans would cause an increase in the marginal cost for producers of goods that use soybeans as an input, such as soybean oil. This would cause the supply curve to shift to the left resulting in higher prices of soybean oil and lower

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[17] Under a revenue-sharing agreement, Argentina is required to share most receipts with the provinces. Export taxes are not included.

employment in the soy crushing industry. However, the assertion that restoring the

export tax to its March 2008 level of 35 percent would bring about a recession like the

one seen after the fall of the convertibility system is an attempt to deceive. Prices of

soybeans and soybean derivatives are of little consequence to Argentines because very

little of either is consumed as final products in Argentina, and the effect on

employment would be marginal. Furthermore, the economy experienced recovery

between 2003 and 2007 with an export tax rate on soybeans of 23.5 percent. The

necessity of a 44.1 percent export tax, or even a 35 percent export tax, in order to

avoid recession is difficult to prove when considering past experiences.

It is important to recognize the different stances toward export taxation

of the interim Duhalde administration and of the Kirchner administrations. Duhalde

introduced significant export taxation while facing an economic crisis and a large

fiscal deficit. His minister of the economy announced the policy with regret,

seemingly in desperation. Although the sincerity of the apparent dissatisfaction

toward export taxation in the Duhalde administration is uncertain, the Kirchners'

stance is certain. The Kirchners see export taxation as a way to redistribute wealth,

and in defending the progressive export tax, Fernández de Kirchner stressed, "It is

impossible to redistribute wealth without touching extraordinary profits" (BBC, 2008).

Whether the Kirchners' principal goal is truly to redistribute wealth or to perpetuate

their dynasty is debatable, but the government's perception of export taxation has

clearly shifted from unfortunate to valuable.

In June of 2008, in an attempt to legitimize the progressive export tax

system, Fernández de Kirchner asked Congress to vote on the proposal[18] (Neumann

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[18] By Argentine law, the President has the right to administer export taxes by decree
and does not need Congressional approval (Richardson 2008).

2008). The Kirchners' political coalition, the Frente Para la Victoria, controlled both

houses of Congress and the bill was widely expected to pass. To the surprise of many,

the bill was defeated 37-36 in the Argentine Senate on July 17, 2008. Ms. Kirchner's

Vice President, Julio Cobos, cast the tie-breaking vote against the President's

proposal. In explaining his vote, Cobos said, "I agree with the distribution of

wealth…I also know that one has to see a reasonable profit. To redistribute wealth, one

has to create it" (Barrionuevo 2008). The next day, Fernández de Kirchner reluctantly

complied with the wishes of Congress and repealed the progressive tax system,

bringing the export tax rate on soybeans back to 35 percent. Figure 2.2 shows the

movement of the export tax rate on soybeans since the end of convertibility.
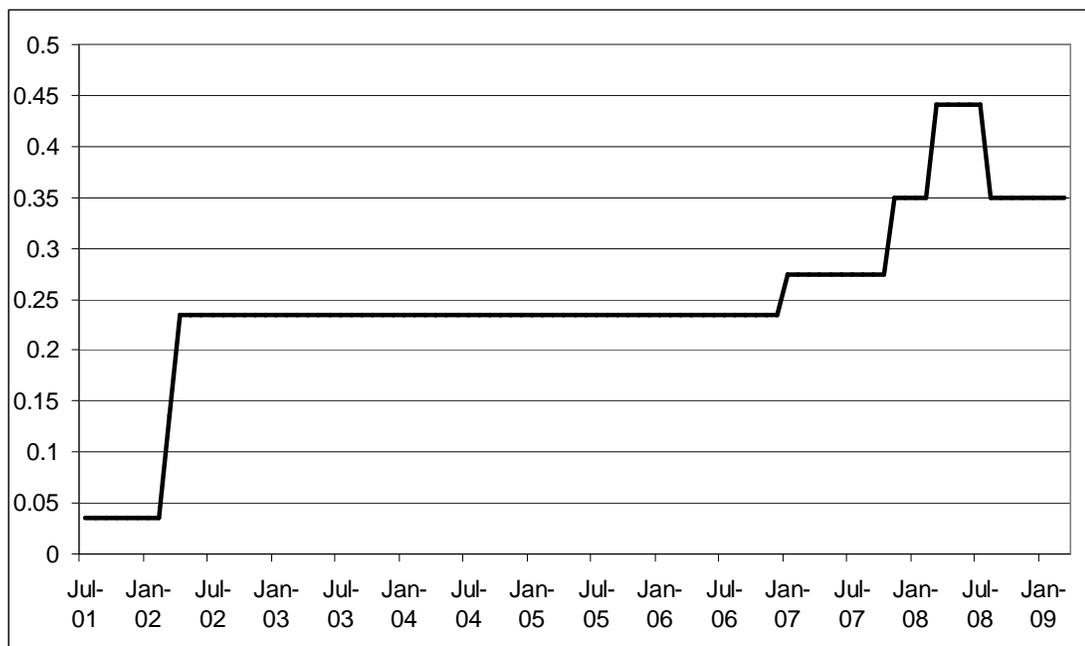
Figure 2.2   Export Tax Rate on Soybeans

2.4 Current Debates over Export Tax Policy in Argentina

In July of 2008, the farmers considered a return to a 35 percent export tax on soybeans a victory over the government, but facing both a global recession and a severe drought, the farmers, certainly strained by current economic conditions and perhaps emboldened by their recent success, are once again demanding concessions. As a result of the worldwide economic slump, soybean prices fell 40 percent since the progressive export tax system was rejected by the Argentine Senate in July of 2008. Ironically, had the progressive export tax system remained in effect, farmers almost certainly would be charged export taxes less than 35 percent today due to today's significantly lower soybean prices. Nevertheless, farmers, also facing the worst drought in 70 years and a ten percent lower crop yield than in 2008, are demanding a reduction in the export tax rate (Moffett 2009).

In late March of 2009, farm groups launched strikes similar to those seen during the previous year's debate over the progressive export tax system. The latest strikes broke out after the government rejected farmers' demands to lower the export tax and instead proposed to share 30 percent of the export tax revenue with the provinces. Farmers consider the revenue sharing a false compromise designed to allocate money to the President's political allies to help them in their bids for re-election in this year's legislative elections. Regarding the revenue sharing plan, farm leader Eduardo Buzzi remarks, "This smells of an electoral ploy. They're unveiling this now to try to give all the mayors and governors -- and maybe even the legislators who were trying to agree on another policy -- a stake in this revenue" (Burke 2009).

The government's decision to share a portion of the revenue from export taxation with the provinces could turn out to be a concession, but the recipients of the revenue have not been disclosed. Regardless of the revenue sharing pledge, the

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destination of the shared revenue is at the discretion of the President, and the decisions will likely be politically motivated, especially in an election year. Farmers, who will be marketing a smaller quantity of soybeans than last year at lower prices than last year, will not likely receive enough relief from the revenue sharing plan to keep them from being worse off than they were in 2008. If the new wave of farm strikes is as successful as those experienced in 2008 and threatens domestic food supply, previously unaligned Argentines may choose sides and push for a solution. In 2008, many Argentines sided with the farmers and engaged in *cacerolazos*, protests characterized by the banging of pots, a common method of Argentine demonstration (Illiano 2008). Since approval of the President is low[19], it is likely that if the unaligned Argentines take a side, it will be in support of the farmers. However, a scenario in which urban Argentines blame farmers for their bare supermarket shelves is not outside the realm of possibility. On the other hand, if the farmers are successful and export taxes are reduced, government spending will likely be reduced as well. There is a chance that this could set off demonstrations opposing the end of social programs, but that seems unlikely. Considering the behavior of Kirchner's approval rating during the 2008 conflict with the farmers, it seems that the majority of Argentines sympathize with the farmers. Also, the improvement of the economy between 2003 and 2007, discussed in more detail in chapter five, suggests that social programs necessary to reduce poverty can be funded with a lower export tax rate of 23.5 percent which persisted during that period.

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[19] In February of 2009, Cristina Fernández de Kirchner had an approval rating of 23.3 percent and a disapproval rating of 55.8 percent according to a poll conducted by Management & Fit (Diario Perfil 2009).

Chapter 3

METHODOLOGY

With all of the debate over the export tax level in Argentina; it would be useful to know the welfare-enhancing level of the tax. This paper estimates supply and demand in the world soybean market in a partial equilibrium (PE) framework using an econometric procedure similar to that of Yilmaz (1996) and Burger (2007), who separately examined the world cocoa market and calculated optimal export tax rates for different cocoa producing countries. Yilmaz calculates optimal export tax rates in a general equilibrium (GE) as well as a PE framework. In a separate paper, Yilmaz (1999) shows that GE optima are slightly higher than PE optima, because the GE framework recognizes that a certain industry does not make up the entire economy, and that a welfare-maximizing government can apply higher taxes on an industry and redistribute revenues to the whole society. The assumption that a government is welfare-maximizing and can redistribute revenues efficiently without falling prey to political pressures is questionable. For this reason I chose to use a PE framework in my analysis of the world soybean market, which considers welfare with respect to the industry in question only. Although the PE framework has its drawbacks, such as its disregard of effects of an export tax on other sectors of the economy, the assumption that government redistribution is more efficient than simply maximizing profits in a given sector is questionable. The PE, welfare-enhancing export tax simply compels soybean producers to reduce their supply to the profit-maximizing level, below the

point where price equals marginal cost[20]. The tax simulates the effects of collusion among producers and causes Argentina to act as a monopolist with respect to its residual demand (Devarajan, et al. 1996).

3.1 Econometric Problems

The analysis uses annual data from 1965 to 2007. Since the data are a time-series, bias in the standard errors associated with autocorrelation is likely. In addition, since the objective is to estimate supply and demand equations, simultaneous equation bias in the coefficient estimates is likely because the market price is a function of the quantities supplied and demanded, and the quantities supplied and demanded are in turn functions of the market price. Since quantity and price are determined simultaneously, biased coefficient estimates result. Thus, steps must be taken to account for the two distinct types of biases that result from autocorrelation and simultaneity. The data set used in the analysis is shown in table 3.1.

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[20] Note that if the government were to apply the optimal export tax rate as defined above and then distributes the revenues back to the producers, this would maximize producer revenue as the tax imposes profit-maximizing monopolistic behavior.

Table 3.1   Relevant Data

Year	Corn Price ($) per Bushel	Soy Price ($) per Bushel	Fringe Supply (1000 MT)	World Demand (1000 MT)	Real GDP
1965	5.11	11.19	39,155	39,162	100.00
1966	5.28	11.70	43,159	43,166	103.35
1967	4.25	10.27	44,027	44,040	105.88
1968	4.26	9.58	46,702	46,720	111.40
1969	4.35	8.81	57,205	57,230	118.11
1970	4.75	10.18	60,534	60,577	123.37
1971	3.68	10.33	61,644	61,706	128.80
1972	5.12	14.26	63,861	64,091	134.98
1973	7.79	17.34	75,986	76,309	143.29
1974	8.34	18.33	69,660	70,234	144.95
1975	6.51	12.62	81,693	82,371	147.02
1976	5.23	16.56	81,813	83,161	152.54
1977	4.61	13.41	91,091	93,931	157.76
1978	4.78	14.16	99,080	102,700	163.78
1979	4.93	12.31	112,582	116,205	168.99
1980	5.55	13.55	105,125	108,594	173.07
1981	4.12	10.00	113,050	117,328	174.24
1982	3.99	8.94	114,995	118,970	172.97
1983	4.86	11.86	105,991	113,029	176.05
1984	3.85	8.54	107,377	114,105	184.07
1985	3.17	7.18	111,308	118,605	188.57
1986	2.09	6.65	119,114	148,522	196.62
1987	2.62	7.95	123,159	131,053	204.64
1988	3.31	9.67	114,275	121,124	211.07
1989	2.97	7.16	121,724	131,395	216.83
1990	2.76	6.95	118,092	130,012	221.92
1991	2.78	6.55	125,950	137,388	227.91
1992	2.38	6.39	133,961	145,190	235.29
1993	2.81	7.19	136,219	148,547	240.84
1994	2.48	6.03	152,548	164,376	250.79
1995	3.49	7.25	150,336	163,269	255.66
1996	2.87	7.78	158,250	170,635	264.48
1997	2.54	6.75	168,049	184,430	275.22
1998	2.00	5.09	175,360	196,738	281.09
1999	1.85	4.70	182,916	204,968	289.56
2000	1.84	4.51	199,680	225,315	299.78
2001	1.91	4.24	209,403	237,375	300.81
2002	2.21	5.27	219,006	252,443	303.08
2003	2.26	6.85	212,476	245,660	311.62
2004	1.86	5.19	231,326	269,657	323.51
2005	1.75	4.94	238,614	279,201	339.22
2006	2.58	5.46	252,452	297,105	357.46
2007	3.31	8.61	259,238	309,252	376.67

Commodity price data are from the USDA National Agricultural Statistics Service and are corrected for inflation using the U.S. GDP deflator from the St. Louis Federal Reserve Bank FRED Database. Quantities of world demand and fringe supply[21] are taken from the USDA Production, Supply, and Distribution Online (PSD) database. World demand is calculated by adding up all exports and domestic consumption. Fringe supply is calculated by subtracting world ending stocks at the end of the year from world total supply in the same year. The above quantity for Argentina is subtracted from the world total to give fringe supply[22]. The real GDP index is based on an average of the annual real GDP growth rates, given by the Penn World Tables (2006), of the top twelve soybean consuming countries, each of which consumed at least 1 million metric tons per year on average between 1965 and 2007 according to the PSD database.

3.1.1   Time-series Data

Time-series data often violate the least squares assumption that data points are independently distributed across observations. The problem that arises when observations in time-series are correlated with other observations in the same series is called autocorrelation (Stock and Watson 2007, 128-9). Regression analyses with time-series data lead to residual errors that are correlated with one another, causing two problems. First, typical methods to compute standard errors provide inaccurate results. Second, coefficient estimates using ordinary least squares methods in the face

[21] Fringe Supply is equal to world supply minus Argentine supply.

[22] The PSD Database does not include USDA estimates for Argentina and Brazil until 1987. Therefore, I use the local estimates from 1965 to 1986, also given in the database.

of autocorrelation are not the most efficient estimates (721-2). In order to overcome

the obstacles associated with autocorrelation, I use logarithmic data and Feasible

Generalized Least Squares (FGLS)

3.1.1.1   Logarithmic Data

Even though the assumption that data points are independent of one

another is likely violated in my analysis of time-series data, Stock and Watson

emphasize that the correlation between observations must diminish as the time

between them increases. Stock and Watson refer to this characteristic as weak

dependence (546). In order to help satisfy the assumption of weak dependence, I use

natural logs of my data sets in my regression analysis. Logarithms have other useful

properties for time series data.   Time-series, such as annual soybean supply and

demand, tend to grow exponentially. As a result the logs of time series grow linearly,

which improves the regression results (530). In addition, regression coefficients of

double log models yield estimates of elasticities, which is the purpose of the analysis.

3.1.1.2   Correcting Autocorrelation with Feasible Generalized Least Squares

One way to correct for the biases associated with autocorrelation is the

FGLS procedure. The FGLS procedure uses the first order autoregressive parameter

of the residual, ρ, to calculate quasi-differences equal to, in the case of a variable X, X_t

$- \rho(X_{t-1})$. The regression can then be run using the quasi-differences[23]. EViews offers

a simplification of this method. By including AR(1) in the regression equation,

EViews estimates ρ using an iterative method and uses the FGLS procedure to

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[23] This procedure is discussed in much more detail in section 15.5 in Stock and
Watson (2006).

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generate efficient coefficient estimates. It is important to note that when using AR(1) in EViews, the first observation is dropped due to the use of quasi-differences. The importance of this dropped observation is frequently debated by econometricians.

3.1.2 Simultaneous Equation Bias

In order to correct for the simultaneity associated with supply and demand equations, I use a two stage least squares regression procedure to estimate supply and demand in the soybean market. Due to the fact that price and quantity are functions of one another and therefore are determined simultaneously, price is an endogenous variable (when quantity is the dependent variable) and is correlated with the error term. I use proxies for price called instruments as well as all other predetermined variables to estimate price in a reduced-form equation. Then, I use the estimate of price in the regression equation[24]. Instrument selection is important, as instruments must meet three important criteria: instruments must be excluded from the original regression, must be correlated with the endogenous variable, and must not be correlated with the error term in the original regression. The second two qualifications are known as instrument relevance and instrument exogeneity (Stock and Watson 2007, 423).

3.2 Assumptions

In order to simplify the analysis, I make three very valid assumptions. First, since 95 percent of Argentine soybeans and soy derivatives are exported (Costa et al. 2009, 6), I assume that there is no domestic consumption of soy products in

---

[24] Chapter twelve of Stock and Watson (2006) is dedicated to the discussion of instrumental variable regressions and the two stage least squares procedure.

Argentina. Second, since neither the United States[25] nor Brazil have export taxes on soybeans, Argentina can ignore the possibility of a change in the export tax rates of other countries when setting their own[26]. Finally, since soybeans are an annual crop which must be planted each year, I assume that there is no long-term planting decision associated with its production, unlike the case of perennial plants like cocoa. Farmers of perennial crops must consider the long-term profitability of a crop, whereas farmers of annual crops need only be concerned about the short-run since they have the advantage of being able to decide what to plant each year.

3.3   Determining the Optimal Export Tax Rate

Estimated equations for the fringe supply and the world demand yield estimates of the price elasticities of world demand and fringe supply. I take much of the derivation of the optimal export tax rate from Burger (2008):

Begin with a simple definition of residual demand, where RD is Argentina's quantity of residual demand, QF is fringe supply, WD is world demand, and P_W is the world price:

$$(1)\, RD = WD - Q_F.$$

The following marginal change equation is also necessarily true:

$$(2)\, dRD = dWD - dQ_F,$$

and the following equation is likewise equivalent:

$$(3)\, dRD = \frac{\partial WD}{\partial P_W} \cdot dP_W - \frac{\partial Q_F}{\partial P_W} \cdot dP_W \, .$$

The following is achieved by dividing by dP_W and multiplying the right hand side by multiple quantities equal to one:

$$(4)\, \frac{dRD}{dP_W} = \left(\frac{\partial WD}{\partial P_W} \cdot \frac{P_W}{WD} \cdot \frac{WD}{P_W} \right) - \left(\frac{\partial Q_F}{\partial P_W} \cdot \frac{P_W}{Q_F} \cdot \frac{Q_F}{WD} \cdot \frac{WD}{P_W} \right).$$

Let σ equal the price elasticity of fringe supply and $-\delta$ equal the price elasticity of world demand. Then (4) simplifies to the following:

$$(5)\, \frac{dRD}{dP_W} = \left(-\delta \cdot \frac{WD}{P_W} \right) - \left(\sigma \cdot \frac{Q_F}{WD} \cdot \frac{WD}{P_W} \right).$$

If one allows MS to equal the Argentine market share, {(1-MS) is the fringe market share}, then,

$$(6)\, \frac{dRD}{dP_W} = \left(-\delta \cdot \frac{WD}{P_W} \right) - \left(\sigma \cdot (1 - MS) \cdot \frac{WD}{P_W} \right).$$

Reorganizing terms and multiplying both sides of the equation by PW gives the following:

$$(7)\, \frac{dRD}{dP_W} \cdot P_W = WD \cdot \left(-\delta - \sigma \cdot (1 - MS) \right).$$

Note the following substitution for WD:

$$(8)\, WD = \frac{RD}{MS} \, .$$

Substituting (8) into (7) and dividing both sides by RD gives

$$(9)\frac{dRD}{dP_W} \cdot \frac{P_W}{RD} = \frac{(-\delta - \sigma \cdot (1 - MS))}{MS}.$$

Now, recall that the relevant optimal export tax is one that maximizes farmers' profits. That is, it maximizes farm revenue minus farm cost. Let Q equal the quantity sold:

$$(10)\, P_W \cdot Q - C(Q).$$

Specifically, the function is maximized with respect to the tax rate, τ. Then

$$(11)\frac{\partial P_W}{\partial \tau} \cdot Q + \frac{\partial Q}{\partial \tau} \cdot P_W - \frac{\partial C(Q)}{\partial \tau} = 0.$$

Multiplying both sides by $\dfrac{\partial Q}{\partial Q}$ and rearranging gives

$$(12)\frac{\partial P_W}{\partial Q} \cdot \frac{\partial Q}{\partial \tau} \cdot Q + \frac{\partial Q}{\partial \tau} \cdot P_W - \frac{\partial C(Q)}{\partial Q} \cdot \frac{\partial Q}{\partial \tau} = 0,$$

and factoring yields

$$(13)\frac{\partial Q}{\partial \tau}\left(\frac{\partial P_W}{\partial Q} \cdot Q + P_W - \frac{\partial C(Q)}{\partial Q}\right) = 0.$$

Assuming that $\dfrac{\partial Q}{\partial \tau}$ is not equal to zero and that a change in the tax rate causes a change in quantity, (13) simplifies to

$$(14)\frac{\partial P_W}{\partial Q} \cdot Q + P_W = \frac{\partial C(Q)}{\partial Q}.$$

Note that the producer price should equal the marginal cost, or

$$(15)\,(1-\tau)\cdot P_W = \frac{\partial C(Q)}{\partial Q}.$$

Substituting (15) into (14) and dividing both sides by PW gives

$$(16)\,\frac{\partial P_W}{\partial Q}\cdot\frac{Q}{P_W}+1=(1-\tau).$$

Realizing that the quantity sold by farmers (Q) is equal to the quantity of residual demand (RD), and substituting (9) into (16) gives

$$(17)\,1-\frac{MS}{\left(\delta+\sigma\cdot(1-MS)\right)}=(1-\tau).$$

Subtracting one from both sides gives the optimal export tax rate,[27]

$$(18)\,\frac{MS}{\left(\delta+\sigma\cdot(1-MS)\right)}=\tau.$$

Therefore, the welfare-maximizing optimal export tax is directly related to the market share and inversely related to the elasticities of the fringe supply and of the world demand. Chapter four estimates the necessary elasticities and calculates the optimal export tax rate.

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[27] It can be shown that the export tax rate is also equal to the reciprocal of the elasticity of residual demand (Yilmaz 1999, 444)

Chapter 4

MODELLING THE WORLD SOYBEAN MARKET

4.1   World Demand for Soybeans

The soybean is a versatile crop which has a variety of uses. They are used for human consumption, animal consumption, fuel production, and as inputs into various industrial goods. The majority of soybeans are processed to produce soybean oil, which is used to cook and fry foods, and to produce edible products such as mayonnaise and salad dressing. Soybean oil is also used to produce biofuels and diverse products such as crayons, candles, foam, ink, paints, and wood adhesives used to make particleboard and plywood. When soybeans are processed for oil, soybean meal is created as a byproduct. High in protein, soybean meal is commonly sold as animal feed for poultry, swine, cattle, and even fish. A small percentage of soybeans are not processed, but are instead used for food products such as soy milk, soy flour, and tofu (NC Soybean Producers Association 2007). Countries that consume significant quantities of soybeans according to the USDA production, supply, and distribution database are listed in table 4.1.

Table 4.1   Average Soybean Consumption, 1965-2007[28]

Country	Average Soybean Consumption (1000 MT)
United States	34228
Brazil	27858
Argentina	18607
China	15894
Japan	4306
India	2484
Mexico	2033
Taiwan	1635
Indonesia	1393
Canada	1261
Netherlands	1234
Spain	1139

4.1.1   Econometric Estimation of the World Demand for Soybeans

The world demand equation is estimated using a two stage least squares procedure with heteroskedasticity consistent standard errors (White 1980)[29]. The instruments I use for the demand equation are the one-period lagged price of soybeans ($Psoy_{-1}$) and the price of corn, Pcorn. $Psoy_{-1}$ is obviously relevant because autocorrelation is evident. Pcorn is relevant because it is an alternative crop that farmers can choose to plant instead of soybeans, depending on relative prices. If the price of corn increases, farmers are expected to shift to corn production, and soybean price will rise as the quantity supplied decreases. Pcorn is exogenous because it is not a substitute good for soybeans and therefore will not affect quantity demanded. $Psoy_{-1}$ is exogenous because consumers do not consider past prices when making purchases,

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[28] As Argentina does not consume soybeans or soy derivatives in large quantities, most of Argentina's consumption was used for processing destined for export.

[29] The fringe supply is also calculated using two stage least squares and standard errors robust to heteroskedasticity.

only current prices and possibly expected future prices. Table 4.2 confirms the

validity of the instruments.

**Table 4.2   Reduced-form Equation and Instrument Significance for World
Demand**

```
Dependent Variable: LOGPSOY
Method: Least Squares
Sample (adjusted): 1966 2007
Included observations: 42 after adjustments
White Heteroskedasticity-Consistent Standard Errors & Covariance

   Variable      Coefficient   Std. Error   t-Statistic   Prob.

   CONSTANT       0.643664      0.578602     1.112448     0.2729
   LOGPSOY(-1)    0.195891      0.099167     1.975365     0.0555
   LOGPCORN       0.758862      0.082850     9.159438     0.0000
   LOGGDP         0.027444      0.083759     0.327652     0.7450

R-squared          0.915013    Adjusted R-squared      0.908304
F-statistic        136.3765    Prob(F-statistic)       0.000000
S.E. of regression 0.117941    Sum squared resid       0.528584
                Durbin-watson stat 1.797587


Wald Test: Significance of Instruments

Test Statistic      Value        df      Probability

F-statistic        77.55026    (2, 38)     0.0000
```

The R-squared value suggests that the reduced-form equation is a good fit

for the data. Both instruments, the lagged price of soybeans and the price of corn,

have strong p-values and the a priori expected signs, and the overall F-statistic is much

greater than ten[30]. A Wald test considering the null hypothesis that the coefficients of

both the instruments are equal to zero suggests that the null hypothesis can safely be

rejected. One can be certain that the instruments are sufficiently strong and that the

reduced-form equation provides a valid estimation of the price of soybeans for use in

---

[30] Stock and Watson argue that instruments are considered strong if the first-stage F-
statistic is greater than ten (2007, 441).

the second stage regression. I estimate the following world demand function for soybeans:

$$Ln(WorldDem) = \beta_0 + \beta_1 Ln(Psoy) + \beta_2 Ln(GDP)$$

The results of the second stage regression are shown below in table 4.3.

Table 4.3   Second Stage Equation for World Demand

```
Dependent variable: LOGWORLDDEM
Method: Two-Stage Least Squares
Sample (adjusted): 1966 2007
Included observations: 42 after adjustments
Convergence achieved after 7 iterations
White Heteroskedasticity-Consistent Standard Errors & Covariance
Instrument list:   CONSTANT LOGPSOY(-1) LOGPCORN LOGGDP
Lagged dependent variable & regressors added to instrument list
```

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CONSTANT	5.044977	0.654880	7.703671	0.0000
LOGPSOY	-0.143586	0.061409	-2.338194	0.0247
LOGGDP	1.324106	0.104827	12.63134	0.0000
AR(1)	0.792550	0.096736	8.192953	0.0000

R-squared	0.988921	Adjusted R-squared		0.988046
F-statistic	1129.414	Prob(F-statistic)		0.000000
S.E. of regression	0.058691	Sum squared resid		0.130898
	Durbin-Watson stat 2.185576			

The second stage equation estimates a direct relationship between GDP and world demand and an inverse relationship between the price of soybeans and world demand. Both are consistent with expectations. The estimated price elasticity of demand of -0.1436 is significant at the five percent level and is within one to two standard deviations of the estimates offered by the elasticities database at Iowa State University's Food and Agricultural Policy Research Institute (FAPRI)[31].

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[31] The FAPRI does not offer an estimate of world demand elasticity, but individual country demand elasticities range from -0.16 to -0.25.

4.2   World Supply for Soybeans

        As I mentioned in section 3.3, Argentina, Brazil, and the United States account for approximately 90 percent of world soybean exports. These three countries accounted for nearly 63 percent of world supply in 2007 as defined in section 3.1. The market shares of the three major suppliers are shown in table 4.4. Farmers choose between planting soybeans or an alternative crop like corn in the summer months. Wheat production, although a major crop, does not necessarily interfere with soybean production as it can be "double cropped" with soybeans – planted in the winter months after soybeans are harvested (Deese and Reeder 2007, 7).

Table 4.4   Market Shares of Major Suppliers

Country	Percentage of World Supply, 2007
Argentina	16.20%
Brazil	19.50%
United States	26.90%

4.2.1   Econometric Estimation of the Fringe Supply for Soybeans

        Although Argentina is a major producer of soybeans, it is necessary to determine the price elasticity of the fringe supply in order to calculate the optimal export tax rate for Argentina. The instruments I use for the supply equation are $Psoy_{-1}$ and GDP. GDP is relevant because income levels affect the quantity demanded, which affects the price[32]. $Psoy_{-1}$ is exogenous[33] because farmers may opt to withhold crop

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[32] Reinhart and Wickham (1994, 24) discuss the cyclical nature of commodity prices, claiming that income elasticity of demand is between 1.0 and 2.0 in industrialized countries.

[33] $Psoy_{-1}$ is relevant for the same reason as in the demand equation.

from the market to supply at a later time depending on the current price and the

expected future price. For this reason, the expected price in future periods is

correlated with the residuals in the fringe supply equation, but not the lagged price.

GDP is exogenous because the statistic is backward looking and farmers do not have

information on current period GDP when making supply decisions. Table 4.5

examines the validity of the instruments.

Table 4.5   Reduced-form Equation and Instrument Significance for Fringe Supply

```
Dependent Variable: LOGPSOY
Method: Least Squares
Sample (adjusted): 1966 2007
Included observations: 42 after adjustments
White Heteroskedasticity-Consistent Standard Errors & Covariance

    Variable        Coefficient   Std. Error  t-Statistic  Prob.

    CONSTANT         -6.429235     3.417851    -1.881075    0.0678
    LOGPSOY(-1)       0.103382     0.107180     0.964563    0.3410
    LOGGDP            1.629849     0.780148     2.089154    0.0436
    LOGPCORN          0.693187     0.089758     7.722881    0.0000
    TIME             -0.050884     0.025612    -1.986689    0.0544

R-squared             0.923879    Adjusted R-squared   0.915650
F-statistic         112.2678      Prob(F-statistic)    0.000000
S.E. of regression    0.113118    Sum squared resid    0.473440
                   Durbin-Watson stat   1.819145



Wald Test: Significance of Instruments

Test Statistic       Value          df      Probability

F-statistic         4.387164      (2, 37)      0.0195
```

The high R-squared value implies that the reduced-form equation is a

good fit for the data. Both instruments, the lagged price of soybeans and GDP have

the a priori expected signs. Although the individual significance of the lagged price of

soybeans is in question, the overall F-statistic is much greater than ten. According to

the Wald test, one can reject the null hypothesis that the coefficients of both of the

instruments are equal to zero. As a result, I estimate the following fringe supply

function for soybeans:

$$Ln(FringeMarket) = \beta_0 + \beta_1 Ln(Psoy) + \beta_2 Ln(Pcorn) + \beta_3 Time$$

The results of the second stage regression are shown below in table 4.6.

Table 4.6   Second Stage Equation for Fringe Supply

```
Dependent Variable: LOGFRINGESUPPLY
Method: Two-Stage Least Squares
Sample (adjusted): 1966 2007
Included observations: 42 after adjustments
Convergence achieved after 6 iterations
White Heteroskedasticity-Consistent Standard Errors & Covariance
Instrument list: CONSTANT DV1 DV2 LOGPCORN LOGPSOY(-1) LOGGDP TIME
Lagged dependent variable & regressors added to instrument list
```

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CONSTANT	9.986750	0.374864	26.64099	0.0000
DV1	0.112650	0.061583	1.829236	0.0759
DV2	-0.064133	0.029436	-2.178749	0.0362
LOGPSOY	0.592858	0.251893	2.353613	0.0243
LOGPCORN	-0.467774	0.188725	-2.478608	0.0182
TIME	0.043317	0.002652	16.33651	0.0000
AR(1)	-0.006806	0.164492	-0.041377	0.9672

R-squared	0.965863	Adjusted R-squared	0.960011	
F-statistic	168.9102	Prob(F-statistic)	0.000000	
S.E. of regression	0.097233	Sum squared resid	0.330900	
	Durbin-Watson stat 2.010221			

The second stage regression estimates an inverse relationship between the

price of corn and the fringe supply, and a direct relationship between the price of soy

and the fringe supply.   The time trend, which was not significant in the demand

equation, is significant in the supply equation and is also directly related to the fringe

supply. All three of these estimates have signs that are consistent with expectations

and are significant at the five percent level. The data also suggest structural change, as

there are two significant intercept dummy variables in the model. The first is

associated with the period from 1974 to 1983 when supply was above trend. The

second covers the period 1988 to 1999, when supply was below trend. The estimate of

0.5929 for the price elasticity of fringe supply is within one standard deviation of the FAPRI estimate of 0.34 for Brazil, a major contributor to fringe supply[34].

4.3 Optimal Export Tax Rate for Argentine Soybeans

Given the price elasticities of world demand and fringe supply, and the Argentina's market share, the optimal export tax rate can be calculated using equation (18) in section 3.3. Table 4.7 reviews the relevant data and gives the welfare-maximizing export tax on Argentine soybeans.

Table 4.7   Relevant Data and Welfare-Maximizing Export Tax Rate

Price Elasticity of World Demand	Price Elasticity of Fringe Supply	Market Share	Optimal Export Tax Rate
-0.1436	0.5929	16.20%	25.29%

The calculated optimal export tax rate of 25.29 percent is lower than the current export tax rate of 35 percent and significantly lower than the rate during the progressive export tax system of 44.1 percent. Chapter five discusses potential reasons for the deviation between the actual rate and the theoretical optimum.

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[34] No estimate for the United States is given.

Chapter 5

POTENTIAL REASONS FOR AN INFLATED EXPORT TAX RATE

The current export tax rate on soybeans is unambiguously higher than the optimal rate, which was calculated to optimize the profits among soybean suppliers by forcing them to collude, or act like monopolists. It is worth noting that the optimal rate presented in the previous chapter does not take into account potential benefits of administering an export tax outside of the realm of soybean producers, and is therefore intended only as a reference point for further research. The fact that the actual export tax rate is higher than the optimum does not automatically categorize the tax as a "bad" policy, but it does suggest that the government's motive is not to achieve the collusive outcome. I suspect that the Kirchner government uses export taxation primarily to raise revenue, and to a lesser extent, to support domestic industry, specifically to benefit the working class. These two reasons are considered by Kazeki to be the most common, as mentioned in chapter two.

5.1 Generating Revenue

Richardson (forthcoming) notes that export taxation accounted for between eight and eleven percent of tax receipts during Néstor Kirchner's administration, nearly two-thirds of which was from taxes levied on soybeans and soy derivatives. It is important to note that the export tax on soybeans was only 23.5 percent throughout most of Mr. Kirchner's administration. The current rate of 35

percent clearly has the potential to generate even more revenue for the administration of Ms. Kirchner, depending on the world price of soybeans.

Obviously, revenue generated through the use of export taxation is desirable to the central government since export taxation does not require congressional approval and the resulting revenue does not have to be shared with the provinces. As in the current situation, the central government can even attempt to gain political goodwill by pledging to share a percentage of the revenues with the provinces as a compromise when pressured.

Does the revenue generated by export taxation fuel clientelism and intentionally contribute to a Kirchner dynasty, or is it truly used to maximize national welfare? Néstor Kirchner's accomplishments in office include a 52 percent increase in private consumption and significant reductions in both the unemployment and poverty rates. Kirchner also brought about a 70 percent increase in real wages by supporting unions and increasing the minimum wage. Public works investment also increased by 400 percent under Kirchner (Levitsky and Murillo 2008, 17). The fact that Argentina is better off than after the 2002 recession is indisputable, and Kirchner's accomplishments have certainly increased the quality of life for many Argentines; however, such a large increase in public expenditures in 2007 – an election year – which necessitated an increase in the export tax rate to 35 percent as mentioned in chapter two, is evidence of politically motivated policy. Kirchner's accomplishments listed above predominantly benefit urban wage earners. Richardson's analysis of the government subsidies on wage goods, discussed in chapter two, describes how Kirchner transferred wealth from the rural areas to the urban areas. A glimpse at the 2007 Presidential election results shows that Ms. Kirchner performed relatively poorly

in the province of Santa Fe[35], winning only 35.5 percent of the vote, ten percent less than her national average (Álvarez-Rivera).   It is clear that farmers do not support the Kirchner administrations.

The Kirchners' policies are aimed at increasing the welfare of the urban classes at the expense of the rural classes. Mr. Kirchner managed most of his accomplishments with an export tax rate on soybeans of 23.5 percent left over from the Duhalde administration. He then increased the export tax rate twice in 2007, once in January and again in November, as he simultaneously expanded public expenditures. The export tax rate of 23.5 percent was sufficient to significantly improve the standard of living of wage earners during the first three years of Mr. Kirchner's administration. Kirchner was able to repair much of the damage done to society by the terrible recession in the early part of the decade. The final two increases, and arguably the introduction of the progressive system by Ms. Kirchner, were likely politically motivated and designed by the Kirchners to perpetuate themselves in power through populism after the realization that they could win an election handily without the support of farmers. This realization reduced the need for subtle policy, and the export tax rate on soybeans increased from 27.5 percent to 44.1 percent between November of 2007 and March of 2008.

5.2   Supporting Domestic Industry

Although Argentina is not the world's top supplier of soybeans, it does supply more soybean oil and soybean meal than any other country (Costa et al. 2009,

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[35] The province of Santa Fe is important in soybean production. According to the *Secretaría de Agricultura, Ganadería, Pesca y Alimentos,* the province accounts for 33 percent of national soybean production.

5). Clearly the primary input into the production of both soybean oil and soybean meal is raw soybeans, for which Argentine oil and meal producers pay 35 percent less than the world price. Oil and meal exports are assessed a tax of 31.5 percent, but the 3.5 percent spread gives Argentine oil and meal producers a cost advantage over the rest of the world (Richardson forthcoming). This form of protectionism is legal under the WTO.

Trying to rationalize this policy based on the infant industry argument presented in chapter two is unconvincing. Since Argentina is already the number one producer of soybean meal and soybean oil, the need for protection is questionable at best. Besides, placing any tax at all on the soy processing industry is inconsistent with the infant industry argument. Taxing both raw and processed soybeans yields more revenue for the government and the 3.5 percent tax spread is another, slightly less subtle way to transfer wealth from the farmers planting the soybeans to the industrial sector that processes them. Increasing revenue and redistribution of income away from the farmers toward the working class is consistent with the Kirchners' goals of remaining in power through populism.

The spread between the taxes has remained at 3.5 percent since broad export taxation was reintroduced after convertibility, so what effect does an equal increase in both tax rates have on both industries? Costa et al. (2009, 16) simulate the effect of a four percentage point increase in both taxes and find that the result is a decrease in soybean exports and an increase in soybean oil and meal exports, while the prices of all three commodities increase. Therefore, the before tax revenue of soy processing firms increases while the before tax revenue for farmers falls. The increase in the tax rate does negligible harm to processing firms because the 3.5 percent tax

spread remains. Therefore, the government can both generate more revenue and transfer more wealth from farmers by increasing the export tax rates together.

Also important to this discussion is the production of biofuels in Argentina. Soybean oil is an ingredient in biodiesel, and exports of soybean oil are taxed at 31.5 percent. Biodiesel exports on the other hand are taxed at 5 percent, with a 2.5 percent rebate. This translates to a significant advantage for Argentine biodiesel producers, as they can purchase soybean oil for 31.5 percent less than the world price and can export biodiesel and face an effective tax of only 2.5 percent. At the same time, biodiesel imports are taxed at fourteen percent. A law passed in 2006 mandates that by 2010, all diesel fuel in Argentina must be at least five percent biodiesel by volume (Joseph 2007). This example is much more consistent with infant industry protection, as it seems that Argentina is attempting to position itself to benefit from the increasing world demand for biodiesel.

Not surprisingly, the USDA expects that Argentine biodiesel production could reach two billion liters by 2010, ten times its 2007 production (Joseph 2007, 5). If the biodiesel industry in Argentina responds to the incentives granted by the Kirchner government and grows significantly, it will divert more domestically produced soybean oil (and potentially soybeans) from the export market, decreasing government export tax revenue. It will be interesting to see what modifications, if any, are made to the export tax structure to maintain the current revenue stream if increases in soybean and soybean oil production cannot or do not keep pace with increases in biodiesel production. It is likely that soybean production will not increase significantly when its exports are so heavily taxed.

Chapter 6

CONCLUSION

This paper calculates the partial equilibrium welfare-maximizing export tax on soybeans in Argentina to be 25.29 percent, significantly lower than the current export tax rate on soybeans of 35 percent, and much lower than the export tax rate that existed under the progressive export tax system of 44.1 percent. The administration of Néstor Kirchner took actions consistent with traditional populism, especially in his 2007 pre-election spending binge, to which the increased export taxes on soy contributed significantly. His policies have remained mostly unchanged during his wife's administration. Some go so far to suggest that Néstor, currently the head of the Justicialist party, is still the de facto leader of Argentina. The Kirchners have also used export taxation to support domestic industry. In the case of the soybean oil industry, the infant industry argument does not apply because Argentina has a well-established soybean crushing industry and is currently the top soybean oil producer. The infant industry argument is stronger in the case of biodiesel since the industry is new. The overall tax scheme which assesses the highest export taxes on the raw commodity and the lowest on the most processed product is most damaging to the farmers and most beneficial to the biodiesel producers. Soybean oil producers also benefit from the spread between the export tax on raw soybeans and that on soybean oil.

An argument in favor of the tax scheme based on the importance of redistribution of wealth, one often made by the Kirchners and their supporters,

assumes that more wealth is in the hands of farmers than in the hands of soybean oil producers and biodiesel producers. This assumption is likely to be false. It is much more likely that the Kirchner government simply favors the industrial sector over the agricultural sector, likely because they are a larger voting bloc. In addition, the revenue generated can be spent in ways which help wage-earners. The Kirchners can remain in office as long as they are supported by both labor and industrial leaders.

An important characteristic of export taxation is its vulnerability to clientelism and populism. Unlike a general income tax, an export tax allows a government to target a specific sector with focused taxes and funnel the wealth in any direction that they please. A shrewd administration can transfer enough wealth from a small sector in the economy to win favor in other sectors. Losses to world welfare notwithstanding, the negatives to enacting a policy of export taxation from a domestic point of view are enough to caution against it.

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