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Argentine Agricultural Policy: Producer and Consumer Support Estimates 2007-2012*

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Abstract

This paper analyzes agricultural policy in Argentina and calculates the degree of support received by producers and consumers. We present a summary of developments in the agricultural policy environment that have occurred in the last decades in Argentina, as well as the resulting performance of the agricultural sector. The concepts of *Producer Support Estimates, Consumer Support Estimates, General Services Support Estimates, Producer Nominal Assistance Coefficient* and *Nominal Protection Coefficient* are used to analyse different dimensions of transfers occurring between agricultural producers, consumers and taxpayers in the period 2007-2012. Total transfers from producers have averaged US$ 11.000 million annually or 26% of total gross farm receipts. Support flowing from the public sector to producers in the form of R&D, infrastructure and other "public good" type of inputs totalize some 500 million annually.

JEL *classification codes*: Q18, Q11

Keywords: Agricultural Policy, Agricultural Prices, Producer Support Estimates

I. Introduction

This paper presents an analysis of policy measures resulting in producer and consumer support in the Argentine agricultural markets. We focus the analysis on a subset of the production activities of the Argentine agricultural sector: wheat, corn, sunflower, soybeans, beef, pork poultry and dairy production. These commodities represent more than 70% of the value of agricultural production of the country, and more than 85% of total agricultural-based exports. Calculation of support measures follows the methodology of the "*OECD's Producer Support Estimate and Related Indicators of Agricultural Support – The PSE Manual*" (OECD, 2010)[1].

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* This paper draws on the report *"Producer Support Estimates: Agentine Agriculture"* prepared for the Inter-American Development Bank by the authors. The information and opinions presented in this paper are entirely those of the authors, and no endorsement by the IDB or the University of CEMA is expressed or implied.

[1] The OECD PSE conceptual model is based on supply-demand interactions among farmers, consumers and taxpayers in the economy in order to measure transfers for the agricultural sector. The methodology allows comparability of policy indicators between countries and is currently used by OECD members to monitor agricultural policies. Recently, the IDB developed "Agrimonitor: PSE Agricultural Monitoring

Understanding the impact of policy on prices paid by consumers and received by farmers is important for several reasons. First, it constitutes an important input for policy makers engaged in trade-related international discussions. Second, it allows progress to be made in understanding response of the agricultural sector to different kinds of interventions. Third, it results in important data for the design of domestic programs aimed at reducing the impacts of increases of commodity prices on low-income population groups.

In Argentina – and in contrast with most other countries – agriculture is discriminated against. The extent of the "negative protection" has changed over the years, however in general public policy has resulted in decreased output prices received by farmers, and increased input prices paid by these farmers. We can anticipate then that, in general, incomes have been transferred from agriculture to both consumers in the form of lower prices, as well as to the government in the form of taxes. The organization of the paper is the following: sections II, III and IV summarize main aspects of agriculture and agricultural policy in Argentina. Estimates of transfers to and from agriculture are presented in Section V. Conclusions follow in Section VI.

II. Argentine Agriculture: 1970-2012

The last decades witnessed significant growth in the Argentine agricultural sector. Indeed, performance of agriculture in this country contrasts sharply with lackluster performance – during most of the period – of the non-agricultural economy. Moreover, performance of Argentine agriculture compares favorably not only with other sectors of the economy, but also with the agriculture of other major exporters and producers.

Attention has been focused on agricultural growth in Argentina (for a recent summary, see the book by Reca, Lema and Flood [2010]). Some part of the overall picture of "what happened" is gradually taking shape; however as of now what is available is a is set of more or less interconnected "facts". A satisfying explanation of growth should attempt to link these facts in an overall process where change in one variable (for example technology availability) interacts with changes in others (e.g. input and output prices) causing as a result changes in the organization of production, in investment in both "conventional" (e.g. tractors) as well as "nonconventional" inputs (e.g. new seeds, managerial practices) and in the linkages between farm production and both input as well as output markets. The point made is that changes have not occurred in isolation but that instead both cause and in turn are affected by changes occurring both in the agricultural as well as the non-agricultural economy.

Consider for example the case of fertilizer. During the 1970´s fertilizer use in extensive crop production was practically non-existent. In Argentina, and in contrast with the U.S. and European countries, agricultural production systems made extensive use of "rotation" of land between annual crops and pastures. Pastures allowed soil fertility to be partially reestablished. The choice of this "mixed" production system was in turn a result of factors such as (i) lack of appropriate crop production technology, (ii) high machinery, fertilizer and herbicide prices due to import tariffs and, (iii) domestic grain prices well below prices in the international markets due to export tariffs and/or exchange rate controls and (iv) fairly recent (late 1960´s) dismantling of legislation which had introduced, since the late 1940´s, uncertainty as to the possibility of eviction of tenants by landowners. As relates to (iii) in an early paper White (1977) presents evidence of much higher input/output price ratios (the exception being labor) in

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System" for Latin American and Caribbean countries to track agricultural policies and to assess and measure the composition of the support to agriculture (see the IDB web site *"Agrimonitor"* for details).

Argentina as compared to other important grain producers. For example, in Argentina some 8-12 kg of wheat was necessary to purchase 1 kg of nitrogen fertilizer. In the U.S. and European countries the relevant ratio ranged from 4 to 5. High relative fertilizer prices in Argentina were the result both of lower grain prices, as well as of import restrictions for fertilizer. These restrictions were aimed at protecting the local fertilizer producing industry. Cirio, Canosa and White (1980) present additional evidence related to severe relative price distortions existing in the agricultural sector in the 1960´s and 1970´s.

Beginning slowly in the 1980´s, and "gathering speed" in the 1990´s fertilizer use increased continuously. By the 2010´s total use reached nearly 3 million tons. Part of the increase can be explained by changing relative prices: elimination of export taxes on grains, and import taxes on fertilizers resulted in falling input/output price ratios in the 1990s as compared to the 1970s. However, other factors also played an important role: in particular and as discussed below, since 1990 fertilizer used increased steadily, despite relatively constant prices between fertilizers and grain. Increased response to fertilizers in new as compared to previous seeds, improved agronomic practices that result in higher yield potential and reduced harvesting, transport and storage costs probably all played a part in allowing increased fertilizer use despite constant or even increasing prices between fertilizers and grain.

In summary: relative prices at the farm level are an important determinant of output in the agricultural sector. However, changes that have occurred in Argentine agriculture since the early 1970´s suggest that factors such as the availability of technology, the accumulation of managerial and technical know-how, the development of a modern input-supply and output processing industry, as well the overall efficiency of grain handling have all had a part in explaining observed output and (in particular) efficiency changes.

III. <u>Input, Output and Productivity</u>

In Argentina public policy has affected the agricultural sector in particular through measures that result in "wedges" between international and domestic prices of outputs and inputs (including among these capital inputs). These price differences have originated in (i) export and import taxes, (ii) multiple exchange rates and (iii) State participation in grain handling and exports.

Macroeconomic policy has also affected the agricultural sector through the impact of general price increase (inflation), interest rates and credit availability. Inflation, coupled with uncertainty as regards to export taxes was the primary cause of the near-disappearance of futures markets that occurred until the early 1990´s. Indeed, during the 1920´s, volume traded in the futures markets totaled some 25 mT, or more than double total grain output of the country. Similar futures volumes were only achieved in the late 1990s, but here total crop output was more than 3 times volume traded in futures exchanges (Olivo, 2010). The impact of macro policy on futures trading – and thus on price risk faced by farmers – is evident.

With variations, the 1950-1990 period can be characterized by:

1. Output price gap between international and domestic markets due to State-monopoly of exports (early 1950´s and mid 1970s) and export taxes or multiple exchange rates (late 1960´s and 1980s),

2. Higher input prices due to import taxes (1950´s to late 1980s),

3. Periods of high inflation (mid-1970´s, late 1980´s)

4. Public-sector management of ports and grain terminal export facilities,

5. A "closed economy" environment, with resulting low levels of investment in private agricultural R&D, as well as in general infrastructure.

6. On the positive side, creation in the late 1950s´ of INTA, the public-funded agricultural research organization. Creation of the CREA groups, a private applied research and technology non-profit.

Despite the generally negative environment, between 1970-74 and 1980-84 total grain output more than doubled. Output increases resulted from improvements in wheat, sunflower and corn crop genetics, from the introduction of the soybean crop as well as from improved management practices. Output increases were caused both by increases in land productivity as well as by a shift in land allocation from livestock to crop production. Land in major crops increased, in this period, by 40 percent.

The macroeconomic reform program implemented in 1990 can be considered an important turning point for the agricultural sector. Sonnet (1999) points out that price stabilization, reduction of barriers to trade, privatization and de regulation resulted in substantial changes in items 1 - 5 mentioned previously. Capital intensity of production increased in the form of new tractors, combines, planting equipment and storage facilities. In the mid 1980´s tractor imports totaled some US$ 12 million per year, this figure increased to US$ 43 million in 1991 and nearly US$ 300 million in 1997 (Sonnet, p.5). As pointed out by Bour (1994) between the late 1980s´and the mid 1990s the relative price of capital with respect to labor fell by approximately 30 percent. This fall was a result of both (i) a reduction in the price of capital inputs themselves, resulting from elimination of import taxes and (ii) a reduction in the interest rate charged to investors. As a result of these changes, from 1988 to 2002 total capital input (in the "*pradera pampeana*") increased by more than 40 percent, while capital per worker increased by a factor of 3 to 4 (Gallacher, 2010). The combined impact of (i) increased capital per unit of land and of labor and (ii) the adoption of no-tillage (which reduced the number of machine-hours necessary to prepare and plant one hectare of land) has resulted in significant improvement in timing of operations in the Argentine agricultural sector. Table 1 presents additional detail relative to output and input changes mentioned previously.

Research in crop genetics resulted in a more vigorous inflow of new varieties: in the 1995-99 period the number of new cultivars was 109 per year, as compared to 77 per year in 1980-84, and only 21 per year in 1985-89 (Castro, Arizu and Gallacher, 2008). Crop genetics, of course, is a major factor determining productivity growth. Lema (2010) analyzes changes in output, input and productivity occurring in the Argentine agricultural sector since the 1970´s. Sources of growth of output (1968-2008) are identified as growth in the land input allocated to crops, capital inputs, fertilizers, labor and other conventional inputs. The author finds that these five input categories account for no more than 1/3 of observed growth in output, leaving the other 2/3 as an "unexplained residual". This residual of course is interpreted as technical change", that is an upward shift in the production function for agriculture. Lema finds that in the 1968-2008 period Total Factor Productivity increased 2.4 percent annually. Increase in TFP was higher in the 1990 – 2008 period: 4.4 percent annually. This indicates a substantial increase in TFP growth occurring in the last two as compared to the first two decades of the 1968-2008 period. The available evidence thus indicates that in order to understand changes occurring in Argentine agriculture, attention should be focused on the pathways through which improved technologies flow into the sector, as well on the determinants of technology adoption by farmers, input suppliers and output demanders.

Changes in output and productivity that occurred in the last decades have been accompanied by changes in farm numbers, farm size and production organization. This is to be expected – as pointed out by Schultz (1975) under "disequilibrium" conditions (e.g. those resulting from rapid inflows of new technologies) adaptation by economic agents occurs at differential rates. Some adapt rapidly, profiting by new opportunities. Adjustment by others occurs more slowly. In some cases adjustment results in the need to re-allocate labor and other resources from agriculture to other sector of the economy.

Total farm numbers in Argentina reached a peak in the late 1960´s (540.000 units). Farm numbers decreased in a linear fashion thereafter, reaching in 2008 some 280.000 units (Gallacher, 2008). These numbers have to be taken with a "grain of salt": it is possible that the fall in farm numbers has been greater than that suggested by these figures. In particular, many units classified by "farms" are probably rented out – thus real farm numbers may be lower that reported by Census figures.[2] The reasons for the decrease in farm numbers are not easy to identify. They include both "push" factors such as economies of scale as well as "pull factors" such as access to improved jobs out of the agricultural sector (Gallacher, 2010). Aspects related to access to financial capital and, in particular, improved possibilities for risk-bearing are also relevant. In particular, "investor pools" have played an increasingly important part in the organization of production. This arrangement allows investors outside agriculture to pool financial resources in order to enter into the agricultural sector. These "virtual firms" in some cases do not own land or machinery but instead hire these resources from others. Planted area varies from 20.000 to 500.000 hectares. Diaz Hermelo and Reca (2010) argue that cost of financial capital is lower for these "pools" than for ordinary farms. They also have better access to technical and managerial know-how. This has important implications for aspects such as cost of capital in the agricultural sector, technology adoption and capacity for risk-bearing. Of course, consolidation of production in fewer and larger units *may* have negative consequences on small communities (loss of population) as well as on the future possibilities of an agricultural sector based on "family farms"

IV. <u>Prices and Supply</u>

Behavior of the agricultural sector results from both price ratios faced by farmers themselves, as well as those faced by input suppliers and output processors/exporters. In Argentina, economic policies directed towards agriculture have in general depressed output prices and increased (tradeable) input prices with respects to those of the world market.

Recent rising trends in agricultural prices should not obscure the fact that in the 1980-2006 period world commodity prices experienced little if any upward trend. Indeed, in this period commodity prices remained practically unchanged, while for example the price of oil (an important input in agricultural production) doubled. In

[2] A piece of land is "farmed" according to the Census by the operator that makes production decisions: a piece of land rented out is part of the tenants´ and not landowners´ farm. However, we suspect that difficulty exists in this classification: some units that appear as "farms" are really rented out by another unit. Farm numbers is thus overestimated.

Argentina, the existence of export duties in the 1980-2012 period resulted in an inverted "U" type pattern of domestic prices relative to international prices: during the 1980´s domestic prices were some 50-75 percent of international prices. During the 1990s this ratio increased to 80 – 100 percent, decreasing after 2001 to 65 – 80 percent, a level slightly higher than during the 1980´s.

In the absence of technical change, increase in output can only be forthcoming from increases in the use of inputs. Input use is increased only in response to reductions in the prices of inputs in relation to outputs: i.e. the relative input/output price ratio. In relation to this point, fertilizer prices increased substantially in the 2000-09 period as compared to the previous decade. In turn, labor prices, and the price of machinery services remained fairly constant (see Table 2). The fact that the crop price index fell slightly from 1990-99 to 2000-09 indicates that relative input/output prices increased substantially for some inputs (fertilizer) and increased somewhat for others (labor, machinery services)[3].

The overall ratio of input to output prices in Argentina fell by 10 percent from the 1980´s to the 1990´s, but remained fairly constant or increased slightly thereafter. The substantial increase in crop production that occurred in the last two decades is thus not a result of a fall in the relative input/output prices. On the contrary, output expansion has occurred with simultaneous increase in (real) input prices. As shown in Figure 1, since the early 1990's fertilizer use increased fifteen-fold while agricultural chemical use increased ten-fold. Clearly, a rightward shift in the demand for these inputs has taken place, due in part to the increased marginal productivity of new technologies.

IV.1 Response to Price

The magnitude of farmers´ response to price has obvious implications for public policy. In particular, if supply is highly inelastic policies resulting in lower output prices will benefit consumers (and government through tax revenues) with "small" losses due to inefficiency. Conversely, efficiency loss will increase as supply elasticity increases. Early studies of supply elasticity in Argentine agriculture (e.g. Reca, 1967, 1969) resulted in general in elasticity estimates (for single crops) well below 1: i.e. inelastic response to price. The study by Brescia and Lema (2007) uses Nerlove´s "distributed lag" model to estimate response to price of wheat, corn and soybeans. They find inelastic response to own price in wheat and soybeans (ε values are wheat = 0.43, soybeans = 0.53) and elastic response in corn (ε = 1.3) in the short run, but greater than one own price elasticities for all crops in the long run. The paper by Fulginiti and Perrin (1990) uses modern production theory to obtain supply and input demand elasticity values for a set of seven commodities and three input classes. Results from this study are particularly important as response to price is analyzed in a multiple-output and multiple input framework. The use of a profit function to obtain elasticity values results in a model where independent variables are exogenous – increased confidence in results should be expected.

Fulginiti and Perrin find for most production activities own-price ε values greater than 1. They also find an elastic response to the price of capital and labor inputs. The authors estimate the impact of changes in selected policies on quantity supplied. For example, elimination of distortions would increase aggregate output by 27 percent (in the case of export taxes), 29 percent (import restrictions) and 25 percent (domestic

[3] Herbicides are an exception to this general trend: for example, the price of Roundpup decreased by more than one half in this period.

taxes). Clearly, even if the above effects are not “additive”, substantial increase in production would result through policies that align domestic prices more in line with prices prevailing in international markets. In the case of export axes, the price distortion assumed by Fulginiti and Perrin is lower than the one existing as of mid 2011: the authors assumed 15 percent export tax for soybeans; current taxes for this crop are 35 percent. The fact that soybeans account for more then 2/3 of the value of grain output attests to the importance of a price wedge on this crop.

As pointed out half a century ago by Schultz (1956), understanding the dynamics of supply requires considerably more than analyzing short-run response of the firm to changing prices. The problem of increasing productivity, occurring both at the farm level as well at the farm/non-farm interface is of crucial importance. Schiff and Montenegro (1995) review studies on agricultural supply, focusing attention on biases that result from factors such as change in price regime, policy reversibility risk, and complementarity between price and non-price (e.g. supply of public goods) factors in aggregate response. All these issues are of central importance in understanding aggregate supply response in agriculture.

As pointed out by Robert Lucas Jr. (1976), optimal decision rules of economic agents vary systematically with changes in policy (*Lucas critique*). As a result, underestimation of supply elasticity may result if response is estimated on the basis of yearly price changes, without taking into account that response may be considerably higher when farmers perceive that a change in *price regime* has taken place. An example of change in price regime is the opening of the Argentine economy in 1990. Similarly, the posterior (partial) “closing” of the economy in 2001 is a return to conditions prevailing in the 1980´s. The point then is that the response of farmers to prices in one regime may be different from that in another.

Economic policy will affect the agricultural sector through many channels: directly through output and input prices, interest rates, labor costs as well indirectly through the supply of infrastructure and other inputs. The impact of policies will depend on the nature of the “cost structure” in production agriculture. For example, the short-run impact of currency devaluation will be different in the production of a labor-intensive as opposed to a capital–intensive activity. Analysis of partial budgeting data for corn and soybeans under alternative production technologies in the “central corn/soybean” production area of the country in mid 2011[4] shows the following:

1. Some 60 percent of total cost corresponds to tradeable inputs. Currency depreciation will not lower the input/output relative prices for this broad category of inputs. If devaluation is accompanied by imposition of export taxes (such as occurred in 2001) input/output price ratios will instead increase.

2. Currency depreciation – if not accompanied by general price increase – will improve the relative prices only with respect to the non-tradeable inputs, representing here 40 percent of total cost. Increase in the price of non-tradeables (as occurred in Argentina in the post-2001 period) will negate these improvements in relative prices.

3. Inputs used “on farm” represent between 64 and 76 percent of total inputs. The remaining 24 – 36 percent results from transport and marketing. Corn – because of a lower per-ton value – is more dependent than soybeans on non-farm costs.

[4] Revista *Agromercado*, June-July 2011.

4. Transport and marketing costs result in reduction in net prices received by farmers. The fact that transport and marketing prices may be relatively inflexible implies that the difference between gross and net prices received by farmers will increase – in percentage - terms when crop prices are low as compared to high.

5. Direct labor costs (excluding labor used in transport and marketing, but including labor used in harvesting) account for 13 – 15 total costs in corn production, and 15-17 percent in soybeans. Seed, fertilizer and ag chemical costs (all tradeable inputs) are thus considerably more important than labor, a non-tradeable. This, plus a possible relatively "easy" substitution of capital for labor in extensive grain production protects this sector against possible increases in the price of the labor input.

Item 3 points out to the importance – for farm production – of public policy measures that increase the supply of inputs that allow transport and marketing costs to fall. Public and private infrastructure investment and labor market deregulation are examples of these. In turn, item 4 emphasizes that a fall in output price of (say) 10 percent may result in an increase in the relative price of tradeable inputs by more than 10 percent. Inputs may thus be more expensive both because output prices have decreased, as well as because transport costs result in a higher (percentage-wise) price discount from gross to net prices when gross prices are lower. This occurs because transport costs are incurred per unit of weight, not value. Thus, a fall in output prices (for example soybeans from US$ 450 to 350 per ton) will result in an increase in the input-output (w/p) price greater than that suggested from w/450 to w/350. In summary, upwards or downwards changes in (final market) output prices may underestimate changes in farm-level prices. This effect will be more marked for relatively lower-value (e.g. corn) as compared to higher-value (e.g. soybeans) crops.

IV.2 Interventions in Domestic Markets

Quantitative Restrictions

The Oficina Nacional de Control Comercial Agropecuario ("ONCCA") was created in 1996[5] and the original stated objective of the organization was to contribute to "transparency" and "efficient operation" of agricultural markets in the country.[6] It carries out its mandate by registering commercial operations, publishing reference prices, administering payments to producers and processors, administering the Hilton export quota for beef and authorizing firms to participate in markets. The ONCCA also had the mandate of gathering and administering market information. Beginning in 2008, ONCCA´s registry and data gathering functions were expanded to include authorizations for exports of grains, beef and milk. The "ROE" ("Registro de Operaciones de Exportación") were introduced as export permits administrated by ONCAA. In some periods and for some products, demand for permits exceeded supply. The stated objective of ONCCA was to guarantee supply of products to the domestic

[5] ONCCA was finally closed down in February 2011, its activities transferred to sections of the Ministry of Economics

[6] Unpublished manuscript: "Que es la ONCCA".

market. Conceptually at least, ONCCA´s preoccupation would appear misplaced as local industry has strong incentives to forecast domestic demand and supply in forthcoming months: if a "shortage" appears possible, profit can be made by carrying grain from one period to the next.

Passero (2011) surveys the impact of ONCCA on the Argentine wheat market. He clearly shows the proliferation of regulation in grain markets the 2007/2010. According to the author's estimates, export quotas for wheat resulted in price decreases of 10 -15 percentage points *below* the levels resulting only from export taxes. Lema (2008) presents similar econometric estimates: between May 2006 and April 2007 the additional price wedge was on average 15 US$/t, or 9 percentage points of the FOB price, implying a total loss for wheat producers of some US$ 300 million/year.

Differential Export Duties

In the absence of quotas or other quantitative restrictions on exports, domestic "FAS" prices should equal FOB prices minus taxes and marketing/handling costs involved in transferring grain from "along side" to "on board". In Argentina these costs have ranged from US$ 3-9 per ton of soybeans, wheat and corn. However, differential export taxes on primary products (e.g. wheat or soybean grain) and processed products (e.g. wheat flour, soybean oil, soybean meal) has raised the issue of transfer of incomes from one sector to another. In Argentina export taxes for primary products have been higher than for processed products. For soybeans, for example, export taxes are 32 percent for oil and pellets, but 35 percent for grain.

The relevant question is what impacts these differential taxes have on soybean producers and processors. Let P_G and P_O be respectively the FOB prices of grain and the processed product ("oil"), and let G and O by the quantities of grain and oil. Assume capital inputs K are required for processing G. Finally, assume a fixed proportion production function linear production function between grain input and oil output: $O = \min(\alpha G, \beta K)$ where $0 < \alpha < 1$. Export taxes on grain and oil are, respectively, t_G and t_O. Revenue (over fixed costs of capital inputs) resulting from exports of a given amount of grain are:

[1] Export as grain: $P_G\, G\, (1 - t_G)$

[2] Export as oil: $P_O\, O\, (1 - t_O) = P_O\, (1\text{-}t_O)\, \alpha G$

If $(1 - t_G)/(1\text{-}t_O) < (P_O/P_G)\, \alpha$, and given sufficient processing capacity K all grain will be processed and exported as oil. Whether this occurs will depend of course on the values of t_G and t_O, and on whether P_O/P_G (the relative price of oil to grain in the international market) is less than or greater than α (the marginal product of grain in the production of oil in the domestic industry). If $P_O/P_G = \alpha$, all grain will be processed whenever $t_G > t_O$. If producers are integrated with processors, the relevant tax for exports will be either t_G or t_O depending on what "corner solution" is optimal.

The fact that part of soybean output is exported as grain and part as oil indicates that the "corner solution" presented above is not realistic. Indeed, with the exception of the 2008/09 crop year (severe drought), soybean local processing has totaled between 70 and 85 percent of total grain output. Thus, for primary producers between 15 and 30 percent of primary production was subject to the higher-level export taxes (35 percent). The remaining 70 – 85 percent was taxed – in the form of soybean oil and meal at a rate of 32 percent of value. The fact that not all grain is processed can indicate: (i) constraints on processing capacity, (ii) increasing processing costs with volume processed, and/or (iii) downward-sloping demand curve for oil. This last possibility cannot be dismissed as Argentina is a significant participant in the world soybean oil and pellets market. At the firm level, processing is characterized by (a modest) degree of concentration: the HHI index while still relatively low at 0.148, has been increasing since the late 1990´s (Lema and Figueroa Casas, 2010).

Higher values of t_G relative to t_O result in an increase in oil exports and a reduction in the exports of grain. For the processing industry, returns over costs of the variable input (grain) will be:

[3] $P_O(1- r_O)G\ \alpha - P_G(1 - r_G)G$.

If FOB prices are such that $P_O/P_G = 1/\alpha$ (marginal product of grain into oil is the same in the world as in Argentina) the above is re-written as:

[4] $P_{G/}\alpha(1 - t_O)G\ \alpha - P_G(1 - t_G)G$

[5] $P_GG\ [t_G - t_O]$

That is profit of the processing sector will be equal to the FOB value of the processed grain times the difference in export tax rate of grain and oil. Given the assumed fixed coefficients production function, processing plants can be expected to work to full capacity:

[6] $O = \min(\alpha G, \beta K^C)$, $G^* = (\beta/\alpha)K^C$

where K^C is the size of the producing plant. Given $P_GG\ [t_G - t_O] > 0$, it will "pay" to invest in additional capacity as long as the firm can expect to have access to additional grain to process. Initially, "rents" resulting from $t_G > t_O$ will be captured by processors. However, if free entry is assumed into processing, a fixed supply of grain has to be allocated among a potentially large number of processing plants. Each additional unit of G that is processed by a plant yields an additional $P_G\ [t_G - t_O]$ to the firm. If processing firms are operating below capacity, they compete with each others for a fixed amount of grain G. They can increase their market share in processing by transferring to producers a part of the per unit rent $P_G\ [t_G - t_O]$ they have access to. Under competitive conditions, this rent would be transferred totally to producers. In summary, assuming investment has proceeded to the point where $(\beta/\alpha)K^C$ is equal to the available output G, differential taxes for grain and grain subproducts will not result in rents captured by processors. Instead lower taxes on processed products are captured by primary producers themselves.

The above simplification may not apply in current Argentine conditions. In particular, strong unions in the transport/processing/export sector result in part of land rents lost by landowners being transferred to rents (returns over opportunity wages) by workers in these sectors. These unions may result in higher processing costs in Argentina as compared to countries with less-regulated labor markets.

If prices received by farmers do not converge to prices received by processors, inefficiency will occur due to the fact that the domestic price ratio between oil and grain is $P_O(1-r_O)/P_G(1-r_G)$ which is different from the "shadow" P_O/P_G price ratio prevailing in the international market. In a "production possibility" graph, the Oil/Grain production mix will not coincide with the production mix which maximizes returns to all the resources of the economy. Again, assuming free entry into processing results will be: (i) zero profits for processors and producers, (ii) reduction in (land) rent of landowners with corresponding increase in returns (not profit) to capital owners and wages to labor in the processing sector and (iii) lower overall output from resources of the economy.

Empirical evidence exists on aspects discussed above. Lema and Figueroa Casas (2010) analyze the impact of differential export taxes for soybean and grain on price differences between these two products. They find that a substantial increase in the "processing margin" occurring after the change in export tax regime. For soybeans used for crushing (soy oil and meal) processing differentials with and without export taxes are estimated at US$ 6 per ton of grain, or an increase of 26 percent over the no-tax situation. Assuming a total soybean crop of some 50 MT, and exports of grain of 14 MT, the above differential would result in a transfer from producers to processing industry of some US$ 216 million per year. Additional (albeit very crude) evidence of the impact of differential export taxes results when comparing the soybean price ratio [grain (domestic)/oil(FOB)] in 2000 (pre-export taxes) with the same ratio after the imposition of taxes. The ratio is 0.55 for the former period, as compared to 0.30 – 0.35 for the latter. This increasing gap may be a result of processing capacity being still below available output, processing plants not having thus to "bribe" primary producers by offering part of their rent P_G [$t_G - t_O$] in order to attract grain from other processing firms. Increased unionization in transport and processing could have played an additional part.

Price Subsidies

Starting in 2007 and until 2011, a price subsidy mechanism was put in place for processors selling wheat, corn, soybean and sunflower products in the local market. Actions fell under responsibility of "Oficina Nacional de Control Comercial Agropecuario" (ONCCA). The per-unit subsidy is calculated as the difference between the market and a domestic "reference" price ("precio de abastecimiento interno"). Eligibility for subsidies is based on the firm having undertaken operations in the grain market prior to the start of the price compensation scheme. Maximum amount of compensation per firm is calculated on the basis of monthly record of operations per firm, net of that channeled to the export market. Subsidy amounts are discussed in another section of this paper.

In the case of wheat, both producers selling to domestic-market processors as well as processors could receive subsidies. In some cases, subsidy payment was conditional on processing maintaining prices for their output within set limits. Beginning 2008 "small farmers" are eligible for subsidies. These are defined as producers with total output of less than 500 tons, and less than 350 hectares in the *pradera pampeana* or 500 hectares in the *zona extra pampeana*. This subsidy attempts to refund to smaller producers part of the price reduction due export taxes. The plan, if successful, would result in "differential" export taxes according to farm size. In this same year, an additional subsidy on grain transport costs is offered to producers in the *zona extra pampeana*. The subsidy is justified by the high transport costs of producers of this area. Again, the plan can be seen as an attempt at "price discrimination" the reasoning being that export taxes are justified as a way of transferring land rents of the highly productive *pradera pampeana* to other sector of the economy. For the *zona extra pampeana*, or for "small" farmers this transfer of land rents is seen in unfavorable light, thus the subsidy decision on output or on transport.

Subsidies were also paid for livestock producers. Feed-lot producers were eligible, the aim being reductions in the cost of production of grain-fed animals. Subsidy is calculated on the basis of an estimate of the quantity of grain used, a "technical conversion" factor of 6 kg of corn to 1 kg of beef is used to calculate amount of compensation to be paid.

The important increase in feed-lot production that occurred since 2008 is the result, in part, of subsidy payments – some observers believe that in the absence of subsidies, beef production under feedlot conditions would have been in most years unprofitable – lower prices for beef in Argentina as compared to for example the U.S or Australia make grain feeding a marginal proposition unless (i) export taxes exist on grain and not beef, and (ii) some subsidy is applied to feedlots. A point to note is that concurrent with feedlot subsidies, export "permits" (resulting in some cases in *de facto* quotas) were imposed on beef exports. The aim of these measures is to reduce beef prices in the domestic market. With variations, similar subsidy schemes have been in effect for pork and poultry production.

In the case of dairy, subsidies of the order of US$ 0.015 (or 5 percent of milk price) were paid in 2007 and 2008, with a limit of 3000 litres/day of output. Only farms producing up to 3000 litres/day were eligible. For a farm producing this upper limit, the annual subsidy would be US$ 16.000 or approximately the annual labor costs of 1.5 workers. In 2010 subsidy is increased to approximately US$/lt 0.02. Subsidies were also directed to milk processors. In this case, eligibility conditions included agreement with maximum prices for milk products set by authorities.

Summarizing, since 2007 until 2011 public policy has aimed at reducing domestic prices in particular of wheat flour, beef, pork, poultry and milk products by various forms of subsidy payments. In some cases, the logic behind subsidy measures is to "help" processors compete with the export sector for primary products. Cursory reading of program design and administration conditions (eligibility, subsidy calculations) suggests a host of problems that could result from the scheme. Independent of the impact on efficiency in resource allocation, questions can be raised on how subsidies will be rationed among potential claimants.

V. Estimates of Policy Transfers 2007-2012

Most of the agricultural commodities produced in Argentina are internationally traded and the country is a net exporter in major crops, beef and milk markets. The set of commodities for the calculation of the PSE and related indicators was selected following the OECD's criteria that more than 70 percent of the total value of agricultural production should be covered. Following this criteria, eight commodities were selected for the analysis: wheat, corn, soybeans, sunflower, beef, pork meat, poultry and milk from 2007 to 2012 (see Table 3). Approximately one half of the total value of production corresponds to cereal and oilseed crops and the other half to animal production, beef production being the most important with 20% of the total[7].

As mentioned previously, export taxes have been an important source of fiscal revenue. The analysis of "policy transfers" for Argentina is thus different than that for OECD countries: in the former transfers have taken place from producers to consumers, in most of the latter, transfers have followed the opposite direction. In addition, in Argentina the analysis of transfers is relatively "simple" as compared in particular both

[7] The values of production for MPS commodities in Table 3 were calculated at farm gate using the PSE methodology by commodity. The share of MPS commodities in the total agricultural value of production (73%) was estimated using data from the National Accounts System from 2007 to 2012.

to OECD countries as well as to several developing economies. Argentine economic policy has resulted in relatively few programs transferring financial or other resources to individual agricultural producers. Moreover – and in contrast to the situation existing in several OECD countries - most of these programs have had relatively straightforward eligibility requirements.

In this section we present estimates of transfers resulting from economic policy in Argentina in the 2007-2012 periods. General aspects related to estimation of transfers are detailed in the OECD *Producer Support estimate and related Indicators of Agricultural Support* Manual (OECD, 2010). We follow closely calculation procedures presented in the manual, in effect our tables are designed correspond to tables in Chapters 6-8 of the OECD manual.[8] The OECD manual presents a detailed description of calculation procedures. We thus present here a summary of these procedures as relates to the situation existing in the Argentine agricultural sector.

V.1 Market Price Differentials and Market Price Support Estimates

Tariff and non-tariff measures affecting trade result in price differentials between international and domestic prices. Differentials between prices received by farmers and international prices faced by the country capture not only these tariff and non-tariff aspects, but also transport costs, processing costs and quality differentials. In order to gauge transfers between farmers, consumers and the government it is necessary to "net out" the multiple aspects determining price differentials: i.e. transport costs lower farm gate prices as compared to export prices, the difference being payments for transport services received by the farmer. A tax on exports, in contrast, lowers farm gate prices but results in government tax revenue: i.e. a transfer from farmers to government. But the tax on commodity exports, by reducing domestic prices, also results in a transfer from farmers to consumers.

The approach adopted to calculate the Market Price Differentials (MPD) for the relevant commodities is *the price gap method*. The underlying principle is to measure the difference between two prices, i.e. a domestic market price in the presence of policies and a border price, representing the theoretical opportunity price for the domestic producers. We need to compare the price received by producers at the farm gate, with a border price that has been adjusted to make it comparable with the farm gate producer price. To do so, adjustments are needed for both marketing margins (representing the costs of processing, transportation and handling) and weight conversion (e.g. grain processing into oil or pellets as in the case of sunflower). As a result of these adjustments, a border price measured at the farm gate level is obtained: this is the *Reference Price (*RP*)*. The MPD for a commodity estimated through this method is:

$$MPD_i = PP_i - RP_i$$

and

$$RP_i = (BP_i \times QA_i - MM_i) \times WA_i$$

Where:

[8] The lower left corner of each of our tables contains a reference to the corresponding table in the OECD manual and the data sources. Additional information on the calculation procedures and data sources is available to interested readers upon request to the authors.

PP_i : producer price for commodity *i*
RP_i : reference price for commodity *i* (border price at farm gate)
BP_i : border price for commodity *i* or products derived from commodity *i*
QA_i : quality adjustment coefficient for commodity *i*
MM_i : marketing margin for commodity *i*
WA_i : weight adjustment for commodity *i*

Cereals and oilseeds are the most important agricultural export products from Argentina. The four major crops selected (wheat, corn, soybeans and sunflower) are products were the agricultural policy induces a lower domestic market price. This occurs through export duties and market interventions (quantitative restrictions and export licensing). Taxes on agricultural exports are a source of budgetary revenue and also contribute to the government objective of lowering food prices for domestic consumption. Consequently the domestic price decreases relative to the border price, creating for these products a negative market price differential (MPD). For the crops analyzed Argentina is an exporter. Thus, policies that reduce the domestic market price of a commodity create transfers from producers to consumers (TPC), who also finance transfers to the public budget (TPT).

The Appendix I details data sources and procedures used to estimate Market Price Differential (MPD), Market Price Support (MPS), Transfers from Producers to Consumers (TPC) and Transfers from Producers to Taxes (TPT). For grains, calculations are relatively straightforward as border prices exist for basic commodities produced at the farm level. In these cases, differences between border and farm prices only result from: (i) export taxes and (ii) transport and handling costs. Given that (ii) may be readily estimated, the impact of (i) can be obtained by directly comparing border (net of item (ii)) and producer prices.

In the case of livestock commodities calculations are more involved: for meats the producer prices refer to live weight, while export prices refer to processed meat products. Corrections thus have to be made to take into account: (i) the transformation ratio from live weight to carcass weight (the exported product), (ii) processing costs, and (iii) handling and transport costs. Thus, for example in Table A.5 it is assumed that 100 kg of live weight results in 55 kg carcass weight. Processing costs per ton of carcass weight are estimated on the basis of published sources.

In the case of milk, additional calculation need to be done as the price received by the producer is expressed per-liter of milk, while dairy exports occur not as fluid milk but as powdered milk and different kinds of cheese. Again, the transformation ratio of milk into these outputs needs to be considered, as well as the processing costs necessary to transform fluid milk into the different dairy products that are exported. In Table A.6 (Appendix I) for example, border prices for the (tradeable) butter and skim milk powdered (SMP) of, respectively US$/ton 3462 and 3529 result in an implicit price for (non-tradeable) raw milk (border) of US$/ton 472 in year 2012. This implicit price of milk at the border, minus marketing and transport costs from farm to the border, minus processing costs for the transformation of milk into butter and SMP result in a "Reference Price" (RP). The RP is the price that the producer would receive if no export taxes were present. The difference between prices effectively receives (PP) and this reference price (RP) results basically from export taxes. [9]

[9] Export quotas may in some cases also be relevant.

V.2 Producer Support Estimates: Price Transfers

Export taxes are by far the most important policy instrument used in Argentina for "support". In this case, producers receive lower prices than what would be the case in the absence of market intervention. As mentioned in previous sections, the magnitude of export taxes has varied through time. Currently (2013) taxes are 23 percent for wheat, 20 percent for corn, 32 percent for sunflower, 35 percent for soybeans and 15 percent for livestock products.

Export taxes result in income transferred from producers to consumers and from producers to tax revenue. Lower domestic prices lead to increases in the level of domestic consumption and a reduction in production. The magnitudes of these changes depend of course on the elasticity of demand and supply of the relevant commodity. For exported commodities, the difference between the Reference Price (RP) and the Producer Price (PP), multiplied by the total amount produced represents total transfer from producers to consumers and tax revenues. This is called the "Market Price Support" (MPS) of the commodity. In some cases, adjustments have to be made on account of part of exported commodity being used as animal feed, and not consumed directly by consumers .

Tables A.1-A.8 (see the Appendix I) present calculations of the impact of export taxes on prices received by agricultural producers, and on transfers made from producers to consumers and tax revenues. These tables are the basis from which all subsequent support estimates are calculated.

Table 4 shows MPS levels for the five years analyzed here, and for the chosen 8 commodities. Simple extrapolation allows an estimate to be obtained for the MPS of other commodities not included in the calculations. For the 2007-2012 period total MPS was always negative, indicating that revenues were transferred from producers to others (consumers and tax revenues). Country-wide MPS (MPS(c)) averaged some US$ 12.000 million of which 40 percent corresponds to transfers from the soybean crop. Beef and corn production respectively account for 17 and 10 percent of total MPS. Important inter-year variation in total MPS (MPS(c)) occurs: the level of this variable in 2008 is more than double that of 2009. Important changes also occur in 2011 as compared to 2010 (see Figure 2).

International prices and export quantities are the major drivers of these variations, because ad-valorem export taxes (the most important policy instrument used in Argentina) remained relatively fixed after 2008. For example, the significant drought occurring in the 2008/09 crop year resulted in a drop of soybean production of more than 30 percent. Table 5 shows an analysis of inter-year changes in MPS (%DMPS) by commodity. A decomposition analysis is made between changes resulting from (i) changes in the quantities produced (%DQP) and (ii) changes in the differential between reference (border) and producer prices adjusted for processing, handling and transport costs (%DMPSu).[10] Recall than in Argentina MPS are negative, that is transfers occur

[10] To obtain the decomposition results at the individual commodity level the formula is:

$$\%\Delta MPS_i^t = \frac{MPS_i^t - MPS_i^{t-1}}{MPS_i^{t-1}} \times 100$$

$$= \left(\frac{QP_i^t - QP_i^{t-1}}{abs(MPS_i^{t-1})} \times \frac{MPSu_i^t + MPSu_i^{t-1}}{2} \times 100 \right) + \left(\frac{MPSu_i^t - MPSu_i^{t-1}}{abs(MPS_i^{t-1})} \times \frac{QP_i^t + QP_i^{t-1}}{2} \times 100 \right)$$

Where: i: individual commodity; MPS_{ui}: per unit MPS; QP: quantity produced and Abs(MPS): absolute MPS.

(See Equation 11.6 -page 149 *contribution analysis*- of the OECD "PSE Manual") from producers to consumers and taxes, and not the other way round. With this in mind, the following points can be highlighted:

1. Large inter-year variation in MPS is observed: for soybeans percentage variations (in absolute terms) range from 20 to nearly 60 percent, for corn from 15 to nearly 230 percent.
2. In the case of soybeans, maximum percentage increase and decrease is similar for quantity- and price-related sources of variation. In the case of corn, however (and contrary to a-priori expectations) maximum percentage increases and decreases appear to be greater from price than from quantity-related variation.
3. Wheat is similar to corn: wide variations in MPS are observed; however variations resulting from changes in prices appear to be greater than those resulting from changes in quantities.
4. For beef production MPS variations resulting from quantity variations are low (in absolute terms from 6 to 20 percent). However, variations resulting from prices are much higher, and range from 50 to 410 percent.

In the period analyzed here (2007-2012) commodity prices varied substantially: from US$/t 290 to 480 for soybeans, US$/t 150 to 230 for corn, US$/t 200 to 290 for wheat and US$/t (carcass weight) 4000 to 8200 for beef. Under these conditions, the same export tax rate on commodities obviously results in widely varying transfers from producers to consumers and taxes. Under the high commodity prices prevailing since 2007, high farm incomes received by producers make these transfers "easier to digest" by these producers, however in absolute magnitudes these high commodity prices result in massive transfers out of the production sector.

The OECD methodology allows MPS estimates to be obtained for commodities not belonging to the "standard" commodity set used for calculations (for Argentina, 4 crop and 4 animal product commodities). Table 6 shows results of this exercise. MPS(c) is the estimate of country-wide MPS, obtained by multiplying the total MPS of standard commodities (MPSsmc) by the ratio of total value of production to value of production of MPS commodities. In Argentina, the eight commodities included in MPS calculations represent approximately 70% of total value of agricultural output, thus extrapolation of MPS from included to total (included plus not included commodities) should involve relatively small error. The fact that (in general) a smaller portion of non-included (as compared to included commodity output) is exported, and also that export taxes are smaller or non-existent for non-included commodities suggests that MPS for these commodities may be biased upward. For example, export taxes for fruits and vegetables are 5 percent, as compared to 20 – 35 percent for the major grain outputs that comprise or "included commodity" set.

V.3. Producer Support Estimates: Other Transfers

Transfers mentioned in the previous section ("MPS") result from differences in domestic and border prices. In Argentina, these transfers flow from producers to consumers and tax revenues. Transfers (in this case negative for producers) may occur not only as a result of export taxes, but from budgetary allocations. In particular, producers may be eligible for different kinds of payments and/or subsidies on inputs used. Adding up non-budgetary price-based transfers (MPS) plus these other budgetary transfers, a total measure of transfers from/to agricultural producers is obtained: the

Producer Support Estimate (PSE). Table 7 shows for the 2007-2012 period total MPS transfers and the different categories of budgetary transfers used to calculate the PSE. For Argentina the Producer Support Estimates are always negative, representing a net transfer from primary producers to consumers and taxes (see Figure 3). The following results are highlighted:

1. In round numbers for the 6-year period, MPS annual transfers total from producers US$ 12.000 million. Producers "received back" as budgetary transfers some US$ 430 million or 4 percent of the total MPS figure.

2. Some 25 percent of budgetary transfers (US$ 119 million) are represented by the state-run extension service. Public extension services are provided "free of charge", thus representing a 100 percent subsidy on the input price of the service.

3. 75 percent of budgetary transfers correspond to direct payments based on some measure of output. Interestingly, most (70 percent) of these subsidies go to relatively large-scale "industrial" agricultural producers (feedlots and poultry operations). This issue was analyzed in greater detail in previous sections of this paper. Dairy operations received a significant portion of remaining output-based subsidies.

4. Credit subsidies, either as interest-rate or as refinancing subsidies represent 2 percent of total subsidies.

Market Price Support transfers from producers to consumers and taxes are significantly higher than transfers to producers. This results in inter-year variation of PSE´s being basically a result of variations of MPS´s, and not of variations in budget allocation from government to producers. As mentioned in the previous section, these inter-year variations of MPS are a result both of variations of output as well as of international prices. The relative importance of both sources of variation differs according to production activity: in general inter-year output variations are greater for crops than for livestock products, thus for livestock products border price variability should be a more significant component of MPS variation than from crops.

Note that the total transfers made to beef, dairy plus poultry producers (an average of US$ 354 million for the 2007-2012 period) is larger than the average annual funds allocated for R&D (INTA) and inspection services (SENASA). Details on General Service Support Estimates are provided in the next section.

V.4. General Service Support Estimates (GSSE)

Agricultural producers may receive support not individually (support based on output, input or other variables) but collectively. In general, this support is represented by State investment in the provision of *public goods* whose main beneficiaries belong to the agricultural production sector. Investment in R&D, in rural roads or in animal health surveillance and early warning systems belong to these categories. The *General Services Support Estimates* (GSSE) capture investment in public goods focused on the agricultural sector. Accounting for these investments is of particular importance, given the linkages existing between agricultural public goods (in particular, scientific and technical research) and output growth.

Table 8 shows measures of support belonging to this category. For the period under study, total support averaged some US$ 260 million, 80 percent of which was allocated to two organizations: INTA (*Instituto Nacional de Tecnología Agropecuaria*) and SENASA (*Servicio Nacional de Sanidad y Calidad Agroalimentaria*). INTA is the principal government R&D organization. In turn, SENASA has mandate over animal and plant health, food safety and agricultural input quality monitoring.[11] Table 9 also shows that the total budget allocations to INTA (R&D) plus SENASA increased from US$ 134 million in 2007 to US$ 382 million in 2012, that is they increased almost three-fold. Of the total GSSE, R&D (basically INTA) has in the 2007-2012 period averaged some 40 percent of total expenditure. Of total GSSE resources, these expenditures can most closely be related to the productivity increased observed in the agricultural sector. In the case of SENASA, the animal and plant inspection services agency, a significant portion (approximately 40 percent) of its budget is basically allocated to foot and-mouth disease prevention activities. As such, they do not directly result in *observed* productivity enhancement: their "impact" relates to the counterfactual comparison of the current sanitary situation with what would happen if a disease outbreak occurs.[12] In general, SENASA´s activities are related more to market access than to crop and livestock productivity per-se.

V.5. Producer Support: %PSE

The Percentage PSE (%PSE) is the PSE as a share of gross farm receipts (including support) at a national level and is a relative indicator of support provided to producers. Table 9 shows that the negative %PSE reached an (absolute) minimum of 19.1 % in year 2010 and a maximum of 39.9 % in year 2008, averaging 32% in the 2007-2012 period. An average %PSE of -26% means that the estimated total value of policy transfers from individual producers to consumers and tax revenue represents 26% of total gross farm receipts[13]. Table 9 also presents the Producer Nominal Assistance Coefficient (producer NAC) that is the ratio between the value of gross farm receipts (including support) and gross farm receipts valued at border prices (measured at farm gate). The NAC reached a maximum of of 0.84 and a minimum of 0.71, meaning that producers receive between 71 to 84% of the gross farm receipts valued at border prices.

The negative support is relatively high; but with an unequal distribution between the subsectors. For example, soybean grain production and beef production are very highly taxed, but dairy, poultry and pig meat production have had in fact positive support. The absolute increase in the negative PSE in 2008 was basically a result of the market price support and was caused both by in rising international prices and an increase in export duties.

V.6. Total Support Estimate (TSE), Percentage GSSE and Percentage TSE

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[11] INTA´s budget was partitioned into extension (54 percent of total) and R&D 46 percent. Extension is imputed to PSE (a "free" input to individual producers), while R&D is imputed to "public godos" (GSSE).

[12] Which indeed was the case in 2001.

[13] Gross farm receipts is the value of production, plus Budgetary and Other Transfers provided to producers (i.e. VP+BOT)

The TSE is the annual monetary value of all gross transfers from taxpayers and consumers arising from policies that support agriculture net of the associated budgetary receipts. In order to assure consistency in calculations, the TSE was estimated by two methods. The first sums up the transfers distinguished by recipient, i.e. transfers to producers (PSE) transfers to general services (GSSE) and transfers to consumers from taxpayers (TCT). The second sums up the transfers over different sources. Transfers from consumers (TPC+OTC) and transfers from taxpayers[14]. Table 10 presents the calculation results in US$ million. The average TSE for the period is negative in US$ 10700 million. This result confirms the already mentioned small effect of GSSE to offset the negative MPS.

The Percentage GSSE (%GSSE) and Percentage TSE (%TSE) are two relative indicators of support derived from absolute values of GSSE and TSE. The %GSSE indicates the importance of support to general services within total support. It is calculated as the percentage share of the TSE (GSSE/TSE). The %TSE indicates the level of total support to agriculture relative to the country gross domestic product (GDP). Table 11 presents the results of these calculations for Argentina in the period 2007-2011. The average %GSSE is estimated at -3% and the average %TSE is estimated at -3.1%. The value of %GSSE indicates that the agricultural producers "received back" 3% of the negative TSE during the period 2007-2011. At the same time, the %TSE suggests that the agricultural producers transferred to consumers and tax revenues, on average and per year, 3.1% of the GDP.

V.7. Consumer Support Estimates (CSE)

The Consumer Support Estimates (CSE) is the annual monetary value of gross transfers to consumers, measured at the farm gate level. Table 11 shows the CSE from agriculture for the Argentine economy. As mentioned previously, export taxes result in reduced domestic as compared to border prices, thus a transfer results from producers to consumers (and taxes). For the 2007-2012 period total CSE averaged US$ 3700 million. Given the country´s population of 41 million, this transfers averages US$ 90 per person, or US$ 360 for a four-person household.

The magnitude of these transfers can be put into perspective by comparing the average household income, in particular of the "low" income households. According to the National Institute of Statistics (INDEC), median household income of the 10-percentile was AR$ 1680/month, or AR$ 21840 per year in 2011[15]. Assuming a four-person household, and of course assuming that average food consumption of this household is equal to households of other income levels total CSE would, as mentioned above be US$ 360 per-year. Given an exchange rate of AR$ 6 per US$, annual income of this household would be 21840/ 6 = US$ 3640 thus CSE´s represent approximately 10 percent of annual income. A-priori, for these households the reduction in domestic prices of food appear quite significant.

Lastly, note the highly variable nature of CSE: for the years analyzed here they range from US$ 1300 to 8000. Clearly, in periods of high international prices, local consumers obtain substantial benefits from taxing agricultural exports. Of course, alternative measures of consumer support (e.g. a food stamp or an income transfer program) could reduce negative impacts of international price hikes with less distortion in incentives for agricultural producers.

[14] For details see Section 8.2 of the OECD PSE Manual

[15] For formal workers, 13 months per year compensation.

VI. Conclusions

During the last decades, Argentine agriculture has been the most dynamic sector of the economy. Rapid productivity growth, coupled with recent increased demand for agricultural commodities make agriculture an important sector of the economy. The agricultural sector has been subject to a changing policy environment: periods of relative openness and macroeconomic stability have alternated with periods of high inflation, and considerable restrictions on foreign trade. Despite changing “rules of the game” performance of agriculture has been significant.

Agricultural policy in Argentina has resulted - as compared to many other countries – to few (in many cases no) programs aimed at subsidizing input prices or affecting land allocating decisions via direct payments. For example, no programs have been in place in order to further agricultural insurance use. Environmental issues (such as deforestation, wetlands or ag-chemical use) are in general just now starting to crop up in the agenda. Price support or stabilization programs have also been absent. Since 2007, however, different kinds of interventions have affected the value chain: export permits or quotas, and of course export taxes have had a significant impact.

Transfers to and from agriculture have been estimated for the principal eight agricultural production activities of Argentina. Results indicate substantial transfers from agriculture to other sectors of the economy. The soybean crop accounts for a major portion of transfers from agriculture: the fact that 90 + percent of the soybeans are exported (either as grain or sub products) implies that these transfers go mostly from farmers to tax collection. For other activities, where exports are a smaller portion of total production (e.g. beef and poultry) lower domestic prices mainly benefit consumers, and only secondarily tax collection. The results for Argentina contrast sharply with estimates for other southern hemisphere countries with large agricultural sectors as Australia, Brazil, Chile, New Zealand and South Africa (OECD 2013). Figure 4 shows that for these countries the %PSE is relatively stable with low and positive values (5%) while for Argentina is volatile and negative in the order of -20% to -40%.

An important issue to be addressed in future research relates to the “costs and benefits” resulting from taxes on exports and the consequences in terms of productivity and efficiency. Clearly, export taxes distort incentives to producers and as such introduce inefficiency and reduce the relative productivity. The magnitude of this inefficiency depends on the elasticity of supply: the lower this elasticity the smaller the resulting inefficiency. Export taxes, however, result in lower food prices for consumers and tax revenue for government. Designing improved ways of subsidizing food consumption by low-income households, and alternative ways of financing government are challenges that remain.

Results also show increasing budgetary allocations over time to both R&D (basically INTA) as well as animal and plant health (SENASA). In Argentina, and in contrast with other countries, relatively few (if any) resources are channeled to support projects addressed to environmental management, food subsidies to low-income population or agricultural insurance. Analysis of the efficiency of public intervention in agriculture is an important topic to be addressed in future research. The improvement of data on the different dimensions of the agricultural sector is a pressing issue.

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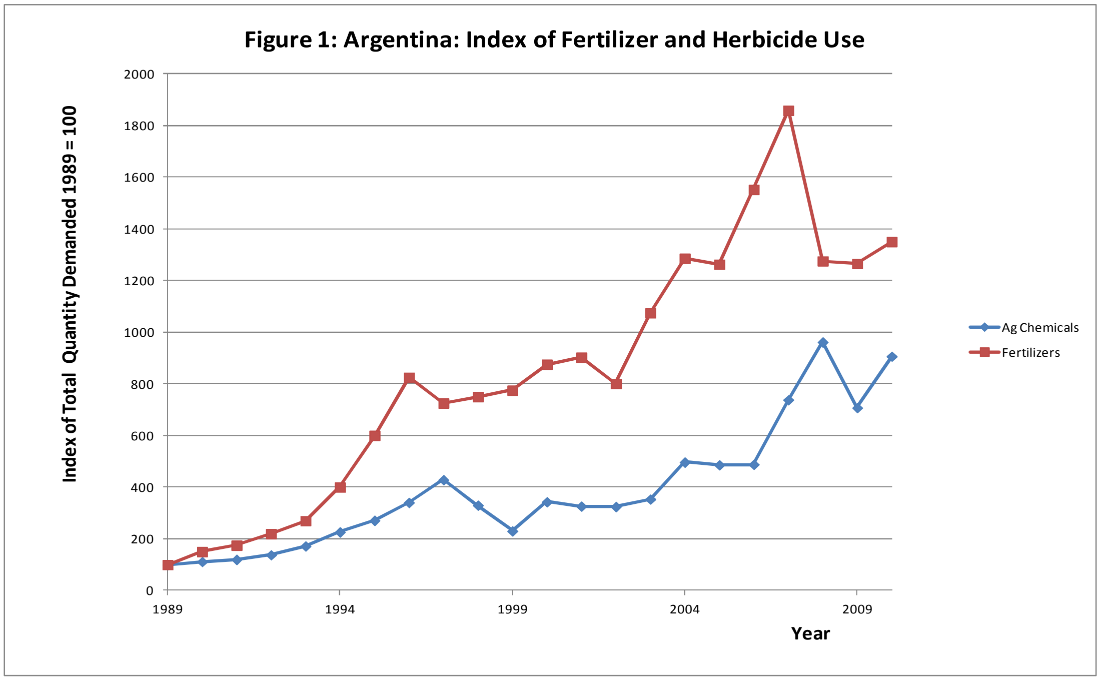
FIGURES



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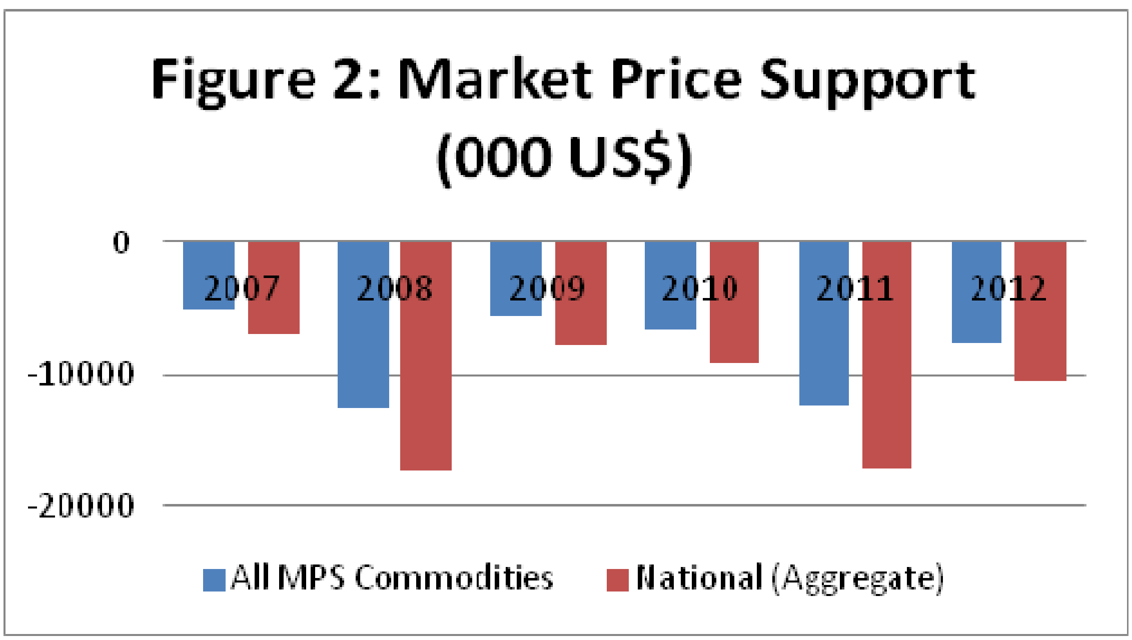

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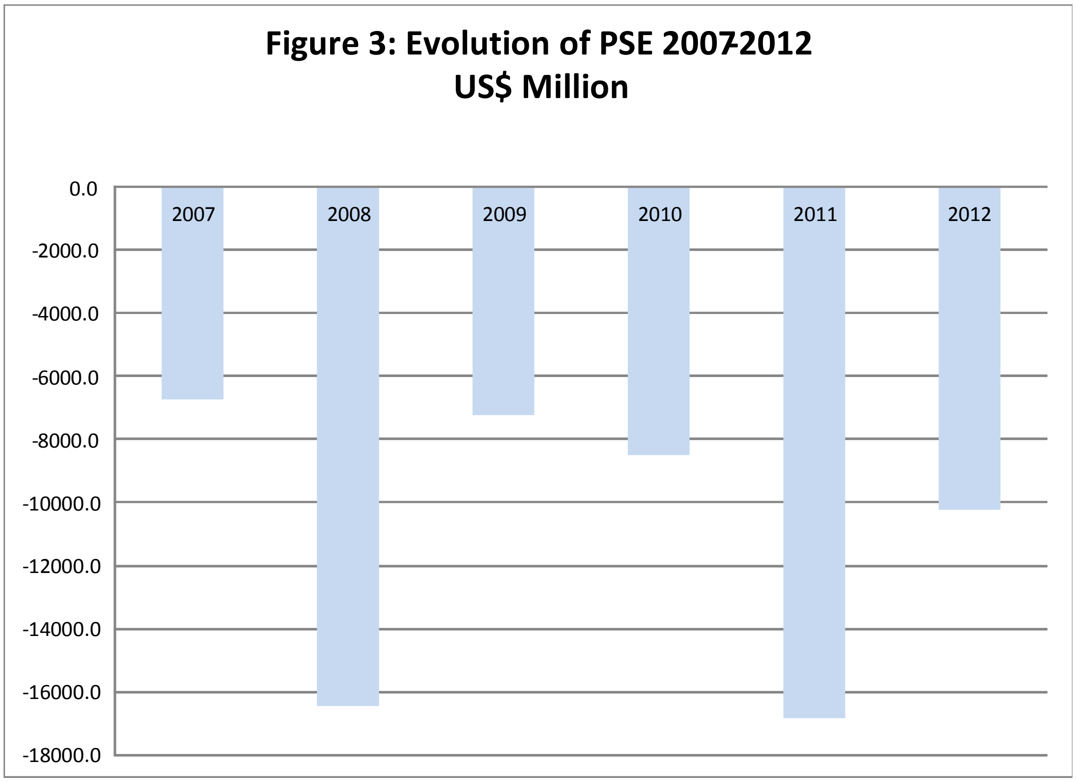

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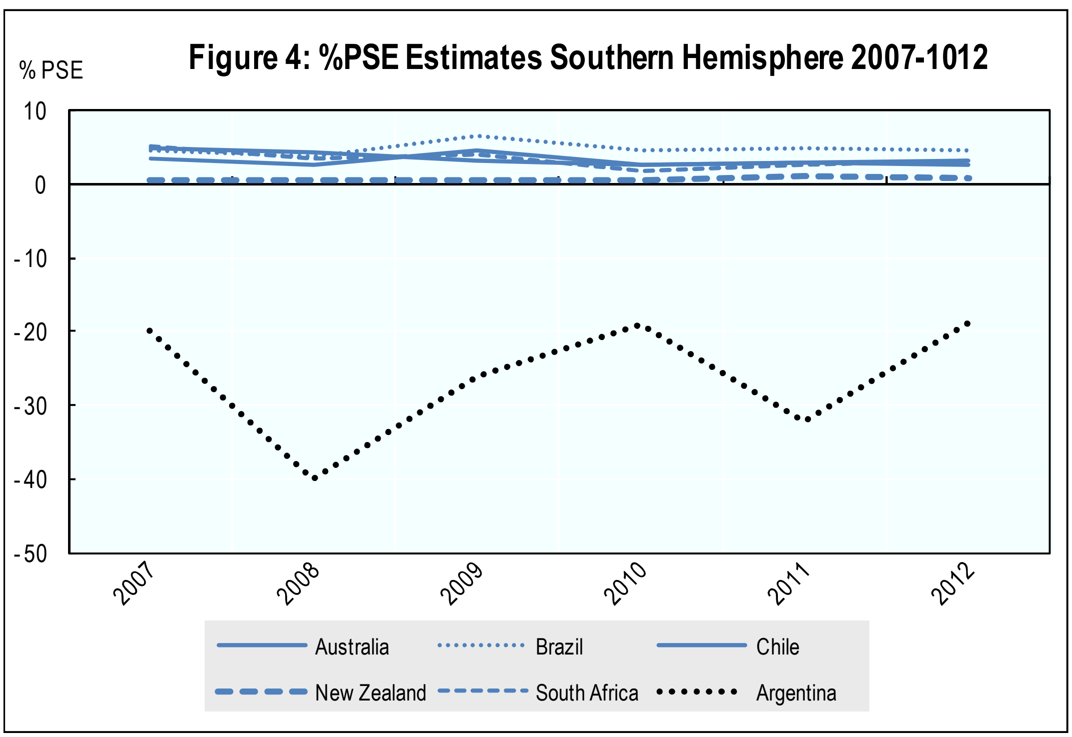

Source: OECD (2013), "Producer and Consumer Support Estimates", OECD Agriculture statistics (database) and authors estimates

TABLES

Table 1: Output and Input

		1985-89	1995-99	2005-09
Output Grains				
Rice	´000 tons	422	1153	1218
Corn	´000 tons	8170	15140	18803
Wheat	´000 tons	8988	13581	11871
Peanuts	´000 tons	262	426	558
Sunflower	´000 tons	3263	5960	3328
Soybeans	´000 tons	8180	16464	43586
Total Output Grains	Index	100	182	278
Planted Area Grains	´000000 has	14.9	20.7	25.9
Output Animal Products				
Beef	´000 tons	2702	2657	3180
Chicken	´000 tons	336	827	1263
Milk	´000 tons	6073	9555	10182

Source: SAGPyA (hectares and output), CASAFE (inputs)

Table 2: Output and Input Prices

		1980-89	1990-99	2000-09
Output Prices - World				
Corn	US$/ton	113	113	127
Wheat	US$/ton	150	149	184
Soybeans	US$/ton	238	228	264
Oil	US$/barrel	26	18	50
Output Prices - Argentina				
Corn	US$/ton	78	106	92
Wheat	US$/ton	97	131	128
Soybeans	US$/ton	150	210	195
Argentine/World Output Prices	Ratio	0.65	0.91	0.76
Tornqvist Crop Price Index - Argentina	Index	57	79	76
Input Prices - Argentina				
Nitrogen Fertilizer	US$/ton	194	247	375
Phosphorus Fertilizer	US$/ton	252	321	496
Machine Services ("UTA")	US$/ha	11	17	19
Herbicide 1 ("Roundup")	US$/lt	na	7	3
Herbicide 2 ("Atrazine")	US$/lt	na	3	4
Labor		93	253	267
Tornqvist Input Price Index - Argenti	Index	57	71	71
w/p (= Tornqvist Input/Tornqvist O	Index	100	90	93

Sources:

IMF (world prices)
AACREA (domestic output and input prices)

Table 3: Selection of Commodities for MPS Calculation

Value of Production (at farm gate) US$ million

	2007	2008	2009	2010	2011	2012	Average 2007-2012	Cumulative %
Soybeans	10326.1	12947.7	7859.1	13914.2	15547.2	14913.6	12584.6	30
Corn	2568.2	3014.0	1484.5	3200.8	3570.0	3597.6	2905.9	37
Wheat	2097.8	2780.0	963.3	1682.8	2616.1	2647.3	2131.2	42
Sunflowers	1232.9	851.0	578.6	761.7	1287.8	1237.9	991.7	44
Dairy	2101.4	2532.8	1978.7	3187.6	3913.4	3731.8	2907.6	51
Beef	4987.5	5698.3	5223.0	7260.0	8681.0	10335.0	7030.8	68
Poultry	1181.8	1394.8	1381.1	1559.0	1868.0	2625.7	1668.4	72
Pigmeat	280.0	347.6	341.7	483.3	627.4	745.9	471.0	73
Value of Production MPS Commodities - VP (i)	24775.7	29566.2	19810.0	32049.4	38110.9	39834.7	30691.2	73
Total Value of Production Agriculture- VP(c)	33939.4	40501.7	27137.0	43903.3	52206.8	54568.0	42042.7	100

Table 4: Calculation of national (agregate) MPS – US$ million

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**Average**
VP(c)	Total value of production	33939.4	40501.7	27137.0	43903.3	52206.8	54568.0	42042.7
VP (amc)	Total value of production (mps commodities)	24775.7	29566.2	19810.0	32049.4	38110.9	39834.7	30691.2
MPS	Soybeans	-2981.6	-4584.9	-3862.6	-4776.9	-7348.1	-4895.8	-4741.7
MPS	Corn	-560.4	-1861.6	-895.3	-699.2	-2092.5	-1379.8	-1248.1
MPS	Wheat	-793.4	-1759.2	-592.9	-176.1	-1674.7	-2110.7	-1184.5
MPS	Sunflowers	316.2	-480.3	-372.7	-495.5	-789.3	-623.1	-407.5
MPS	Dairy	-190.2	-704.9	1282.4	169.2	718.7	915.6	365.1
MPS	Beef	-945.0	-3327.8	-1598.8	-706.7	-1843.6	-59.2	-1413.5
MPS	Poultry	58.1	159.5	258.5	-19.4	366.8	257.1	180.1
MPS	Pigmeat	31.6	31.9	92.1	92.3	247.3	231.0	121.0
MPS (amc)	All MPS commodities	-5064.8	-12527.2	-5689.2	-6612.3	-12415.4	-7665.0	-8329.0
MPS(c)	Market Price Support	-6938.1	-17160.6	-7793.4	-9058.0	-17007.4	-10500.0	-11409.6

Data source: SAGPyA
Ref T 6.5 OECD Manual

Table 5: Source of Variation (contribution analysis)

		2008	2009	2010	2011	2012	Absolute Changes:	
							Minimum	Maximum
Soybeans	%DMPS	-54%	16%	-24%	-54%	33%	16%	54%
	%DQP	3%	37%	-60%	9%	17%	3%	60%
	%DMPSu	-57%	-21%	37%	-63%	17%	17%	63%
Corn	%DMPS	-232%	52%	22%	-199%	34%	22%	232%
	%DQP	-3%	37%	-53%	16%	-1%	1%	53%
	%DMPSu	-230%	15%	75%	-215%	35%	15%	230%
Wheat	%DMPS	-122%	66%	70%	-851%	-26%	26%	851%
	%DQP	-18%	40%	-3%	-226%	2%	2%	226%
	%DMPSu	-103%	26%	73%	-625%	-28%	26%	625%
								0%
Suflower	%DMPS	-5%	22%	-33%	-59%	21%	5%	59%
	%DQP	-30%	57%	13%	-64%	8%	8%	64%
	%DMPSu	24%	-35%	-46%	5%	13%	5%	46%
Beef	%DMPS	-252%	52%	56%	-161%	97%	52%	252%
	%DQP	7%	-6%	17%	9%	-2%	2%	17%
	%DMPSu	-259%	58%	38%	-170%	90%	38%	259%
Milk	%DMPS	-271%	282%	-87%	325%	27%	27%	325%
	%DQP	-11%	0%	1%	30%	1%	0%	30%
	%DMPSu	-259%	282%	-88%	295%	-14%	14%	295%
Poultry	%DMPS	175%	62%	-108%	1991%	-30%	30%	1991%
	%DQP	13%	7%	2%	52%	1%	1%	52%
	%DMPSu	95%	74%	-127%	1939%	-31%	31%	1939%
Pork meat	%DMPS	1%	189%	0%	168%	-7%	0%	189%
	%DQP	-1%	10%	-3%	12%	7%	1%	12%
	%DMPSu	2%	177%	3%	155%	-56%	2%	177%

%DMPS = % difference in total MPS
%DQP = % difference due to quantity variation
%DMPSu = % difference due to price & tax rate variation

Table 6 MPS for other Commodities – US$ million -

	2007	2008	2009	2010	2011	2012
MPS(c)	-6938.1	-17160.6	-7793.4	-9058.0	-17007.4	-10500.0
MPS(smc)	-5064.8	-12527.2	-5689.2	-6612.3	-12415.4	-7665.0
MPS(oc)	-1873.3	-4633.4	-2104.2	-2445.6	-4592.0	-2835.0
MPS(amc)	-5064.8	-12527.2	-5689.2	-6612.3	-12415.4	-7665.0
MPS(xe)	-1873.3	-4633.4	-2104.2	-2445.6	-4592.0	-2835.0

Ref T 6.6 OECD Manual

Table 7: Calculation of PSE – US$ million –

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**Average**
Producer Support Estimate (PSE)	-6743.5	-16447.0	-7244.0	-8492.5	-16824.2	-10227.6	-10996.5
A. Support based on commodity outputs							
A.1 Market Price Support (MPS)	-6938.1	-17160.6	-7793.4	-9058.0	-17007.4	-10500.0	-11409.6
A.2 Payments based on output (ONCCA subsidies*):	108.6	595.0	431.1	415.0	0.0	0.0	258.3
Soybeans and sunflower producers	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Wheat and Corn producers	19.1	52.5	30.5	3.5	0.0	0.0	17.6
Dairy producers	25.0	104.8	104.5	79.0	0.0	0.0	52.2
Pig producers	7.2	20.8	0.3	0.0	0.0	0.0	4.7
Poultry producers	49.6	220.2	113.6	160.0	0.0	0.0	90.6
Beef feed-lot producers	7.7	196.6	182.1	172.5	0.0	0.0	93.2
B. Payments based on input use	86.0	118.6	118.4	150.4	183.2	272.4	154.8
Interest rate subsidies & credit restructuring	5.2	6.5	9.2	16.9	23.5	40.5	17.0
Extension and advisory services	80.8	112.1	109.2	133.5	159.7	231.9	137.9

Data sources: SAGPyA
Ref T 6.7 OECD Manual
* Note: Since February 2011 the ONCCA was replaced by another agency called UCESCI (Unidad de Coordinación y Evaluación de Subsidios al Consumo Interno). The UCESCI is now in charge of the administration of subsidies to specific activities. The new agency does not provide any public information on the amounts of subsidies allocated.

Table 8: Calculation of GSSE

Description	2007	2008	2009	2010	2011	2012	Average
			US$ Million				
General Services Support Estimates (GSSE)	189.5	229.2	252.9	263.3	356.4	500.5	298.6
H. Research and Development							
INTA	68.	95.5	93.0	113.7	136.0	197.6	117.4
INASE	2.7	3.3	3.6	5.2	6.3	11.5	5.4
I. Agricultural Schools							
J. Inspection Services							
SENASA	65.2	92.2	116.4	109.6	137.7	184.9	117.7
PROSAP (animal & plant health, food quality)	12.5	0.0	0.3	0.0	0.0	0.0	2.1
K. Infrastructure							
PROSAP (infrastr, inst strengthening)	23.8	26.8	17.5	15.5	37.3	44.8	27.6
L. Marketing and Promotion							
PROSAP (technology & mkt development)	4.0	1.4	0.6	0.2	16.2	0.0	3.8
M. Miscellaneous							
Social Programs	8.9	6.7	17.1	17.2	20.7	7.9	13.1
Productive reconversion	3.5	3.4	4.3	1.9	2.1	53.8	11.5

Ref T 8.1 OECD Manual

Table 9: Calculation of PSE and Producer NAC

		Units	2007	2008	2009	2010	2011	2012
VP(c)	Total value of production	US$ mill	33939.4	40501.7	27137.0	43903.3	52206.8	54568.0
PSE(c)	Producer Support Estimate	US$ mill	-6743.5	-16447.0	-7244.0	-8492.5	-16824.2	-10227.6
MPS(c)	Market Price Support	US$ mill	-6938.1	-17160.6	-7793.4	-9058.0	-17007.4	-10500.00
BOT(c)	Budgetary and Other Transfers	US$ mill	194.6	713.6	549.5	565.4	183.2	272.4
GFR(c)	Gross Farm Receipts	US$ mill	34134.0	41215.3	27686.5	44468.8	52389.9	54840.4
%PSE(c)	Percentage PSE	%	-19.8	-39.9	-26.2	-19.1	-32.1	-18.6
Producer NAC(c)	Producer Nominal Assistance Coefficient	Ratio	0.84	0.71	0.79	0.84	0.76	0.84

Ref T 6.8 OECD Manual

Table 10: Calculation of %GSSE and %TSE

		Units	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Average**
GSSE	General Services Support Estimate	US$ mil	190	229	253	263	356	501	299
TSE	Total Support Estimate	US$ mil	-6554	-16218	-6991	-8229	-16468	-9727	-10698
%GSSE	Percentage General Services/Support Estimate	%	-2.9	-1.4	-3.6	-3.2	-2.2	-5.1	-3.1
GDP	Gross Domestic Product	US$ mil	260769	326677	307082	370389	446005	475658	364430
%TSE	Percentage Total Support Estimate	%	-2.5	-5.0	-2.3	-2.2	-3.7	-2.0	-3.0
	Exchange Rate	AR$	3.12	3.16	3.73	3.89	4.13	4.55	4

Ref T 8.3 OECD Manual

Table 11: Calculation of CSE

Symbol	Description	Units	2007	2008	2009	2010	2011	2012	Average
VP(c)	Value of production	US$ mill	33939	40502	27137	43903	52207	54568	42043
VP (amc)	Value of production MPS commodities	US$ mill	24776	29566	19810	32049	38111	39835	30691
TCT(c)	Transfer to consumers from taxpayers	US$ mill	0	0	0	0	0	0	0
TCT (amc)	Transfer to consumers from taxpayers for MPS commodities	US$ mill	0	0	0	0	0	0	0
TCT(xe)	Transfer to consumers from taxpayers for non-MPS commodities	US$ mill	0	0	0	0	0	0	0
TPC(c)	Transfers to producers from consumers	US$ mill	-2770	-9015	-2300	-3113	-7270	-2806	-4546
TPC (amc)	Transfers to consumers from producers all MPS commodities	US$ mill	-2022	-6581	-1679	-2273	-5307	-2048	-3318
OTC(c)	Other transfers from consumers	US$ mill	0	0	0	0	0	0	0
OTC (amc)	Other transfers from consumers MPS commodities	US$ mill	0	0	0	0	0	0	0
EFC(c)	Excess Feed Costs (feed crops only)	US$ mill	-337	-930	-948	-509	-1343	-988	-842
CSE	Consumer Support Estimate	US$ mill	2433	8085	1352	2605	5928	1819	3703

Ref T 7.2 OECD Paper

APPENDIX I

Table A.1: Soybeans MPD/MPS Calculation

		Year	2007	2008	2009	2010	2011	2012	
		Exchange Rate	3.12	3.16	3.73	3.89	4.13	4.55	
		Export Taxes	Jan-Oct=27.5% Nov-Dec=35%	35%	35%	35%	35%	35%	
Symbol	**Description**	**Units**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Source/Equation**
QP	Production	000 T	47,483	46,238	30,993	52,677	49,200	40,100	Data Minagri
VP	Value of Production	US$ million	10,326	12,948	7,859	13,914	15,547	14,914	PPxQP
PP	Producer Price	US$/Ton	217	280	254	264	316	372	Soybeans Rosario.
QC	Consumption	000 T	2,753	7,002	1,579	10,615	10,906	9,519	QP - QX
BP	Border Price	US$/Ton	290	391	390	366	479	510	VX/QX
VX	Value of Exports	US$ million	12,975	15,341	11,471	15,401	18,340	15,596	Data: Minagri
QX	Quantity of Exports	000 T	44,730	39,236	29,414	42,062	38,294	30,581	Grain equivalent estimation
MM	Marketing Margin	US$/Ton	34	37	34	51	51	63	Margenes Agropecuarios Dec 2007 (N. Bs As/Sta Fe - Rosario)
T1	Handling and Transportation farm/wholesale/border	US$/Ton	19	24	20	28	28	35	Margenes Agropecuarios Dec 2007 (N. Bs As/Sta Fe - Rosario)
T2	Storage+Other expenses	US$/Ton	15	13	14	23	23	28	Margenes Agropecuarios Dec 2007 (N. Bs As/Sta Fe - Rosario)
F	Fobbing	US$/Ton	10	12	12	11	14	16	Bolsa de Comercio Rosario
F1	Port Expenses	US$/Ton	4	4	4	4	4	6	Bolsa de Comercio Rosario
F2	Trading Expenses (3%)	US$/Ton	6	8	8	7	10	10	Bolsa de Comercio Rosario
RP	Reference Price	US$/Ton	246	342	344	304	414	431	BP-MM-F
NPP	Net Producer Price	US$/Ton	183	243	219	213	265	309	PP-MM
MPD	Market Price Differential	US$/Ton	-63	-99	-125	-91	-149	-122	RP-NPP
MPS	Market Price Support	US$ million	-2,982	-4,585	-3,863	-4,777	-7,348	-4,896	MPD*QP
TPC	Transfer to producers from consumers	US$ million	-173	-694	-197	-963	-1,629	-1,162	MPDxQC
TPT	Transfer from producers to Taxes	US$ million	-2,809	-3,891	-3,666	-3,814	-5,719	-3,734	MPS - TPC

Table A.2: Corn MPD/MPS Calculation

		Year	2007	2008	2009	2010	2011	2012	
		Exchange Rate	**3.12**	**3.16**	**3.73**	**3.89**	**4.13**	**4.55**	
		Export Taxes	**Jan-Oct=20% Nov-Dec=25%**	**20%**	**20%**	**20%**	**20%**	**20%**	
Symbol	**Description**	**Units**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Source/Equation**
QP	Production	000 T	21,755	22,017	13,121	22,677	21,000	21,196	Data Minagri
VP	Value of Production	US$ million	2,568	3,014	1,484	3,201	3,570	3,598	PPxQP
PP	Producer Price	US$/Ton	118	137	113	141	170	170	Data: Corn Rosario Port - Bolsa de Cereales Bs.As.
QC	Consumption	000 T	6,760	6,634	4,593	5,192	5,626	3,168	QP - VX
BP	Border Price	US$/Ton	150	230	189	179	279	245	VX/QX
VX	Value of Exports	US$ million	2,254	3,531	1,609	3,131	4,285	4,421	Data: Minagri
QX	Quantity of Exports	000 T	14,996	15,383	8,528	17,485	15,374	18,028	Data: Minagri
MM	Marketing Margin	US$/Ton	29	33	29	43	43	55	Margenes Agropecuarios (N. Bs As/Sta Fe - Rosario)
T1	Handling and Transportation farm/wholesale/border	US$/Ton	19	24	20	28	28	35	Margenes Agropecuarios (N. Bs As/Sta Fe - Rosario)
T2	Storage+Other expenses	US$/Ton	9	9	10	15	15	20	Margenes Agropecuarios (N. Bs As/Sta Fe - Rosario)
F	Fobbing	US$/Ton	7	8	7	7	9	10	Bolsa de Comercio Rosario
F1	Port Expenses	US$/Ton	4	4	4	4	4	6	Bolsa de Comercio Rosario
F2	Trading Expenses (3%)	US$/Ton	3	5	4	4	6	5	Bolsa de Comercio Rosario
RP	Reference Price	US$/Ton	115	188	152	129	226	180	BP-MM-F
NPP	Net Producer Price	US$/Ton	89	104	84	98	127	115	PP-MM
MPD	Market Price Differential	US$/Ton	-26	-85	-68	-31	-100	-65	RP-NPP
MPS	Market Price Support	US$ million	-560	-1,862	-895	-699	-2,093	-1,380	MPD*QP
TPC	Transfer from producers to Consumers	US$ million	-174	-561	-313	-160	-561	-206	MPDxQC
TPT	Transfer from producers to Taxes	US$ million	-386	-1,301	-582	-539	-1,532	-1,174	MPS - TPC

Table A.3: Wheat MPD/MPS Calculation

		Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	
		Exchange Rate	**3.12**	**3.16**	**3.73**	**3.89**	**4.13**	**4.55**	
		Export Taxes	**Jan-Oct=20% - Nov-Dec=28%**	**23%**	**23%**	**23%**	**23%**	**23%**	
Symbol	**Description**	**Units**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Source/Equation**
QP	Production	000 T	14548	16348	8373	8751	14697	14500	Data Minagri
VP	Value of Production	US$ million	2098	2780	963	1683	2616	2612	PPxQP
PP	Producer Price	US$/Ton	144	170	115	192	178	180	Data: Trigo Quequen Port - Bolsa de Cereales Bs.As. 2012 MATBA
QC	Consumption	000 T	4902	7576	3276	4758	6644	3224	QP - VX
BP	Border Price	US$/Ton	209	290	196	223	305	341	VX/QX
VX	Value of Exports	US$ million	2016	2547	998	891	2457	3850	Data: Minagri
QX	Quantity of Exports	000 T	9645	8772	5097	3993	8053	11276	Data: MInagri
MM	Marketing Margin	US$/Ton	24	26	23	32	32	38	Margenes Agropecuarios-Dec 2007 (Quequen Port- Average)
T1	Handling and Transportation farm/wholesale/border	US$/Ton	16	20	16	24	24	27	Margenes Agropecuarios-Dec 2007 (Quequen Port- Average)
T2	Storage+Other expenses	US$/Ton	8	6	7	9	9	11	Margenes Agropecuarios-Dec 2007 (Quequen Port- Average)
F	Fobbing	US$/Ton	10	13	10	11	13	16	Bolsa de Comercio Rosario
F1	Port Expenses	US$/Ton	4	4	4	4	4	6	Bolsa de Comercio Rosario
F2	Trading Expenses (3%)	US$/Ton	6	9	6	7	9	10	Bolsa de Comercio Rosario
RP	Reference Price	US$/Ton	175	252	163	180	260	288	BP-MM-F
NPP	Net Producer Price	US$/Ton	120	144	92	160	146	142	PP-MM
MPD	Market Price Differential	US$/Ton	-55	-108	-71	-20	-114	-146	RP-NPP
MPS	Market Price Support	US$ million	-793	-1759	-593	-176	-1675	-2111	MPDxQP
TPC	Transfer from producers to Consumers	US$ million	-267	-815	-232	-96	-757	-469	MPDxQC
TPT	Transfer from producers to Taxes	US$ million	-526	-944	-361	-80	-918	-1641	MPS - TPC

Table A.4: Sunflower MPD/MPS Calculation

Symbol	Description	Units	2007	2008	2009	2010	2011	2012	Source/Equation
		Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	
		Exchange Rate	**3.12**	**3.16**	**3.73**	**3.89**	**4.13**	**4.55**	
		Export Taxes	**Jan-Oct=23.50% Nov-Dec=32%**	**32%**	**32%**	**32%**	**32%**	**32%**	
QP	Production	000 T	3,497	4,650	2,483	2,221	3,669	3,340	Data
VP	Value of Production	US$ million	1,233	851	579	762	1,288	1,127	Production x Producer Price
PP	Producer Price	US$/Ton	353	183	233	343	351	337	Sunflower Rosario - Margenes Agropecuarios
QC	Consumption	000 T	1,373	2,081	280	746	2,674	2,608	Data: Production - Exports
BP	Border Price	US$/Ton	555	331	441	649	649	602	Margenes Agropecuarios dec 2008
VX	Value of Exports	US$ million	1,178	850	972	957	646	440	Data
QX	Quantity of Exports	000 T	2,124	2,569	2,203	1,475	995	732	Data
MM	Marketing Margin	US$/Ton	36	35	33	48	48	56	Margenes Agropecuarios dec 2007 (N. Bs As/Sta Fe - Rosario)
T1	Handling and Transportation farm/wholesale/border	US$/Ton	21	24	21	30	30	37	Margenes Agropecuarios dec 2007 (N. Bs As/Sta Fe - Rosario)
T2	Storage+Other expenses	US$/Ton	16	11	12	18	18	19	Margenes Agropecuarios dec 2007 (N. Bs As/Sta Fe - Rosario)
F	Fobbing	US$/Ton	72	45	58	83	83	78	Bolsa de Comercio Rosario
F1	Port Expenses	US$/Ton	5	5	5	5	5	6	Bolsa de Comercio Rosario
F2	Trading + Processing Expenses (12%)	US$/Ton	67	40	53	78	78	72	Bolsa de Comercio Rosario
RP	Reference Price	US$/Ton	447	251	350	518	518	468	BP-MM-F
NPP	Net Producer Price	US$/Ton	316	148	200	295	303	281	PP-MM
MPD	Market Price Differential	US$/Ton	-131	-103	-150	-223	-215	-187	RP-NPP
MPS	Market Price Support	US$ million	-457	-480	-373	-495	-789	-623	MPD*QP
TPC	Transfer from producers to Consumers	US$ million	-179	-215	-42	-166	-575	-487	MPDxQC
TPT	Transfer from producers to Taxes	US$ million	-277	-265	-331	-329	-214	-137	MPS - TPC

Table A.5: Beef - MPD/MPS Calculation

Symbol	Description	Units	2007	2008	2009	2010	2011	2012	Source/Equation
	Year		**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	
	Exchange Rate		**3.12**	**3.16**	**3.73**	**3.89**	**4.13**	**4.55**	
	Export Taxes		**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	
QPbf	Production (live weight)	000 T	5,861	5,694	6,139	4,773	4,542	4,740	Data
WA	Weight Adjustment (ratio of carcass to live weight)	ratio	0.55	0.55	0.55	0.55	0.55	0.55	Data
QPcw	Production (carcass weight)	000 T	3,224	3,132	3,376	2,625	2,498	2,607	QPlw*WA
Ppliv	Producer Price (live weight)	US$/T	851	1,001	851	1,521	1,911	2,180	Data
VPbh	Value of production	US$ million	4,987	5,698	5,223	7,260	8,681	10,335	VPbh=VPb+VPh
PPcw	Producer Price (carcass weight)	US$/T	1,547	1,819	1,547	2,766	3,475	3,964	PPlw/WA
QCcw	Consumption (carcass weight)	000 T	2,927	2,901	2,993	2,458	2,354	2,498	QPcw - QXcw
BPcw	Border Price (carcass weight)	US$/Ton	3,947	5,884	3,972	6,477	8,254	8,615	(VXcv/QXcw)*1000
VXcw	Value of exports	US$ million	1,171	1,360	1,523	1,085	1,188	939	Data
QXcw	Quantity of Exports	000 T	297	231	383	168	144	109	Data
MMcw	Marketing Margins (carcass weitght)	US$/Ton	1,689	2,518	1,700	2,772	3,533	3,687	T1cw+T2cw
Scw	Processing costs	US$/Ton	1,444	2,154	1,454	2,370	3,021	3,153	Data (BPcw*0.37)
T1cw	Handling and transportation wholesale/border	US$/Ton	158	235	159	259	330	345	Data (BPcw*0.04)
T2cw	Handling and transportation farm/wholesale	US$/Ton	87	129	87	142	182	190	Data (BPcw*0.022)
RPcw (b h)	Reference Price (Beef and Hilton Quality Beef)	US$/Ton							BPcw - MMcw
RPcw	Reference Price (weighted average)	US$/Ton	1,868	2,967	2,091	3,069	4,315	4,055	[RPcwb*QPcwb/QPcw] + [RPcwh*QPcwh/QPcw]
MPD	Market Price Differential	US$/Ton	-321	-1,147	-544	-303	-840	-91	PPcw - RPcw
EFC	Excess Feed Cost	US$ million	-90	-266	-238	-90	-254	-178	Data
TPC	Transfers to Producers from Consumers	US$ million	-940	-3,328	-1,628	-746	-1,977	-227	MPDxQC
TPT	Transfer from producers to Taxes	US$ million	-95	-265	-209	-51	-121	-10	MPD * (QP-QC)
MPS	Market Price Support	US$ million	-945	-3,328	-1,599	-707	-1,844	-59	(MPD*QP) - EFC

Table A.6: Milk - Implicit Price and MPD/MPS Calculation

Symbol	Description	Units	2007	2008	2009	2010	2011	2012	Source/Equation
		Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	
		Exchange Rate	**3.12**	**3.16**	**3.73**	**3.89**	**4.13**	**4.55**	
		Export Taxes	**5%**	**5%**	**0%**	**0%**	**0%**	**0%**	
QP	Production	000 T	9,223	9,690	9,733	9,978	11,229	11,338	Data
VP	Value of Production	US$ million	2,101	2,533	1,979	3,188	3,913	3,732	Production x Producer Price
PPm_liter	Producer Price of raw milk - (liter)	US$/liter	0.24	0.27	0.21	0.33	0.36	0.34	Data
PPm	Producer Price of raw milk	US$/T	228	261	203	319	348	329	Data
QC	Consumption	000 T	7,466	7,756	7,793	8,046	8,519	9,143	QP - QX
QX	Quantity of Exports	000 T	1,757	1,934	1,940	1,932	2,711	2,195	Data
BPb	Border Price - Butter	US$/Ton	2,148	3,335	1,780	3,755	4,493	3,462	Data
BPs	Border Price - SMP (Skim Milk Powder)	US$/Ton	2,930	3,756	2,147	3,112	3,387	3,529	Data
a	Milkfat content in butter	%	82	82	82	82	82	82	Data
c	Non-fat solids content in butter	%	2	2	2	2	2	2	Data
b	Milkfat content in SMP	%	1	1	1	1	1	1	Data
d	Non-fat solids content in SMP	%	95	95	95	95	95	95	Data
e	Milkfat content in raw milk	%	4	4	4	4	4	4	Data
f	Non-fat solids content in raw milk	%	9	9	9	9	9	9	Data
BPm	Implicit Border Price of raw milk		361	487	273	446	503	472	(eX+fY)/100
X	Implicit Border Price of milkfat		2,545	3,972	2,116	4,501	5,393	4,132	(dBPb-cBPs)/(ad-bc)*100
Y	Implicit Border Price of non-fat solids		3,057	3,912	2,238	3,228	3,508	3,671	(aBPs-bBPb)/(ad-bc)*100
WPb	Domestic Wholesale Price of butter		2,344	2,640	2,384	2,736	3,608	3,560	Data
WPs	Domestic Wholesale Price of SMP		2,517	3,030	3,001	3,611	4,080	4,084	Data
α	Share of butter price in milk price		0.04	0.04	0.04	0.04	0.04	0.04	(de-bf)/(ad-bc)
β	Share of SMP price in milk price		0.09	0.09	0.09	0.09	0.09	0.09	(af-cd)/(ad-bc)
MM	Marketing Margin		103	130	174	129	180	198	(αWPb + β WPs) - PPm
RPm	Reference Price raw milk		257	358	99	317	323	274	BPm - MM
MPD	Market Price Differential		-30	-96	104	2	26	55	PPm - RPm
EFC	Excess Feed Cost	US$ million	-82	-229	-268	-148	-430	-291	Data
TPC	Transfers to Producers from Consumers	US$ million	-220	-748	812	17	219	504	MPDxQC
TPT	Transfer from producers to Taxes	US$ million	-52	-186	202	4	70	121	MPD * (QP-QC)
MPS	Market Price Support	US$ million	-190	-705	1282	169	719	916	(MPD*QP) - EFC

Table A.7: Poultry - MPD/MPS Calculation

		Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	
		Exchange Rate	**3.12**	**3.16**	**3.73**	**3.89**	**4.13**	**4.55**	
		Export Taxes	**5%**	**5%**	**5%**	**5%**	**5%**	**5%**	
Symbol	**Description**	**Units**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Source/Equation**
QPpt	Production (live weight)	000 T	1,244	1,400	1,502	1,598	1,779	1,903	Data
WA	Weight Adjustment (ratio of carcass to live weight)	ratio	0.75	0.75	0.75	0.75	0.75	0.75	Data
QPcw	Production (carcass weight)	000 T	933	1,050	1,127	1,199	1,334	1,427	QPlw*WA
WPcw	Wholesale Price (carcass weight)	US$/T	1,267	1,328	1,226	1,301	1,400	1,840	Data
VPpt	Value of production	US$ million	1,182	1,395	1,381	1,559	1,868	2,626	WP*QPcw
QCcw	Consumption (carcass weight)		840	915	980	1,005	1,141	1,156	
BPcw	Border Price (carcass weight)	US$/Ton	1,369	1,568	1,342	1,567	1,573	1,694	(VXcv/QXcw)*1000
VMcw	Value of Exports	US$ million	128	211	197	303	304	459	Data
QMcw	Quantity of Exports	000 T	93	135	146	193	193	271	Data
	Assuming a constant relative price gap								
	Price gap in relative terms	ratio	-0.08	-0.18	-0.09	-0.20	-0.12	-0.08	(WPcw - BPcw)/WPcw
MPD	Market Price Differential	US$/Ton	-77	-179	-87	-200	-130	-110	(WPcw*WA) * (1 - BPcw/WPcw)
EFC	Excess Feed Cost	US$ million	-130	-348	-356	-220	-540	-415	Data
TPC	Transfers to Producers from Consumers	US$ million	-65	-164	-85	-201	-148	-128	MPDxQC
TPT	Transfer from producers to Taxes	US$ million	-7	-24	-13	-39	-25	-30	MPD * (QP-QC)
MPS	Market Price Support	US$ million	58	159	258	-19	367	257	(MPD*QP) - EFC

Table A.8: Porkmeat - MPD/MPS Calculation

Symbol	Description	Units	2007	2008	2009	2010	2011	2012	Source/Equation
		Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	
		Exchange Rate	**3.12**	**3.16**	**3.73**	**3.89**	**4.13**	**4.55**	
		Import Tariff	**10%**	**10%**	**10%**	**10%**	**10%**	**10%**	
QPbf	Production (live weight)	000 T	389	386	407	396	424	466	Data
WA	Weight Adjustment (ratio of carcass to live weight)	ratio	0.71	0.71	0.71	0.71	0.71	0.71	Data
QPcw	Production (carcass weight)	000 T	276	274	289	281	301	331	QPlw*WA
Ppliv	Producer Price (live weight)	US$/T	720	900	840	1220	1480	1600	Data
			0.72	0.90	0.84	1.22	1.48	1.60	
VPbh	Value of production	US$ million	280	348	342	483	627	746	QP*PP
PPcw	Producer Price (carcass weight)	US$/T	1014	1268	1183	1718	2085	2254	PPlw/WA
QCcw	Consumption (carcass weight)		306	301	317	318	347	361	
BPcw	Border Price (carcass weight)	US$/Ton	1871	2674	2107	2857	3065	3400	(VXcv/QXcw)*1000
VMcw	Value of Imports	US$ million	55	71	59	106	141	102	Data
QMcw	Quantity of Imports	000 T	29	26	28	37	46	30	Data
MMcw	Marketing Margins								Scw with T1=T2 (transport components offset each other)
Scw	Processing costs	US$/Ton	842	1203	948	1286	1379	1530	Data (BPcw*0.45)
RPcw	Reference Price (CIF price adjusted to the farm gate)	US$/Ton	1029	1471	1159	1571	1686	1870	BPcw + T1cw - T2cw - Scw
MPD	Market Price Differential	US$/Ton	-15	-203	24	147	399	384	PPcw - RPcw
EFC	Excess Feed Cost	US$ million	-36	-88	-85	-51	-127	-104	Data
TPC	Transfers to Producers from Consumers	US$ million	-4	-56	7	41	120	127	MPDxQP
OTC	Other Transfers from Consumers	US$ million	-0.45	-5.37	0.67	5.46	18.34	11.51	MPD * (QC-QP)
MPS	Market Price Support	US$ million	32	32	92	92	247	231	(MPD*QP) - EFC