Private and Social Profits and the Effects on the Competitiveness of Uruguay Beef Export Chain

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Abstract

This research analyzed the economic performance of Uruguay beef export chain in two different years. Global profits during 2010 reached US$ 985.5 per ton, growing to US$ 1,374.9 in 2013. The proportion captured by private agents decreased from 30% in 2010 to only 10% in 2013. The rest was left on the table as net transfers towards other sectors of the economy. Direct transfers derived from taxes explained between 13% in 2010 and 30% in 2013. Weight of the social security costs represented between 20 to 30%, while cost of capital inefficiencies grew from 40% to 67% in the period.

Keywords: policy analysis matrix, public policies, export markets

Introduction

The Uruguayan beef is very well positioned in the international market, being exported to more than 80 countries on the five continents. It is well accepted by consumers all over the world because of its good quality and health status. Every year, Uruguay exports around two thirds of the bovine meat produced in the country, which, in turn, represents about 80% of total meat exports of this country. According to FAO, Uruguay was responsible for 5% of total beef exports at the global level in 2011, positioning itself as a relevant exporter and in seventh place in the ranking of the top exporters (FAOSTAT, 2013).

In the last few years, the efforts of Uruguay beef exporters have focused on complying with the requirements of the most demanding consumer markets in order to diversify destinations as most as possible with the aim of dealing with potential changes in the conditions of access and be able to place the largest number of products that generated in those markets that most the recovered. Under this premise are increasingly important high-value markets in Europe, Asia and North America.

According to official data published by Uruguay's customs office, in 2013, Uruguay exported 236.4 thousand metric tons (TMT) of beef products to the rest of the world. The FOB value reached US$ 1.3 billion. The weighted average price per ton of shipping product was near US$ 5,900. Eighty-five of the exported volume corresponded to frozen beef cuts and 15% to chilled products. In terms of monetary value, the proportions change to 75% and 25%, respectively (URUNET, 2014).

As observed in Table 1, in terms of shipped weight the main destination region was Asia, with 39% of the shipped weight. China (67.6 TMT) represented 28.6% of total exports. Israel, the other key destination in this continent is a traditional purchaser of forequarter cuts (*kosher*), explaining 9.4% of the volume exported by Uruguay in 2013. Always in terms of physical quantities, the shipments to Europe represented 30.9% of the volume with Russia (30.2 TMT) representing alone 12.8% of the shipped weight. The exports to American continent represented 28.6% of the weight, with USA (23.5 TMT) performing as the main market with 10% of the total weight.

However, it should be noted that the key market in monetary terms was Europe. The FOB value of the beef products shipped to this continent amounted US$ 508 million, representing 39.2% of total beef exports in 2013. Taking together the top-five importers from the European Union (EU): Netherlands, Germany, Italy, Spain and U.K., it can be seen that while the shipped weight (35.3 TMT) symbolized only 14.9% of total exports, the monetary value (US$ 317 million FOB) represented 24.5%.

Uruguay can sell to the (EU) up to 6.3 TMT per year of high-value beef cuts (especially rump and loins) through the Hilton quota. In addition, Uruguay shares with USA, Australia,

and New Zealand, a 20 TMT quota of high-quality grain-fed produced beef. In its first year of implementation (2013), Uruguay allocated 6.6 TMT within this so-called “481 quota”.

Table 1. Uruguay: Beef exports by destination (2013)

Destinations	FOB Value (US$)	% over total	Shipped Weight (MT)	% over total	FOB Price (US$/MT)
EUROPE	508,125,966	39.2%	72,610	30.7%	6,998
- Russia	114,843,185	8.8%	30,165	12.8%	3,807
- Netherlands	105,524,627	8.1%	10,987	4.6%	9,604
- Germany	83,835,225	6.5%	7,589	3.2%	11,048
- Italy	49,108,053	3.8%	6,771	2.9%	7,253
- Spain	41,675,538	3.2%	5,382	2.3%	7,743
- U.K.	37,170,893	2.9%	4,587	1.9%	8,104
- Switzerland	29,405,869	2.3%	2,514	1.1%	11,698
- Rest of Europe	46,562,575	3.6%	4,616	2.0%	10,087
AMERICA	370,228,075	28.5%	67,559	28.6%	5,480
- U.S.A.	129,274,379	10.0%	23,547	10.0%	5,490
- Brazil	74,913,182	5.8%	11,284	4.8%	6,639
- Chile	66,631,357	5.1%	11,687	4.9%	5,701
- Venezuela	42,715,077	3.3%	7,251	3.1%	5,891
- Canada	41,401,256	3.2%	10,509	4.4%	3,939
- Rest of America	15,292,824	1.2%	3,280	1.4%	4,662
ASIA	405,760,782	31.3%	92,104	39.0%	4,405
- China	263,408,079	20.3%	67,622	28.6%	3,892
- Israel	132,594,792	10.2%	22,198	9.4%	5,973
- Rest of Asia	9,757,911	0.8%	2,284	1.0%	4,273
AFRICA	7,781,765	0.6%	3,192	1.4%	2,438
OCEANIA	5,890,073	0.5%	901	0.4%	6,535
TOTAL	1,297,786,662	100.0%	236,365	100.0%	5,491

Note: MT refers to metric tons. Europe includes Russia, Turkey, and European former USSR nations

Source: Based on official data from Uruguay customs (URUNET, 2014).

At the global level, Uruguay does not have many opportunities to compete in volume, although it can do it in quality. Many analysts argue that the country has the potential to differentiate its products. However, building a brand to differentiate a product and moving away from the commodity involves a substantial investment. The construction of the brand “Uruguay beef” is in progress and is generating a valuable asset that has attracted the investment of foreign capital. Since 2009, it is mandatory to use the logo “Pastos-Uruguay” next to the private brands in all export packages and vacuum-packed cuts (Bonsignore, 2010).

After two decades of an important growth of exports, the beef sector is currently facing some loss of competitiveness. The increasing price of raw materials and labor costs, as well as the appreciation of the local currency against the US dollar, is driven current export volumes to stagnation. In addition, current export prices are not expected to rise in the short term, while the national cattle stock has decreased, threatened by the competition of agriculture and forestry for the rural land. Under this framework, the beef chain is being challenged, so that it is essential to improve the insertion of the Uruguayan beef in the international market, in order to continue with the process of growth in a sustained manner.

As a contribution to this goal, the aim of this work was to perform an economic analysis of this important industry. The analysis was carried out through the so-called Policy Analysis Matrix (PAM). Specifically, it included a quantification of the effects of public policies

(taxes, subsidies, social charges) through the various links that constitute the beef export chain and the estimation of possible transfers of resources between the beef industry and other sector of the economy. A series of coefficients were calculated for assessing the level of competitiveness of the chain, which allow making valid comparisons with other beef production systems from other countries or with other alternatives of production within the same country.

Materials and Methods

The policy analysis matrix

The policy analysis matrix (PAM) is an instrument designed to perform studies about the competitiveness of industrial chains. Originally developed in 1981 as an instrumental method for the analysis of changes in agricultural policy in Portugal, it has been used in a number of studies, primarily on the assessment of investment projects in the agriculture sector and efficiency studies, and, in the analysis of economic policy in the framework of international trade (Vieira *et al*., 2001).

In recent years, the PAM has been adapted and widely used in Brazil by the *Empresa Brasileira de Pesquisa Agropecuaria* (EMBRAPA) to assess the competitiveness of several production chains. Vieira *et al*. (2001) compared the results obtained with the PAM in eleven agro-based products of Brazil: cotton, rice, cocoa, coffee, beans, milk, cassava, corn, soybeans, industrial tomato, and wheat. The information generated in this way allowed this country to redirect agricultural research toward the lifting of the technical bottlenecks observed in these sectors, in accordance with the requirements of the agribusiness.

Previously, in Costa Rica, Jimenez and Quiros (1999), and Charpantier and Mora (1999) respectively applied the PAM in the potato and onion chains. And finally in the nearest time, Reig, Picazo, and Estruch (2008) combined the implementation of the MAP with techniques of data envelopment analysis for modeling the analysis of profitability of the Spanish agriculture. In Uruguay, Rava, Lanfranco and Ferraro (2011) applied the PAM analysis to assess the private and social benefits in the Uruguayan apple export chain.

To review the theoretical concepts that underlie the implementation of the PAM it is advisable to follow the development of Monke and Pearson (1989), complemented by the contributions of Vieira *et al*. (2001) and the methodological adjustments made in the framework of this study. In general, the PAM can be presented as the product of two identities: the first, which defines profits as the difference between revenues and costs; the second, which reveal the effects of the divergences that result of public policies that generate distortions and, if any, market failures.

These divergences can be calculated as the difference between the observed patterns and those that could be seen if the factors causing such divergences were removed. From the foregoing, the amount of the money transfers caused by the entire set of policies acting on the system can be measured, along with the degree of economic efficiency of the system.

For the purposes of this work, the term private refers to the revenues and costs reflecting the implicit price, i.e. The price actually received or paid by producers, traders or processors that operate in the system. These prices do not necessarily match with market prices, as they can be affected by taxes or subsidies. Instead, they reflect the actual revenues and costs incurred by the private agents that operate in the chain. The private prices are, then, implicit prices. They incorporate the costs and underlying economic values plus the effects of all the policies and possible market failures that originate transfers in the system.

The results of the calculations of the private profits show the extension of the true competitiveness of the agricultural system, for a given level of technology, product price, input costs and current transfers caused by public policies. The normal cost of capital, defined

as the minimum after-tax return that the owners of the capital require to maintain the investment in the system, is included in the domestic costs.

In this study, the term social refers, in the case of income, to the prices that the agents would receive if there were no deductions derived from taxes or additional income from subsidies or market failures that would change the price to be received. In the case of the costs, it refers to those who actually would incur the agents, if they to pay prices and wages not affected by taxes, subsidies, social charges or any other causing divergence, including market failures. In this context, the PAM approach attempts to measure the effects of the policies that generate distortions, as well as market failures that could interfere with obtaining the efficient outcome. The social profit represents what the private agents would get without a redistributive policy and in the absence of market imperfections or corrective policies.

The policies that generate distortions are often used because the decision-makers are willing to accept some of the inefficiencies to achieve objectives such as redistribution of income, to ensure food supply to the local population or even to promote the development of a productive activity that is in nascent stage. A central part of the policy analysis is weighing the balance between the goals of efficiency and the objectives not related to efficiency. The causes of the divergences can be further broken down into three categories: the market failures, distortive policies, and efficient policies. In the absence of failures affecting the product market, all the differences between private and social prices of outputs and tradable inputs correspond to the effects of distortive policies.

On the other hand, specific policies applying to specific products usually include taxes or subsidies as well as restrictions on trade. The outcome received by producers can be increased through subsidies, tariffs, import quotas for competitive products (that increase domestic prices) or price support systems. Specific policies promoting or discouraging the use of certain inputs also affect the private profit.

Exchange rate policies can also impact on product prices. The PAM is expressed in monetary units, typically using the corresponding domestic currency, but international prices are quoted in foreign currency. Therefore, an exchange rate for foreign currency is needed to convert world prices in domestic equivalent prices. The social price of domestic factors is given by the underlying supply and demand conditions in the domestic factor market. In consequence, factor prices are influenced by the set of prevailing macroeconomic policies and by the pricing policies of the commodities.

The government can also apply the policies of taxes or subsidies on one or more factors (capital, labor or land) that create differences between private and social costs, resulting in a grant or a tax on the entire system. The net transfer derived from the different policies is the algebraic sum of all the divergences. They can also be calculated as the difference between private and social profits.

If the market failures were irrelevant or even null, the divergences will basically measure the effects of policies that might generate distortions. Efficient systems get additional profits without any help from a distortive policy. The policies of subsidies may increase substantially the final level of private profits. A policy of subsidies is necessary to allow the survival of inefficient systems, but the subsequent implementation of resources for this purpose must be justified in terms of objectives of non-efficiency.

On the other hand, the differentials derived from the cost of capital measured in terms of both private and social prices, are included within the domestic or non-tradable costs and are obtained by using different interest rates. While that for the social opportunity cost was used the Libor, as low-risk interest rate, for the computation of the private cost it was used a local average interest rate in US dollars for large and medium-sized firms, which includes the so-called “country risk” as part of the cost. In all cases were used lending rates.

Definition of the productive system and its marketing pathway

In order to define the scope of the system, this research considered a beef production chain composed of four basic links, drawing a production and marketing corridor that starts at the ranch, where cattle are raised, and ends up at the port of Montevideo, where beef products are exported overseas. The first link corresponds to the primary sector represented by a "country firm", which is engaged in farming activities (agriculture, livestock production), in a proportion given by the national average. This country firm, defined as the first ring of the beef production chain, is neither a representative nor a predominant type of firm; it represents the technological conditions of production of the primary sector as a whole, taken to a farm scale only for the sake of the calculations. The technical and costing coefficients at the national level are annually recorded by a specialized statistics office of the Ministry of Agriculture (DIEA-MGAP). Setting aside dairy farms, 14% of the firms that raise cattle for beef production also do agriculture; the remaining 86% are purely beef cattle producers (DIEA, 2013).

The second link considers the transportation of the animals from the farm up to the industrial plant facilities (slaughter, manufacturing, and packing), which sets the third link of the chain. The fourth and last link corresponds to the freight of the container to the port. The analysis was conducted for two different calendar years, 2010 and 2013. Again, the revenues and costs of these three links were constructed from technical coefficients that represent current average technological and logistic conditions of the country. All the figures are expressed in current US dollars. During each period, the inputs or production factors originally quoted in Uruguayan pesos were converted to the American currency using an average exchange rate for the reference month (October). Per unit revenues and costs were calculated for each link using the most suitable unit (hectare, live weight, carcass and shipped weight). To ensure the consistency of the units, the monetary values of the consolidated PAM are expressed in US dollars per metric ton of shipping product (US$/MT).

Due to the lack of space, the complete calculations performed to estimate private and social revenues and costs for each component of the system are not included in this article. They are available for the interested reader upon request. Nevertheless, it is worth to say that the calculations of taxes, subsidies, and social security costs referred to input and factor costs, labor costs and product prices, were explicitly recorded for separately assessing private and social estimations. The computation of the opportunity cost of capital in each of the links was carried out using appropriate interest rates.

In the case of private costs, it was used a domestic average annual rate in US dollars available for large and medium-size firms, which includes the so-called "country risk" as part of the cost of the public sector. The exception was the computation of the opportunity cost of investment in rural land, which was not calculated in the usual way. Rava, Ferraro and Lanfranco (2013) suggested that private opportunity cost should be estimated considering the rationality of the livestock producer, who considers rural land as a long-term risk-free investment. In that sense, these authors recommended to assign a leasing price for the land effectively exploited under leasing mode and a zero-percent interest rate for the land owned by the cattleman.

In Uruguay, 34% of the land destined to beef cattle production is rented; the remaining 66% is exploited directly by the owner. The private opportunity cost per unit (hectare) of land devoted to beef production was then calculated considering this proportion. At the time of computing the social opportunity cost of land and capital, it was used a unique low-risk interest rate (Libor) as for the four links.

Structure of the Policy Analysis Matrix

Once that the revenues and costs were estimated for each component of the chain, the PAM was constructed as shown in Table 2. From the private revenue and costs (A, B and C) and social revenue and costs (E, F and G) previously calculated, the PAM was completed through the computation of the respective profits and divergences. The first identity of the accounting matrix corresponds to profits. They are measured horizontally as revenues minus costs, through the algebraic sum of the corresponding values of the first three columns. They appear in the last column and may have either positive or negative sign (±). Profits at private prices (D) are given by the first row, while profits at social prices (H) are calculated from the second row.

Table 2. Scheme of the policy analysis matrix (PAM)

Policy Analysis Matrix (values in US$/MT)	Revenues	Costs		Profits
		Tradable Inputs	Domestic Factors	
Private Prices	+A	–B	–C	±D
Social Prices	+E	–F	–G	±H
Divergences or Transfers	±I	±J	±K	±L

Source: Adapted from Monke and Pearson (1989).

Both private and social revenues are presented in the first column, as A and E. Both appear with a positive sign (+). The second and third columns correspond to the costs, all of which are presented with a negative sign (–). The cost of tradable inputs calculated at social prices appears in cell B; the corresponding value measured at social prices is presented at cell F. The costs of non-tradable inputs, also named domestic factors, include both labor and capital costs and are placed respectively in cells C (private) and G (social).

The second identity that defines the accounting matrix refers to the differences between private and social values of revenues, costs and profits. These differences, referred as divergences (I, J, K and L) give rise to transfers of resources from or toward the chain. The production transfers (I = A – E), as well as the inputs transfers from both tradable (J = B – F) and not tradable (K = C – G) inputs represent the differences between private and social prices of products and inputs.

The net policy transfers (NPT) are obtained from summing the effects of all the policies considered by the PAM (effects on the product, tradable and non-tradable inputs). It represents the monetary value that public policies transfer from (negative sign) or toward the chain (positive sign), obtained through the sum of the individual effects of product and factor markets. Denoted by L in the PAM, the NPT can also be found by comparing the private and social benefits (L = D – H). By definition, the result must be identical as the PAM is a double entry array. Finally, the PAM allows the calculation of a set of coefficients for assessing the competitiveness of the agri-industrial chain under study. The six coefficients are:

Private Costs Ratio (PCR): It is a good indicator of competitiveness for an individual chain, as well as for comparing chains. It is the ratio between the absolute value of the cost of domestic factors (non-tradable) and the added-value, at private prices, PCR = |C| / (A – |B|). The smaller this ratio, the greater the competitiveness of the chain. If PCR = 1, the added value exactly pays for the use of domestic factors in the activity (normal profits). If PCR < 1, the domestic factors are receiving a payoff that is higher than normal (pure profits). The activity can maintain and even expand the domestic factors in its current use. On the contrary, if PCR > 1, these factors are not being paid in a consistent manner, so that may not be kept in the activity in the long-term, under the prevailing conditions. Minimizing the value of PCR means maximizing private profits in the chain.

Domestic Costs Ratio (DCR): This coefficient allows the evaluation of an individual industry and the comparison of productive chains or systems that produce different products. It is a measure of the comparative advantages of a chain. Its measurement and interpretation is similar to PCR, although in terms of social prices, DCR = |G| / (E – |F|). It indicates how many domestic (non-tradable) resources are used to generate an extra dollar through increasing exports or to save a dollar by reducing imports. Minimizing the value of the DCR is equivalent to maximizing private profits in the chain.

Nominal Protection Coefficient (NPC): It is the ratio between the private and the social price, NPC = A / E, and measures the degree of protection in the chain, allowing its comparison with other chains that produce different goods. In this case, the social price is considered as equivalent to the international price. If NPC = 1, public policies do not alter the domestic price in relation to the international. An NPC > 1 indicates a positive protection, while NPC < 1 indicate implies that the level of taxation makes the value received by private agents of the chain less than it would be without this distortion.

Effective Protection Coefficient (EPC): It is the quotient between the value added at private prices and its analog at social or international equivalent price, EPC = (A – |B|) / (E – |F|). The EPC considers the effects of distortive policies on products and tradable inputs, estimating the extent to which policies that affect these markets make the added value to differ from what would arise in the absence of these policies. Although the interpretation is similar in both cases, the EPC represents a more complete measure of the incentives provided by public policies than the NPC.

Profits Coefficient (PC): This is the ratio between the private and social profits, PC = D / H. It gives an idea of the existing gap between them and provides an indirect measure of the net transfer. In addition, it can be seen as an extension of the EPC, from the moment that it takes into account the potential transfers. If PC > 1, it means that the activity is being subsidized in net terms. On the other hand, if PC < 1, it implies that the chain is being taxed, also in net terms. However, it should be noted that its correct interpretation is limited to both private and social profits are of positive sign (+). If both are either negative or showing opposite signs, the PC loses validity as an indicator.

Producer Subsidies Ratio (PSR): It measures the net transfer caused by public policies, as a proportion of the social product, PSR = L / E = (D - H) / E. The PSR enables making comparisons about the extent to which public policies subsidize the production systems. The lower the magnitude of the PSR, in absolute terms, the lower the level of subsidies in the chains. If PSR < 0, it indicates that the chain is taxed, not subsidized, in net terms.

Results and discussion

Consolidated Policy Analysis Matrix (PAM)

Table 3 presents the results of applying the PAM in the beef export chain of Uruguay, for the two considered periods (2010 and 2013). All figures are annual and expressed in US dollars per metric ton of shipping beef (US$/MT). As it was explained in the previous chapter, all the costs appear with a negative sign (–). In that way, the direction of the transfers can be seen with greater clarity through the sign of the divergences. Positive values (+) involve transfers from other sectors toward the chain under analysis, while negative values (–) involve transfers from the chain into other sectors of the economy.

For 2010, the private revenue of the entire production chain was estimated at 3,829.42 US$/MT, a value 2.5 % inferior to the revenue to be received in the absence of distortions (social price), which was estimated at 3,927.17 US$/MT. The resulting difference in the prices of the product for the entire chain was negative, reaching -97.75 US$/MT. Things changed in a sensitive manner in 2013. The private revenue of the entire production chain

grew 13.9% with respect to 2010. However, the estimated value (4,361.29 US$/MT) was 6.1% below the revenue computed at social prices (4,388.16 US$/MT). The resulting difference in the prices of the product for the entire chain was negative in both cases, reaching -97.75 US$/MT in 2010 and -26.87 US$/MT in 2013.

As a consequence of the way private and social values were estimated in this study, the effects of public policies derived from direct taxes (basically income tax) subsidies and tax-return credits (VAT) were represented in the revenue side. At this level, the divergences represent the net balance between such taxes and subsidies. The negative sign is due to the direct taxes paid by the beef chain. As private income before tax dropped substantially during 2013, this year the income tax paid by the entire chain also reduced.

Public policies also affect the costs of tradable inputs (TI) and domestic factors (DF). The divergence observed in the TI coefficient reflects the proportion of VAT paid by input purchase that cannot be "discounted" on the private costs. The divergences by that concept were calculated in -103.95 US$ /MT in 2010 and -130.03 US$/MT in 2013. In 2010, the estimated private cost of TI was -1,304.45 US$/MT for the whole chain, while the social cost was -US$ 1,200.50 /MT. The corresponding values for 2013 were -1,457.60 US$/MT and -1,327.57 US$/MT. The increment between years was 11.7% and 10.6%

Table 3. Policy Analysis Matrix for Uruguay beef export chain, in US$/MT (2010 & 2013)

PAM (US$/MT)	**Year 2010**				**Year 2013**			
	Revenues	Costs		Profits	Revenues	Costs		Profits
		TI	DF			TI	DF	
Private	3,829.42	-1,304.45	-2,230.52	294.44	4,361.29	-1,457.60	-2,767.96	135.72
Social	3,927.17	-1,200.50	-1,741.15	985.51	4,388.16	-1,327.57	-1,685.68	1,374.90
Transfers	–97.75	-103.95	-489.37	-691.07	-26.87	-130.03	-1.082.28	-1,239.18

In the case of the DF, the negative divergence involves two concepts. On the one hand, unlike the social cost, the private cost estimated at -2,230.52 US$/ton in 2010 and -2,767.96 US$/ton in 2013 posted the social charges related to labor. In theory, the social security costs should not be considered as transfers to other sectors of the economy. However, in the particular case of Uruguay, one may speak of a system of transfers through which the government carries out distributive policies, since both the social security and the health system, are mainly distributive systems based on the concept of inter-generation solidarity.

In the private accounting, the opportunity cost of capital was estimated using a local interest rate, with the exception of the opportunity cost of land in the primary sector. In this case the opportunity cost was computed as the weighted average of the rental cost applied to 34% of the area (leased by producers), and a zero rate opportunity cost to the remaining 66 % (owned by producers). At the social level, a unique low risk international interest rate (Libor) was used in all cases. The social cost of DF calculated using the Libor rate in the four links of the chain resulted in -US$1,741.15 /MT for 2010 and -1,685.69 US$/ton in 2013.

By using this method for measuring the social cost of the investment in the beef industry as an expression of the minimum profit required by the society, the associated country risk is not considered herein. Therefore, in this case, the divergence observed between private and social prices of DF reflects, as a cost, the revenue required by the private agents in the prevailing economic conditions (under different investment alternatives) with respect to the society that, in turn, requires at least a low-risk rate.

The observed negative divergence in the DF indicates that the prices paid by the agents at the private level are higher than the prices that they would pay in the absence of distortions or market failures. The results show that the social profits of the entire export beef chain would be 985.51 US$/MT in 2010 and 1,374.90 US$/ton in 2013. Private agents involved in the

process would receive a net profit of US$ 294.44 /MT in 2010, a figure that represents almost 30% of the total amount. During this year, the total magnitude of the divergences would reach to -691.07 US$ /ton of processed beef. In 2013, the amount captured by the agents operating in the chain would attain only 135.72 US$/ton, which represent barely 10% of the total.

At the global level, the direct transfer of resources related to taxation, from the studied chain toward other sectors of the economy, explained 29.2% of the divergences found in 2010. The social security charges explained 30.3 %; the inefficiencies derived from the cost of capital and the "country risk", explained together the remaining 40.5 % of the total divergences. In 2013, these percentages changed respectively to 12.7%, 67.2%, and 20.1%. Although the interest rates used to compute cost of capital did not vary too much between periods, the relative increase of the cost of capital was explained by the increase in the investment in live cattle and rent of rural land.

Policy Analysis Matrix expanded by sector (link)

The results of the divergences discussed in the previous section refer to the entire beef export chain, without discriminating between sectors. However, it is important to note the individual impact on each of the links: 1st - livestock production firm (ranch), 2nd - freight to the processing plant, 3rd - beef processing plant, and 4th - freight to the port. Table 4 shows that all the components contributed with the transfer of resources to the rest of the economy in both years of the study.

Table 4. Expanded Policy Analysis Matrix for Uruguay beef export chain, in US$/MT (2010 & 2013)

PAM (US$/MT)	**Year 2010**				**Year 2013**			
	Revenues	Costs		Profits	Revenues	Costs		Profits
		TI	DF			TI	DF	
Private	**3,829.42**	**-1,304.45**	**-2,230.52**	**294.44**	**4,361.29**	**-1,457.60**	**-2,767.96**	**135.72**
1st link	2,774.49	-937.18	1,832.69	5.12	3.659.19	-1,108.79	-2,429.57	120.83
2nd link	55.07	-20.42	-5.66	28.99	67.93	-25.72	-7.14	35.06
3rd link	971.31	-341.15	-390.76	239.39	599.76	-315.76	-329.52	-45.53
4th link	28.05	-5,71	-1.40	20.40	34.41	-7.33	-1.73	25.36
Social	**3,927.17**	**-1,200.50**	**-1,741.15**	**985.51**	**4,388.16**	**-1,327.57**	**-1,685.68**	**1,374.90**
1st link	2,774.99	-833.23	-1,483.83	457.94	3,659.19	-978.76	-1,465.09	1,215.35
2nd link	79.63	-20.42	-4.22	54.99	97.92	-25.72	-5.31	66.88
3rd link	1,037.29	-341.15	-252.17	443.96	587.92	-315.76	-214.11	58.04
4th link	35.25	-5,71	-0.92	28.62	43.13	-7.33	-1.17	34.63
Transfer	**-97.75**	**-103.95**	**-489.37**	**-691.07**	**-26.87**	**-130.03**	**-1.082.28**	**-1,239.18**
1st link	0.00	-103.95	-348.86	-452.82	0.00	-130.03	-964.49	-1,094.52
2nd link	-24.56	0.00	-1.44	-26.00	-29.99	0.00	-1.83	-31.82
3rd link	-65.99	0.00	-138.59	-204.68	11.83	0.00	-115.40	-103.57
4th link	-7.20	0.00	-0.48	-7.68	-8.71	0.00	-0.56	-9.28

Competitiveness of the beef export chain

Table 5 presents the coefficients that were computed for assessing the competitiveness of Uruguay's beef export chain for 2010 and 2013.

Table 5. Indicators of competitiveness for Uruguayan beef export chain

Coefficient of Competitiveness	Calculation Method	2010	2013
Private Costs Ratio (PCR)	PCR = |C| / (A – |B|)	0.88	0.95
Domestic Costs Ratio (DCR)	DCR = |G| / (E – |F|)	0.64	0.55
Nominal Protection Coefficient (NPC)	NPC = A / E	0.98	0.99
Effective Protection Coefficient (EPC)	EPC = (A – |B|) / (E – |F|)	0.93	0.95
Profits Coefficient (PC)	PC = D / H	0.30	0.10
Producer Subsidies Ratio (PSR)	PSR = L / E = (D - H) / E	-0.18	-0.28

The value computed PCR was 0.88 in 2010 and 0.95 in 2013, indicating that the remuneration of the DF for the whole chain determined a modest profit that even declined between both periods. Consequently, the competitiveness of the chain has been reduced between 2010 and 2013. In turn, the value for the DCR that appears in the second row was estimated at 0.64 in 2010 and 0.55 in 2013. Obtaining a value quite less than the unit confirms the good possibilities of competition displayed by this economic activity, in terms of its comparative advantages under the prevailing production and market conditions.

The NPC exhibited a value very close to the unit in both periods (0.98 in 2010 and 0.99 in 2013) indicating that, on average, public policies would not alter, in net terms, the domestic (private) price with respect to the social price used as a proxy of the international reference price. This number allows inferring that public policies would be showing a relatively neutral effect on competitiveness. If due to some specific public policy, for any reason, this coefficient decreases in magnitude, it would mean that the chain becoming unprotected or, in other words, it is facing a level of taxation where the value received by the agents of the chain is less than the market prices.

However, the EPC represents a more complete measure of the incentives or disincentives provided by the public policy, although the considerations about the sign and magnitude are similar to the NPC. The magnitude obtained in this study (0.93 in 2010 and 0.95 in 2013) implies that there would be a slight distortion in the prevailing prices of beef export chain by the effect of the taxation.

The estimated PC, which constitutes an indirect measure of the net transfer, was positive and clearly lower than one (0.3 in 2010 and 0.1 in 2013), indicating that, in net terms, the level of taxation increased between 2010 and 2013. In addition, as this is a highly demanding sector for capital investment, especially in the industrial phase it is subject to a substantial divergence in the profits resulting from the “country risk” cost. Finally, the measure of the net transfer given by the PSR suggests that the Uruguayan beef export chain is being taxed in an increasing way, in net terms (-0.18 in 2010 and -0.28 in 2013).

Conclusions and implicancies of the study

The results of this study confirm that the export beef production is a very competitive activity in Uruguay, in spite of the important tax burden, the increasing weight of social security costs and the important costs of capital borne by all the links of the chain. In general terms, the Uruguayan beef chain transfers a very high amount of resources into other sectors of the economy. The amount of this transfer augmented from 70% to 90% of the total profits generated by the entire industry between 2010 and 2013. The private agents that operate in the chain retain the remaining value.

2013 was an atypical year for beef industry in Uruguay. Two-thirds of the observed divergences correspond to inefficiencies derived from the cost of capital due mainly to the high prices of live cattle during that year. About 20% was transferred through taxes while the remaining 13% was transferred through social security contributions.

As was pointed previously in this article, even when technically the costs of social security and public health costs may not be considered as real transfers to other sectors, this study considered them as such because they are mainly, solidarity contribution systems. A certain proportion of these costs, not estimated in this work, return back to the chain through mutual coverage services, insurance for accident, sickness and unemployment insurance.

Speaking strictly from an economic perspective, the beef export chain has been able to compensate the use of production factors involved in the activity, although very close to the equilibrium levels. By analyzing the particular situation of each link chain, it can be seen that the transfers recognize several different sources and are supported in different proportion by

each of the links. On the one hand, the effects of direct taxes and tax-return credits from indirect taxes such as the VAT are more heavily borne by the manufacturing and transport activities.

Between 70 and 84% of the divergences generated along the chain are originated in the DF, involving two origins. On one hand appear the social charges related to labor. About 70% of the divergence in DF observed in the manufacturing plant is explained by social security charges, since this is the link the makes the most intensive use of labor per ton of beef. In the ranch, the social security charges accounted for something more than 30% of the divergences found in the cost of the DF. In the second link, which includes transporting the live cattle to the slaughterhouse, the social security charges represent 60% of the DF while this percentage is reduced to 38% in the fourth link, constituted by the freight of the container to the port. The second source of divergence in the DF involves the opportunity cost of capital, which represents a market distortion reflected through the "country risk" cost. Eventually, this cost expresses a risk premium that the private firms are required to pay to the owners of financial capital for investment in the country

This situation generates a flow of monetary resources from the private sector to the financial sector. Viewed from another perspective, the social cost of the investment measured through a low-risk rate expresses the minimum return required by society. In this case, the divergence between private and social prices applied to DF reflects, in terms of costs, the return required by the private sector in the context of the prevailing economic conditions in the country, with respect to the society, which requires at least a low-risk rate. In the primary sector (first link), something less than 70% of the generated divergences is related to inefficiencies in the cost of capital. The relative weight of the factors of production, land and capital, is much higher for the cattleman than for the processing plant, when it is considered per ton of processed product. For the latter, only 30% of the divergence would correspond to inefficiencies of the cost of capital.

On the basis of the results obtained in this study, it is possible to draw some conclusions. There is no doubt that beef production is one of the most competitive economic activities developed in Uruguay. It constitutes the basis of the country exports. Livestock production has been the mainstay of the national economy through its history. With some interruption due to a major financial crisis that struck the country at the beginning of the XXI century, the beef industry has shown great dynamism in the last two decades, growing at high rates. The livestock production system has remained competitive in spite of high levels of transfers to other sectors of the economy and the heavy burden imposed by the inefficiencies related to the cost of capital. Within this context, the results of this work show that this level of competitiveness is not infinite and should not be taken for granted.

In fact, 2013 proved to be a bad year for the beef processing sector, with some packing plants even loosing money. However, the main reason for this poor performance was the high cost of raw material (fat cattle) due to specific conditions of live cattle markets. From the side of the cost of capital, the news is more encouraging in virtue of the improvement that has been observed with regard to the position of Uruguay in the international markets. The "country risk", measured through the gap between international and domestic interest rates, is always a limiting factor to be taken into account by the productive sector, encroaching on the actual possibilities of development and competitiveness in international markets, through an expensive access to financing.

The recovery of the investment grade announced in early April 2012 by Standard & Poor's and followed later by the other important rating agencies has confirmed the reduction of Uruguay's country risk observed in previous years. This became important to reduce the financial cost required for investment in productive activity. Probably, the greatest uncertainty

comes from the side of the taxation policy. As suggested by the results of this research work, the export beef chain is rewarding the factors of production in a level close to equilibrium; there is no extra room for increasing taxes without the risk of harming the whole activity.

The beef industry, from the ranch where the calf is borne to the gates of the port, from which the product is exported all over the world, is competitive in terms of their comparative advantages. But while the public policies currently show a relatively neutral effect on the competitiveness, they are in a limit after which, further transfers through this mechanism to other sectors, can seriously compromise the competitiveness of the industry in any of its stages or links. Another issue to be addressed by public policies is the increasing costs observed in recent years by some inputs and factors. This increment in prices is affecting both tradable (fuel, spare parts, and imported inputs and machinery) and domestic (non-tradable) factors (wages and related social charges), exacerbated by the weakness of the American currency that affect the competitiveness of exports.

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