EFFECT OF THE REAL EXCHANGE RATE ON THE ARGENTINE DAIRY SUPPLY

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ABSTRACT

This paper analyzes the impact of the real exchange rate (RER) on domestic supply and export of dairy products from Argentina during the period 2000-2012. For this is estimate a series of models that incorporate different measures of RER. The results show that all measures of the RER are statistically significant, with a greater impact on exports than domestic supply. Disaggregating the bilateral RER, we find that the nominal exchange rate and domestic inflation are significant in determining the fate of the deal. It also emphasizes the importance of primary milk production as a determinant of exports.

KEYWORDS: Competitiveness Exchange; Exports; Domestic Market.

INTRODUCTION

The argentine dairy sector is important at a national socioeconomic level for the value added and employment generated throughout the production chain, and its ability to generate foreign exchange from exports of commodities such as milk powder, or products with a higher degree differentiation as are some cheeses. Historically, Argentina's industrial milk production has been overturned preferably the domestic market, with exports as residue of domestic absorption. However, in the last ten years, the growth of international demand of food, and dairy in particular, accompanied by rising prices, have made foreign markets a sales channel more attractive for local industry, who has managed position with very favorable competitive performance, diversifying the export supply, in destinations and products (Depetris Guiguet et al., 2009).

The international competitiveness of exports from this resort has a direct impact on supply decisions on the fate of them, from the creation of incentives that favor the placement of products on the domestic market or abroad, considering that the main milk products have a strong participation in the food basket of Argentina. One of the factors mentioned by the theory as a determinant of the competitiveness of goods, and in which this study focuses, is the real exchange rate (RER). The real exchange rate between different currencies is a broad indicator of prices of goods and services from a country over other countries. Following Krugman and Obstfeld (2007) the RER of one currency against another, can be understood as the relative price of two baskets of goods, these being representative of goods produced and consumed in each of the countries considered. An increase of the same, is a cheapening of goods produced within one country over those produced abroad, improving in this way the competitiveness of the former.

Additionally, the RER is an important tool to promote the development of the tradable sector, which is usually a very dynamic sector, and contribute to innovation and productivity increases (Gala, 2007).

However, there are factors that can reduce the effect of RER on exports, such as protectionist policies and trade agreements for goods manufactured, the role of different factors such as brands and the quality and technological level (Cerimedo et al., 2005).

Equivalently, the variations in the RER affect the quantity produced of good to cover domestic consumption, as it occurs some trade-off between exports and domestic supply, which can be based on the idea that firms have a convex cost function in the short term, so you should replace the sales in a market where there are better opportunities elsewhere (Berman, Berthou and Héricourt, 2011).

Another point to consider, is the effect it can have distinct RER depending on the specific characteristics of a particular sector, ie not all sectors equivalent respond to changes in this variable. In this sense, the factor endowment is extremely relevant, since those labor-intensive sectors would benefit to real depreciation, compared to capital-intensive sectors (Gala, 2007). On the other hand, there is evidence that some sectors with market power tend to channel increases in the real exchange rate towards its mark-ups, thus reducing the sensitivity of export volumes to exchange rate variations (Berman, Martin and Mayer, 2012).

There is a vast empirical literature, internationally (eg Ahmed, 2009; Bayoumi et al., 2011; Berman et al. 2012; Berthou, 2008; Cabezas et al., 2004; Haider et al., 2009; Jaramillo Villanueva et al. 2011) and in Argentina (eg Berretoni and Castresana, 2007, 2009; Catao and Falceti, 2002; Colonel Garcia Masaro and Vicentin Arancibia, 2012; Coronel and Garcia

Arancibia, 2011; Frachia and Lopez, 2010; Moccero and Winograd, 2006) that validate the link between exports and the real exchange rate or some measure of mismatch in this respect its equilibrium value. However, there are studies that analyze the effect of this variable on the total exports of Argentine dairy complex, and even more on the supply of such products is intended to cover domestic consumption, taking into account that for the above aspects, each sector has idiosyncratic aspects that permeate this response to certain economic variables[1].

Therefore, the objective of this study is to quantify the impact of real exchange rate on the domestic supply and export of dairy products from Argentina during the period 2000-2012. To meet this objective, a series of models estimated from the consistency which analyzes the relationships noted above with different indicators of the real exchange rate. Specifically, we use a measure of the real effective exchange rate, from the multilateral real exchange rate (MRER). The two remaining models contemplate the bilateral real exchange rate against the U.S. dollar due to its importance in commercial transactions (BRER-US) and the same but broken down into its components; namely, the nominal exchange rate, the domestic price level and U.S. retail prices.

The remainder of this paper is structured as follows: The next section presents the methodological framework, econometric models of milk offer and detail of the data and construction of variables for empirical analysis. Then in the following section presents the results of the work, where in the first part, a descriptive analysis of the variables of interest and then present the results of the proposed models. The last section is the conclusions.

DEVELOPMENT

1. Model of Dairy Offer and RER

To meet the objectives model the supply of industrial milk production function of the exchange rate and other relevant variables, considering the two locations of the same: the domestic market and abroad. To do this we use two models, one based on simultaneous equations, and another in which the response variable is the ratio of exports and domestic supply. Now, given the diversity of dairy production it is necessary to have a common unit of measurement. As for the production of each dairy product there is a conversion coefficient

1 In Coronel and Garcia Arancibia (2011), it is analyzing the effect of the RER on cheese exports in national aspect. However, it is modeled in export demand from importing countries, not supply sector decisions.

equivalent of liters of milk, determined by the characteristics of the product and technology firms, then the supply of the dairy industry can be measured by the equivalent of number of liters raw milk.

Being XT_t dairy exports (equivalent in liters) at time t and DL_t the number of liters of industrialized milk that are in the domestic market (including consumption and stocks), then if we assume that the explanatory variables to differentially affect each supply destination, which in turn constitute a simultaneous and interrelated choice, the econometric model can be written as:

$$\left\{ \begin{array}{l} \ln(XL_t) = \alpha_0 + \alpha_1 \ln(RER_t) + \alpha_2 \ln(prodL_t) + \delta' Z + u_t \\ \ln(DL_t) = \beta_0 + \beta_1 \ln(RER_t) + \beta_2 \ln(prodL_t) + \boldsymbol{\gamma}'\mathbf{Z} + v_t \end{array} \right\} \quad [1]$$

Where RER_t is some measure of the real exchange rate; $prod_t$ is the quantity of raw milk to industrialize; Z comprising a vector of variables control trend, seasonality of sales and production, and climatic and relevant circumstantial situations. Specifically, to seasonality it takes different quarters from the year (Q1: January to March, Q2: April to June. Q3: July to September and Q4: October to December)[2] and, according to Garcia Arancibia et al. (2013), we consider two binary control variables: Flood shock indicator on the availability of milk due to the floods in 2003 and 2007 in one of the main dairy Argentina (Santa Fe), and Business Cycles cyclical indicator period occurred in 2007-2008 characterized by extraordinarily high international prices along with strong political intervention based on deductions, cutting prices and quantitative restrictions (for lack of permits, bureaucratic delays, etc..) (Depetris Guiguet et al., 2011).

Also, included are two binary variables indicating strong drought periods in major dairy exporting countries worldwide, specifically SequíaAUS end of 2006 and early 2007 in Australia, and SequíaNZ for 2008 in New Zealand[3]. The inclusion of these variables respond to such climatic events that reduce the availability of pasture, affecting the amount of milk produced and thus exports of these countries, generating potential market openings for competitors, including Argentina.

2 For the climatic and demand that Argentina has, the seasonality is best reflected by taking the first quarter from December to March (Garcia Arancibia et al., 2013). Given the availability of quarterly data from the first month of the calendar year, the quarters are indicated since January.

3 The identification of the periods was based on National Water Commission (2011) and Kamber et al. (2013) for Australia and New Zealand, respectively.

The equations [1] are estimated by the method SURE (Seemingly Unrelated Regression Equations), consisting of a two-stage process, which takes into account the potential correlation between the residuals of both equations (Zellner, 1962). In the first stage we estimate the covariance of the error terms between equations of ordinary least squares, and in a second stage are estimated all parameters of the system by feasible generalized least squares.

Additionally, we propose a model taking as response variable the ratio between quantity exported and the amount for the domestic market, XL_t/DL_t. The goal of this specification is to know particularly how the RER affects the relationship between exports and domestic supply, while in [1] we studied the influence of the RER in each supply destination separately (although simultaneously). Thus, the single equation model is given by:

$$\ln\left(\frac{XL}{DL}\right)_t = \lambda_0 + \lambda_1 \ln(RER_t) + \lambda_2 \ln(prodL_t) + \theta' Z + \varepsilon_t \qquad [2]$$

Equation [2] is estimated by ordinary least squares (OLS). To work with series should correct auto-correlation, if necessary. In this paper we compute the Durbin-Watson statistic, on the acceptable range for correction no statistical values between 1.5 and 2.5.

As a measure of RER it uses three: the multilateral real exchange rate $MRER_t$ and real bilateral exchange rate with the U.S. $RBER^{U.S.}$, considering the importance of the U.S. dollar as a reference for sector commercial transactions. Additionally we consider the bilateral real exchange rate with the U.S. disaggregated, so you have the consumer price index in Argentina CPI, the consumer U.S. price index $CPI^{U.S.}$ and the nominal exchange rate against the dollar $NER^{U.S.}$. Disaggregating the $RBER^{U.S.}$, the models estimate would be:

$$\left\{\begin{array}{l} \ln(XL_t) = \alpha_0 + \alpha_1 \ln(NER_t^{US}) + \alpha_2 \ln(CPI_t^{US}) - \alpha_3 \ln(CPI_t) + \alpha_4 \ln(prodL_t) + \delta' Z + u_t \\ \ln(DL_t) = \beta_0 + \beta_1 \ln(NER_t^{US}) + \beta_2 \ln(CPI_t^{US}) - \beta_3 \ln(CPI_t) + \beta_4 \ln(prodL_t) + \boldsymbol{\gamma' Z} + v_t \end{array}\right\} \qquad [3]$$

and

$$\ln\left(\frac{XL}{DL}\right)_t = \lambda_0 + \lambda_1 \ln(NER_t^{US}) + \lambda_2 \ln(CPI_t^{US}) - \lambda_3 \ln(CPI_t) + \lambda_2 \ln(prodL_t) + \theta' Z + \varepsilon_t \qquad [4]$$

Therefore, we estimate a total of six models, two models with the specification [1] and

two for [2], using actual exchange rates MRER and $RBER^{U.S.}$, and the models [3] and [4].

2. Data and construction of variables

The data to be used in the present research are in quarterly frequency and cover the period from the first quarter of 2000 until the third quarter of 2012.

The total production of raw milk from Argentina ($prodRM_t$) comes from the Department of Dairy Santafesina belonging to the Ministry of Production of the Province of Santa Fe.

The total quantity exported was obtained from a private base of foreign trade (Penta Transaction), corresponding to Customs data.

To standardize the production and export series, were transformed quantities exported of various dairy products equivalent liters of raw milk. With this goal were sought conversion factors for each product from public sources such as the National Agricultural Control Office (NACO), the National Institute of Industrial Technology (NIIT) and the Secretariat of Agriculture, Livestock, Fisheries and Food of the Nation (SAGPyA). Conversion coefficients selected (θ_i), measured in liters per kilogram are; 4.04 for Cream, 13,4 for hard Cheese Pasta, 10 for semi-hard cheese, 8.06 for Soft Cheese Pasta, 10.3 to butter; 8.32 for Whole Milk Powder, 12.5 for Skim Milk Powder, 4.2 for Dulce de Leche and 0.92 for Yogurt. Therefore, the volume of exports dairy equivalent liters raw milk, is given by:

$$XL_t = \sum_{i=1}^{N_X} \varpi_{it} \theta_i x_{it} \qquad [5]$$

Being θ_i the conversion coefficient for product i; ϖ_{it} the share of exports of product i in period t, and x_{it} the quantity exported dairy product i in t.

The domestic supply (DS) arises from the subtraction between the total production of raw milk $prodRM_t$ and exports equivalent liters (XL).

The real exchange rate can be calculated from the following expression:

$$RER_t = \frac{E_t . CPI^{externo}}{CPI^{Argentina}} \qquad [6]$$

With respect to this measure, it works with the serial real multilateral exchange rate (MRER) from the Central Bank of Argentina (BCRA), but deflated by the consumer price index in the province of Santa Fe, whose source is the Provincial Institute of Statistics and

Census of the province (IPEC)[4]. It also used a series of bilateral real exchange rate with the United States ($RBER^{U.S.}$), which is constructed from nominal exchange rate against the dollar $NER^{U.S.}$ whose source is the Central Bank, the consumer price index of U.S. $CPI^{U.S.}$ obtained from the Bureau of Labor Statistics, and the consumer price index CPI developed by IPEC.

3. Results

3.1 Evolution of the Milk Offer and the Real Exchange Rate

Figure 1 shows the evolution of the domestic supply and export of dairy products from Argentina for the period 2000-2012. From 2003, there is a sustained export growth, peaking in the last quarter of 2006. After falling in 2007, due to a greater intervention in foreign trade by the national government and the effects of the flood of that year, recovering and reaching a peak in the last quarter of 2008 in a context of rising prices of international agricultural commodities. However, from the second quarter of 2010 it is when there is a sustained recovery of the same.

When analyzing the evolution of the domestic supply, we see the counter effect had when the deep economic crisis occurred in 2002. Then, production for the domestic market remains relatively constant until 2009, and has experienced a steady growth from there on, and until the end of the series.

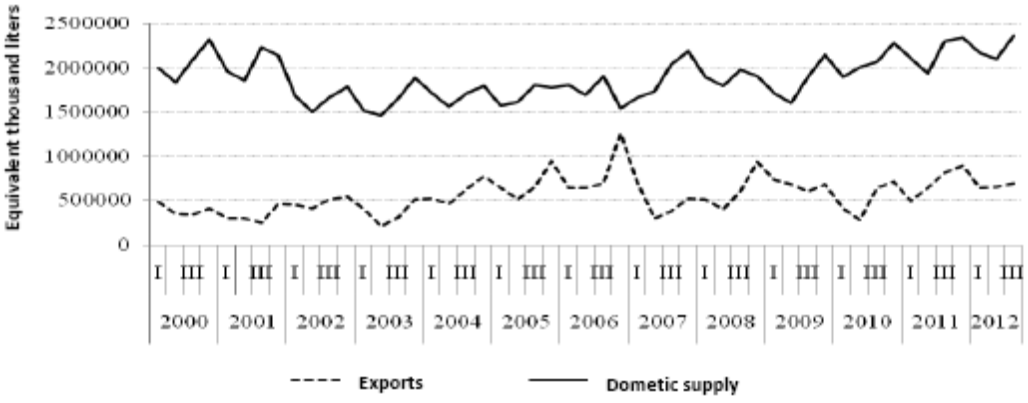

Figure 1. Evolution of Exports and Milk Argentine Domestic Offer Period 2000-2012
Source: Own Elaboration

4 Because of disbelief the CPIs nationally developed by the INDEC (Argentina), we use the CPI Santa Fe since it is considered better to reflects the evolution of retail prices. Therefore, when discussing inflation and domestic price level on Argentina, it should be understood that they are measured from the level of prices in the province of Santa Fe, considering that regional differences in the overall price level which is not very significant.

Overall, exports and domestic supply opposite behave despite not being controlled by the availability of raw milk to industrialize in the market. From 2000-2006, the trend in sales to the foreign market is growing, while supply is decreasing in the domestic market. The last quarter of 2006-2008, the external supply falls steeply, increasing domestic availability. In turn, after a small recovery in export levels in late 2008, there is a continuous decline until the second quarter of 2010, corresponding to an increased domestic supply. From there, both series show an increasing behavior.

MRER evolution and $BRER^{U.S.}$ is shown in Figure 2. From this graph, you can see the deep real devaluation experienced by Argentina in 2002, both through the MRER and $BRER^{U.S.}$. Both variables reach their peak during the year, reaching the MRER and $BRER^{U.S}$ higher values by 190% and 156%, respectively, compared with the period of convertibility. Since 2003, these two measures show a different dynamic, presenting a real overvaluation continues the $BRER^{U.S}$, being in the third quarter of 2012 only 27% above its pre-devaluation value. By taking the average of 2003-2012, the $BRER^{U.S}$ is 87% above its value in the convertibility period.

Instead, the MRER exhibits sustained growth between 2003 and 2007, and then decreases until the end of the series, counting in the third quarter of 2012, a value 66% higher than that observed for the convertible. The 2003-2012 average is only two times higher than in the period before the economic crisis of 2002. From the comparison between the two indices, shows that from 2004, the exchange rate competitiveness of Argentina and its major trading partners has been greater than that evidenced over the United States.

The decomposition of $MBER^{U.S.}$ may help explain the higher real appreciation experienced in recent years (Figure 3). While the average annual inflation in the United States during the period under analysis does not exceed 3%, the consumer price index in Argentina indicates that domestic inflation was 15% per year on average. In turn, the annual average depreciation of the exchange rate from the year 2003 was approximately 7%, no compensating increase in domestic prices.

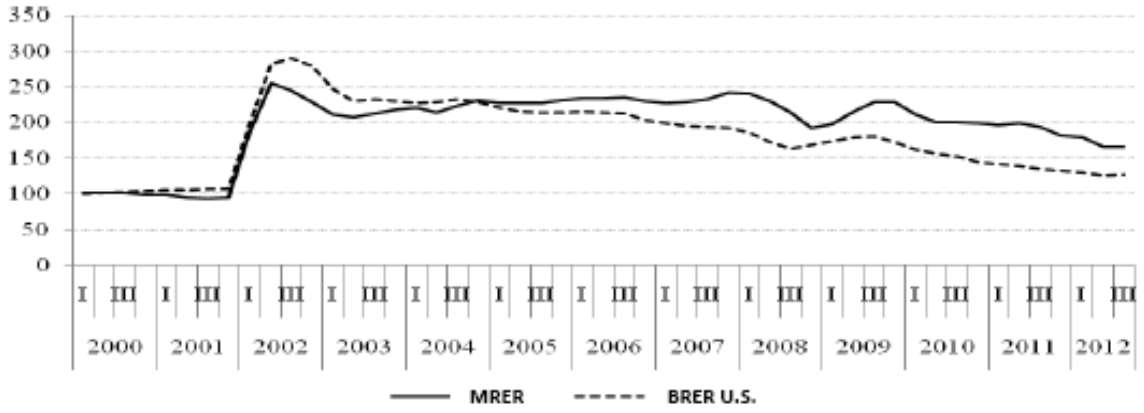

Figure 2. Evolution of MRER and BRER U.S. (Base: T1-2000 = 100). Period 2000-2012
Source: Own Elaboration

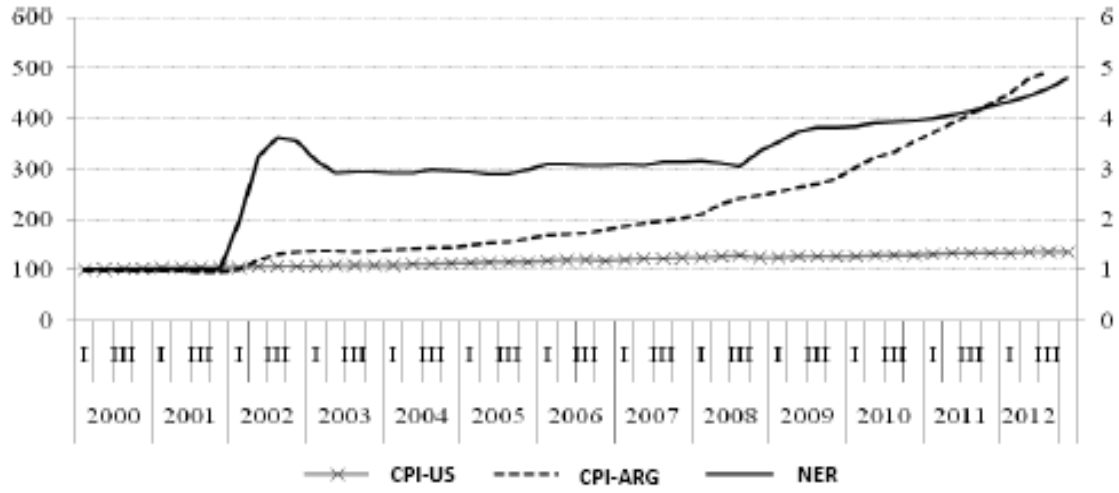

Figure 3. Evolution of domestic consumer prices and the United States (Base: T1-2000 = 100) and Nominal Exchange Rate (pesos per dollar). Period 2000-2012
Source: Own Elaboration

Finally, we present in Table 1 a statistical summary of the main variables under study, reporting mean, standard deviation, minimum and maximum of each. The same is observed that the average level of exports of milk in liters equivalent represents 23% percent of the average total produced raw milk, with a range greater than the domestic supply (as the coefficient of variation becomes almost 3 times greater), having a minimum of 209 million liters quarterly maximum 1260000000. The MRER and BRER have similar averages, and the latter has a greater range of variation. When comparing price indices it can be seen that the variability of domestic CPI, along with the NER, are what determine BRER variations.

Table 1. Statistics Summary

Variable	N°	Media	Estándar Variation	Min	Max
Raw Milk Production [a]	51	2440	328	1670	3240
Exports [a]	51	560	204	209	1260
Domestic Market a	51	1880	245	1460	2360
MRER	51	197,7	47,4	93,8	256,1
$BRER^{US}$	51	180,3	51,1	100,5	290,8
CPI^{US}	51	118,5	10,9	100,7	136,4
CPI	51	212,8	111,03	97,07	492,5
NER	51	3,02	1,02	0,99	4,62

Source: Own Elaboration

3.2 Model results

Table 2 presents the estimated coefficients for the two alternative econometric specifications as a measure of RER incorporating the MRER. It is observed that the model of simultaneous equations (SURE) provides a better fit than the ratio equation. The correlation coefficient test next to B-P confirm the importance of jointly modeling external and internal supply. The D-W statistics of SURE fall in the acceptable range. Single equation for the case, the D-W is slightly below 1.63.

This shows that all parameters of interest and the expected sign are statistically significant. Noting the results obtained using the SURE model, shows that exports showed a higher sensitivity to the multilateral RER. In this sense, a real depreciation of 10% increased exports by about 10%, while an equivalent increase in the multilateral RER domestic supply fell by 2.3%. Moreover, an increase in primary production of raw milk directly impacted in both variables, but did so most heavily on exports. When primary production rose by 10%, exports responded, on average, an increase of 32%, while domestic supply only made it by 4% to an equivalent increase in primary production. This greater impact on exports makes sense considering that the proportion of processed milk that exports will be significantly lower than in the domestic market dump, in addition to the constraint given by the level of domestic demand. Therefore it is expected that the absolute increase in the number of liters exported is expressed in a higher percentage.

The estimate uni-equational model by OLS, dependent variable is the ratio between exports and domestic supply shows similar results. A multilateral RER elevation produces an increase in this ratio, from an increase in exports and a reduction in domestic supply. The direct relationship between the ratio and primary production also shows the largest effect this variable has on exports. While domestic supply increases at higher production, equivalent to a decrease in the ratio, exports appear to be more elastic with respect to production, with the end result, a rise in the ratio export / domestic market.

Table 2. Elasticity including multilateral RER. Period: 2000 - 2012

	SURE		MCO
VARIABLES	$ln(XL_t)$	$ln(DL_t)$	$Ln(XL_t/DL_t)$
$Ln(TCRM_t)$	0,9580***	-0,2381***	1,1961***
	(0,1222)	(0,0384)	(0,1783)
ln(prodLCt)	3,2331***	0,4460***	2,7871***
	(0,5276)	(0,1660)	(0,7699)
T1	0,1975**	-0,0280	0,2255
	(0,0985)	(0,0310)	(0,1437)
T2	0,2310*	-0,0387	0,2697
	(0,1329)	(0,0418)	(0,1940)
T3	-0,0036	0,0192	-0,0228
	(0,0775)	(0,0243)	(0,1130)
Conjuncture	-0,3117**	0,1023**	-0,4140**
	(0,1291)	(0,0406)	(0,1885)
Inundation	-0,0205	0,0125	-0,0331
	(0,1109)	(0,0348)	(0,1618)
SequíaAUS	0,2177**	-0,1126***	0,3304**
	(0,0921)	(0,0289)	(0,1344)
SequíaNZ	0,2864*	-0,0953*	0,3818
	(0,1561)	(0,0491)	(0,2279)
Tendence	-0,0121***	0,0030***	-0,0152***
	(0,0036)	(0,0011)	(0,0053)
Constant	-53,50***	12,62***	-66,12***
	(11,68)	(3,6763)	(17,052)
Observations	51	51	51
	245,2	307,84	
B-P test	-0,9073		
	41,983		
	0,8278	0,8579	0,728
DW	2,4074	1,8871	1,6359

Source: Own Elaboration

The variables indicating the quarters show that, on average, between January and March exports rose by more than 21% (= 100 (exp (0.1975))) from the previous quarter, decreasing supply in the domestic market at approximately 3% on average. Difference was also observed between the second quarter and the last, although at a lower significance level. Regarding the other quarters, the coefficients were not statistically significant.

Following Garcia Arancibia et al. (2013a), it would be expected that Flood and Situation variables be significant, with a negative (positive) in exports (domestic supply) in the period of floods and positive (negative) in exports (domestic supply) in the period 2007-2008. The first one was not significant, while the second was at 5%. During the quarters in which there were high international prices and trade restrictions simultaneously, exports fell by an average of 36%, while domestic supply increased by 10%. This would indicate that the effect

of trade restrictions was greater than the influence of high international prices. The same emerges from the interpretation of semi-elasticity for this variable in the single equation model.

Binary variables indicating drought in Australia and New Zealand were found to be both significant at the 5% and 10%, respectively, and with the expected sign, being greater the effect on exports. During the drought in Australia, in late 2006 and early 2007, exports were boosted by 23% on average per quarter. While domestic supply fell during that event by 11% on average per quarter. The influence of drought in New Zealand on the domestic and export supply is almost similar to that found for drought in Australia.

Table 3 shows the results found by incorporating the bilateral RER against the U.S. dollar. From SURE model shows that the effect holds bilateral RER respect to the United States is equivalent to the effect that owns the multilateral RER, either on exports and on domestic supply. This indicates that the response to competitive exchange signals by the dairy industry which does not differ substantially if one looks at the actual change of the Argentine peso and the U.S. dollar relative to a weighted average of Argentina's main trading partners.

It highlights again the importance that the primary production on exports, being in this case the magnitude higher for exports and the ratio between export supply and domestic, that is calculated by the models that incorporate the multilateral RER.

In this case it is also the single-equation model results which are consistent with those found in the SURE.

In line with previous studies (Bayoumi, Harmsen and Turunen, 2011; Berretoni and Castresana, 2007, 2009, King, 2011; Thoerbecke and Kato, 2011, among others), and beyond the RER measurement used, the elasticity exports of dairy products for this variable, although it is significant, it does not exceed unity.

Table 3. Elasticities including bilateral RER on USA. Period: 2000 - 2012

	SURE		MCO
VARIABLE	$\ln(XL_t)$	$\ln(DL_t)$	$\ln(XL_t/DL_t)$
$\ln(RBER^{U.S.})$	0,9517***	-0,2394***	1,1911***
	(0,1097)	(0,0349)	(0,1602)
$\ln(prodRM^t)$	3,7038***	0,3186*	3,3851***
	(0,5266)	(0,1675)	(0,7689)
T1	0,2830***	-0,0508	0,3339**
	(0,0974)	(0,0310)	(0,1422)
T2	0,3461***	-0,0696*	0,4157**
	(0,1319)	(0,0419)	(0,1926)
T3	0,0403	0,0073	0,0330

	(0,0748)	(0,0238)	(0,1092)
Coyunture	-0,2415**	0,0852**	-0,3267*
	(0,1205)	(0,0383)	(0,1760)
Inundation	-0,0171	0,0109	-0,0281
	(0,1044)	(0,0332)	(0,1524)
SequíaAUS	0,2057**	-0,1091***	0,3148**
	(0,0871)	(0,0277)	(0,1272)
SequíaNZ	0,2924**	-0,0973**	0,3898*
	(0,1473)	(0,0469)	(0,2152)
Tendence	-0,0051*	0,0013	-0,0065
	(0,0028)	(0,0008)	(0,0041)
Constant	-64,75***	15,65***	-80,40***
	(11,74)	(3,7375)	(17,14)
Observaction	51	51	51
χ^2	281,49	342,60	
ρ_{uv}	-0,8970		
B-P test (χ^2)	41,034		
R^2	0,8466	0,8704	0,7573
DW	2,0796	1,6870	1,7393

Note: ***,**,* significant at 1%, 5%, y 10% respectively. Standard errors in parentheses.

Source: Own Elaboration

Finally, the results obtained when disaggregating the bilateral RER against the U.S. dollar (Table 4) show that only the domestic price level (CPI), and the nominal exchange rate against the dollar are relevant in terms of competitive exchange rate, while the evolution of retail prices to consumers in the United States significantly affects it. The coefficients show that a growth of 10% in the domestic price level pushed an average 5% increase in domestic supply, sacrificing exports with a 13% reduction. Meanwhile, a nominal appreciation against the dollar inversely impacted exports. The estimated elasticity with respect to the primary production of raw milk are equivalent to those found in the other models, although slightly higher.

These results indicate that the evolution of domestic prices is crucial for the competitiveness of Argentine dairy, impacting more strongly than the nominal exchange rate in the allocation of production among overseas and domestic market. The latter appears more strongly evident from the year 2009, the year in which most domestic inflation begins to be accompanied by a growth in loans in the domestic market and export stabilization.

Similar considerations previous models arising from the interpretation of the coefficients of binary variables that attempt to capture the effect of droughts in Australia and New Zealand.

Table 4. Elasticities including disaggregated bilateral RER USA. Period: 2000-2012

	SURE		MCO
VARIABLES	$\ln(XL_t)$	$\ln(DL_t)$	$\ln(XL_t/DL_t)$
$\ln(CPI^t)$	-1,3622***	0,4371***	-1,7994***
	(0,3431)	(0,1072)	(0,5120)
$\ln(CPI^{US})$	-2,9717	0,9978	-3,9695
	(3,6905)	(1,1536)	(5,5062)
$\ln(NER^t)$	0,9484***	-0,2344***	1,1828***
	(0,1094)	(0,03422)	(0,1633)
$\ln(prodLC^t)$	3,9759***	0,2114	3,7645***
	(0,5563)	(0,1739)	(0,8300)
T1	0,3326***	-0,0707**	0,4033**
	(0,1026)	(0,0320)	(0,1531)
T2	0,4459***	-0,1077**	0,5537**
	(0,1507)	(0,0471)	(0,2249)
T3	0,0972	-0,0137	0,1110
	(0,0861)	(0,0269)	(0,1284)
Coyunture	-0,2501*	0,1014**	-0,3515*
	(0,1360)	(0,0425)	(0,2029)
Inundation	0,0246	-0,0111	0,0358
	(0,1094)	(0,0342)	(0,1633)
SequíaAUS	0,1952**	-0,1005***	0,2957**
	(0,0887)	(0,0277)	(0,1324)
SequíaNZ	0,3926**	-0,1373***	0,5300**
	(0,1629)	(0,0509)	(0,2431)
Tendence	0,0308	-0,0122	0,0430
	(0,0281)	(0,0087)	(0,0419)
Constant	-47,38***	10,681**	-58,065**
	(17,144)	(5,3591)	(25,578)
Observaction	51	51	51
χ^2	293,61	371,81	
ρ_{uv}	-0,8971		
B-P test (χ^2)	41,045		
R^2	0,8520	0,8794	0,7678
DW	2,1052	1,7050	1,7896

Note: ***,**,* significant at 1%, 5%, y 10% respectively. Standard errors in parentheses.

Source: Own Elaboration

CONCLUSION

In this paper we analyzed the impact of real exchange rate (RER) on the supply of dairy products in Argentina for the period 2000-2012, and how that variable affects decisions about placement of such products from the domestic market and the external market.

From the proposed models, we found that the RER is statistically significant in determining the milk supply destinations Argentina, showing an inverse relationship between the RER and the domestic supply, and a direct relationship between the RER and export volumes. In line with the above, the link between the RER and the ratio exports / domestic supply also proved to be straightforward. These relationships were found to be consistent with the different measures used to account for the RER, no differences between the RER specification including multilateral and bilateral including RER on the United States.

Furthermore, we found that exports are more sensitive to the RER as primary production of raw milk, the latter standing out above the rest of the determinants of export supply.

Another point to note, and with clear implications in politics, is the role played by the domestic price level on milk supply allocation between the domestic market and abroad. Increasing levels of inflation in recent years induce producers to dump milk production to a greater extent in the domestic market under competitive exchange loss. In this sense, and in view of what was found in this investigation, becomes relevant fostering primary production of raw milk by different government bodies and the control of domestic inflation, in order to enhance the export profile.

BIBLIOGRAPHY

Please refer to articles Spanish Bibliography.

BIOGRAPHICAL ABSTRACT

Please refer to articles Spanish Biographical abstract.