INTERNATIONAL MONETARY FUND

IMF Country Report No. 19/65

URUGUAY

SELECTED ISSUES

February 2019

This Selected Issues paper on Uruguay was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with Uruguay. It is based on the information available at the time it was completed on January 29, 2019.

Copies of this report are available to the public from

International Monetary Fund • Publication Services
PO Box 92780 • Washington, D.C. 20090
Telephone: (202) 623-7430 • Fax: (202) 623-7201
E-mail: publications@imf.org Web: http://www.imf.org
Price: $18.00 per printed copy

International Monetary Fund
Washington, D.C.

INTERNATIONAL MONETARY FUND

URUGUAY

SELECTED ISSUES

January 29, 2019

Approved By
Western Hemisphere Department

Prepared by Yehenew Endegnanew, Dmitry Gershenson, Carlos Goncalves, and Luis Omar Herrera Prada

CONTENTS

TABLES

APPENDIX

REAL EXCHANGE RATE AND SECTORAL COMPETITIVENESS IN URUGUAY[1]

Starting in 2003, Uruguay's real effective exchange rate (REER) has appreciated, while the composition of exports shifted towards primary sectors at the expense of manufacturing products. We analyze the sectoral trends and the impact of the REER changes on sectoral exports using the detailed product data from the United Nations' Commodity Trade Statistics Database (Comtrade). We conclude that Uruguay's manufacturing exports are sensitive to the changes in REER, and, accordingly, that productivity-enhancing measures to promote competitiveness would be beneficial.

1. In the wake of the 2002 crisis, Uruguay underwent a remarkable economic recovery accompanied by the significant changes in the composition of its export basket. Between 2003 and 2017, the real GDP expanded at an annual average rate of 4.3 percent and the per capita income increased by almost 80 percent. Even as investment-driven imports have been volatile, exports stayed broadly constant as a share of GDP—in the context of a slowdown in global trade—and Uruguay has remained one of the more open countries in the region.[2] The composition of exports shifted towards primary commodities (their share rose from 5 percent of total exports in 2000 to 30 percent in 2017) at the expense of manufacturing products[3], where textile and vehicles share contracted sharply (Figure 1).

2. Uruguay's REER has appreciated during that period (Figure 2). We use four distinct measures of the REER: (i) export-destination-weighted; (ii) competitor-weighted; (iii) a combination of export-weighted and competitor-weighted (IMF methodology); and (iv) the REER calculated by the *Banco Central del Uruguay* (BCU) (Box 1). According to any of the four measures, Uruguay's REER has appreciated since 2003; of particular interest, the competitor-weighted REER has appreciated the most, suggesting that Uruguay's competitiveness may be affected.

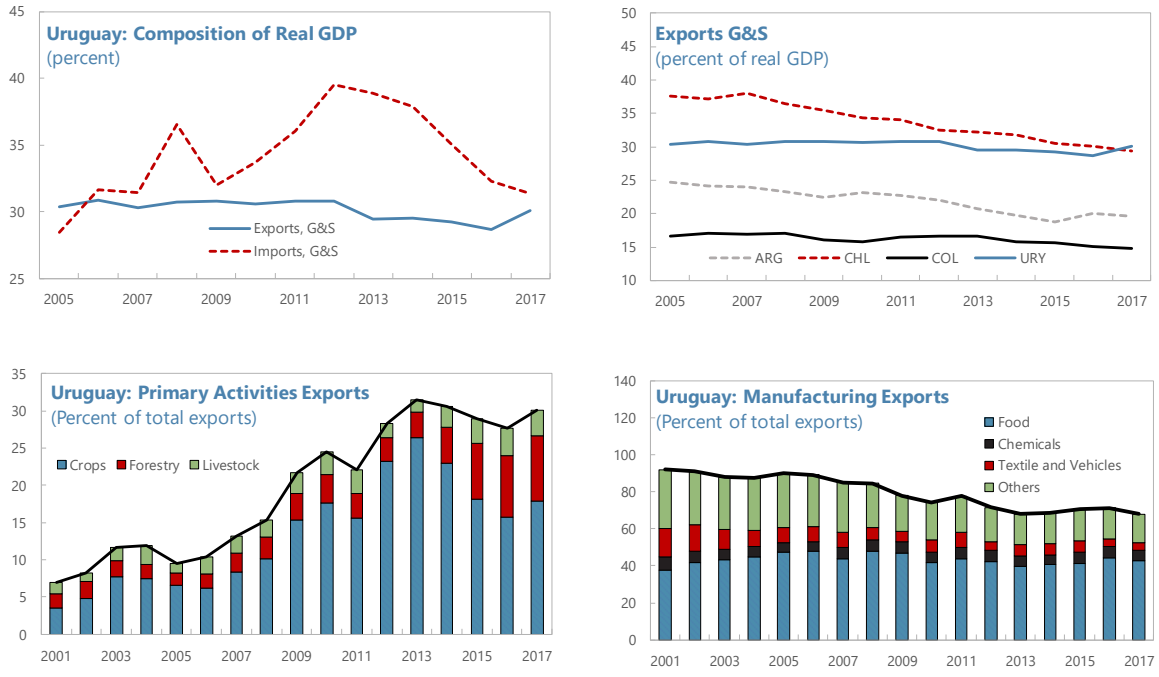
[1] Prepared by Dmitry Gershenson, Carlos Goncalves, and Luis Omar Herrera Prada. We are grateful to Juan Yepez Albornoz and Yan Carriere-Swallow for making their datasets available for our analysis and to Pelin Berkmen, Jorge Restrepo, and seminar participants at the *Banco Central del Uruguay* and at the *Universidad de la Republica* for constructive comments. All errors are the authors'.

[2] That slowdown followed from the overall weakness in economic activity post-global financial crisis, as well as from the slower growth in global value chains and the waning pace of trade liberalization. See IMF (2016) for further discussion.

[3] It is worth noting that the shift from manufacturing to primary commodities does not necessarily imply a shift to "simpler" economic activities. As one example, Uruguay's highly mechanized agriculture is a far cry from what is was half a century ago. We incorporate this observation into our analysis by using the product classification of the *Banco Central del Uruguay* (see paragraph 5 and Appendix I).

3. This paper analyzes the trends in Uruguay's competitiveness. Competitiveness is defined as ability to offer products and services of desired quality at prices that compare favorably with the prices charged by others.[4] To assess competitiveness, this paper focuses on Uruguay's product- and sector-specific global export market shares. It also estimates the sensitivity of these market shares to real effective exchange rate by using the product data from the Comtrade database and building on the work presented in IMF (2017)

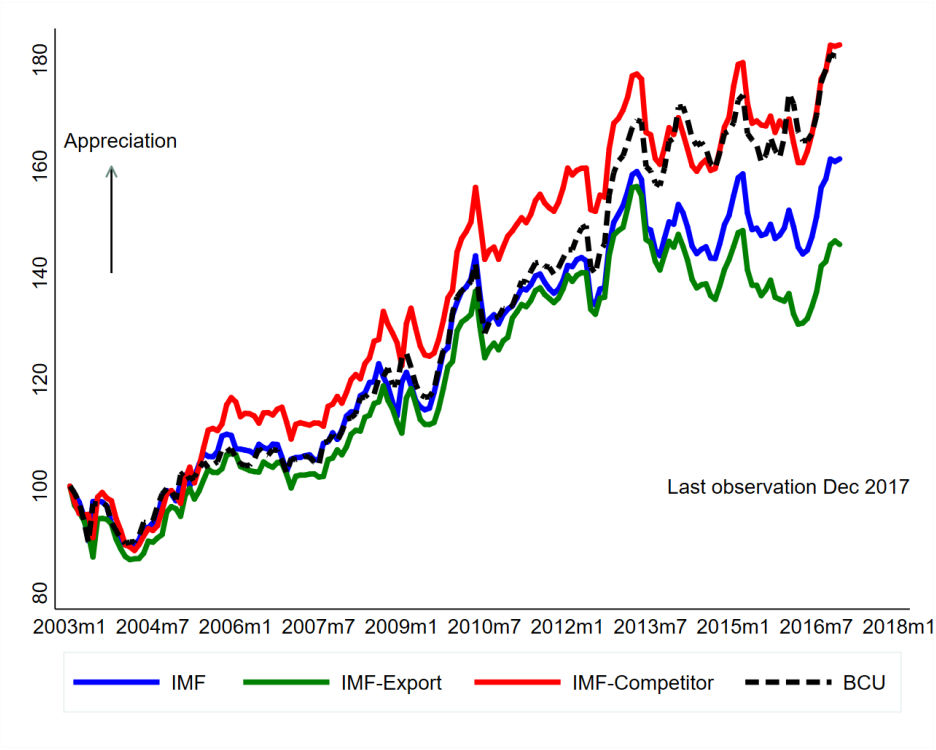
Figure 1. Uruguay: Export Developments



Sources: Haver Analytics, and IMF staff calculations.

[4] In the literature, there no single definition of the term "competitiveness." We follow closely the dictionary definition of competitiveness as "ability of a firm or a nation to offer products and services that meet the quality standards of the local and world markets at prices that are competitive and provide adequate returns on the resources employed or consumed in producing them" (BusinessDictionary, no date). Other similar definitions are "the quality of being as good as or better than others of a comparable nature" (English Oxford Living Dictionaries, no date) and "the degree to which, under free and fair market conditions, a country can produce goods and services which meet the test of foreign competition while simultaneously maintaining and expanding the real income of its people" (OECD 1992). Yet another, and more productivity-tilted definition is "the set of institutions, policies and factors that determine the level of productivity of a country" (World Economic Forum 2017).

Figure 2. Uruguay: Real Effective Exchange Rate (2003m1=100)



4. We begin by tracking the evolution of market shares for individual products exported from Uruguay between 2004 and 2015. Market share of product *k* in year *t* is the ratio of Uruguay's exports of *k* to the world exports of *k* in year *t*.[5] Products are defined according to the Standard International Trade Classification (SITC, Revision 2) at the four-digit aggregation level; there are 763 product lines reported for Uruguay. To avoid being swayed by the year-to-year volatility, we compare the average shares observed during the three years from 2013 to 2015 to the average shares for 2004-2006.

[5] For instance, a 3-percent market share of soybeans (observed on average in 2013-15) means that during that period Uruguay accounted for 3 percent of global soybean exports.

Box 1. Calculation of REER

Following IMF (2017), the REER of country i is calculated as a weighted geometric average of bilateral real exchange rates:

$$REER_i = \prod_j \left(\frac{P_i E_i}{P_j E_j}\right)^{w_{ij}}$$

where E_i is the nominal exchange rate of the currency of county i vis-a-vis the U.S. dollar, P_i is the consumer price index (or an appropriate price deflator) for country i, and w_{ij} is the weight of the trading partner j for country i.

In assessing external competitiveness, many relative prices are relevant, and can motivate alternative choices of weights w_{ij}. The first is the relative price of exports with respect to goods that are produced in the destination country, a concept that is approximated by weights equal to the shares of each partner j in country i's total exports (the *export-destination-weighted* REER). Another is the relative price of exports with respect to those of competing exporters that sell the same products, with which country i may or may not trade directly (the *competitor-weighted* REER). The trade weights used to compute the combined REER incorporate information along both export and competitor dimensions. For a detailed discussion see Zanello and Desruelle (1997).

5. The evolution of Uruguay's market shares through 2015 does not point to an obvious competitiveness problem (Figure 3). Across the product space, Uruguay both gained and lost shares, so that the distribution is not skewed to either side. In contrast, should Uruguay have lost overall competitiveness, we would have expected to see more share losses and fewer share gains. Aggregating the products by SITC sectoral groups does indeed show that the market share of agricultural raw materials increased the most, followed by food products, while textiles posted declines. An aggregation across the sectoral groups used by the *Banco Central de Uruguay* (BCU), however, indicates that manufacturing exports posted market share gains while commodity exports posted losses. The BCU classifies products in the manufacturing category as long as there is an element of manufacturing value added. In other words, the BCU's definition of manufacturing is broader than the one used in SITC.[6] Overall, looking at the individual products that posted the largest market share gains and losses (see Table 1 and Figure 4), Uruguay has increased its market share in soybeans and wood pulp and lost market share in some textile and leather products.

[6] These classifications are presented in Appendix I.

Figure 3. Uruguay: Export Shares by Product, Group, and Class

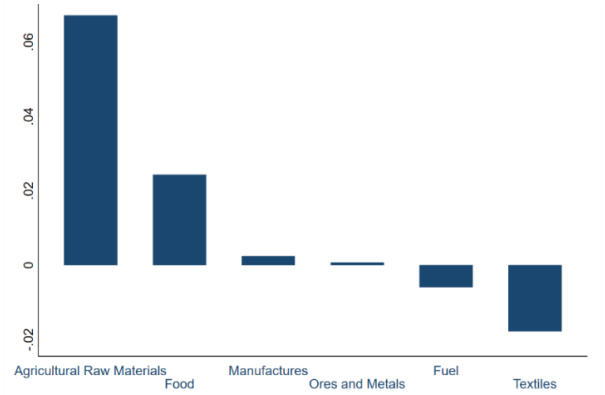
(Percentage points)

Difference in Global Market Shares Between 2004-2006 and 2013-2015, by product

(Percentage Points)

Difference in Global Market Shares Between 2004-2006 and 2013-2015, by product group

(Percentage Points)



Difference in Global Market Shares Between 2004-2006 and 2013-2015, by product class

(Percentage Points)

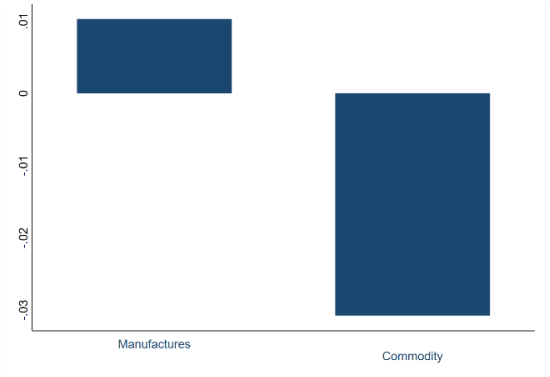


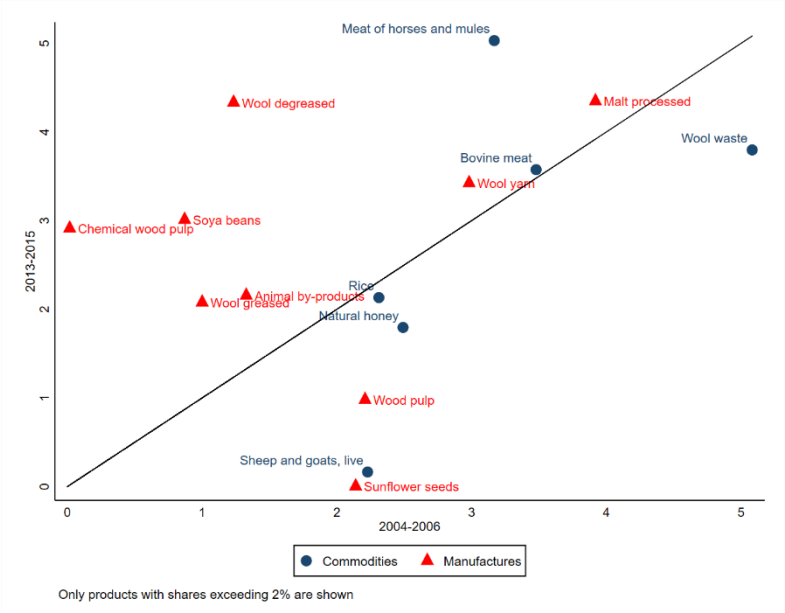
Table 1. Uruguay: Largest Increases and Declines in Market Share

	Product	Group 2/	Class 3/	Change between 2013-2015 and 2004-2006 4/	Share in 2013-2015	Share in 2004-2006
				(1)=(2)-(3)	(2)	(3)
1	Wool degreased, uncombed of sheep or lambs	Textiles	Manufactures	3.1	4.3	1.2
2	Chemical wood pulp, soda or sulphate	Agricultural Raw Materials	Manufactures	2.9	2.9	0.0
3	Soya beans	Food	Manufactures	2.1	3.0	0.9
4	Meat of horses, asses, mules and hinnies, fresh, chilled or frozen	Food	Commodity	1.9	5.0	3.2
5	Margarine, imitation lard and other prepared edible fats, nes	Food	Manufactures	1.5	1.5	0.0
6	Bovine and equine hides, raw, whether or not split	Agricultural Raw Materials	Commodity	1.5	1.7	0.2
7	Wool greasy or fleece-washed of sheep or lambs	Textiles	Manufactures	1.1	2.1	1.0
8	Animals of the bovine species (including buffaloes), live	Food	Commodity	1.0	1.4	0.3
9	Chemical wood pulp, sulphite	Agricultural Raw Materials	Manufactures	1.0	1.3	0.2
10	Animals oils, fats and greases, nes	Food	Manufactures	0.8	2.2	1.3
10	Fur clothing (not headgear) and other articles made of furskins	Textiles	Manufactures	-0.9	0.1	1.0
9	Sheep's or lambs' wool, or of other animal hair, carded or combed	Textiles	Commodity	-1.0	0.4	1.4
8	Fabrics, woven, 85% plus of sheep's or lambs' wool or of fine hair	Textiles	Manufactures	-1.1	0.1	1.2
7	Calf skins, raw, whether or not split	Agricultural Raw Materials	Commodity	-1.1	0.5	1.6
6	Leather, specially dressed or finished, nes	Manufactures	Manufactures	-1.2	0.1	1.4
5	Pulpwood (including chips and wood waste)	Agricultural Raw Materials	Manufactures	-1.2	1.0	2.2
4	Waste of sheep's or lambs' wool, or of other animal hair, nes	Textiles	Commodity	-1.3	3.8	5.1
3	Sawlogs and veneer logs, of non-coniferous species	Agricultural Raw Materials	Manufactures	-1.5	0.3	1.7
2	Sheep and goats, live	Food	Commodity	-2.1	0.2	2.2
1	Sunflower seeds	Food	Manufactures	-2.1	0.0	2.1

Source: UN - COMTRADE and Fund staff calculations.
1/ Market share is defined as a ratio of Uruguay's export of a given product to the world's total trade of that product.
2/ According to the SITC classification. See Appendix I for details.
3/ According to the BCU classifcation. See Appendix I for details.
4/ In percentage points.

Figure 4. Uruguay: Increases and Declines in Market Share for Large Products

(Percentage points; BCU classification)



6. IMF (2017) estimates the elasticities of product market shares with respect to the real exchange rates for country groups. The overall elasticity for a country group is a weighted average of country-product elasticities. The weight attached to an elasticity associated with product *k* exported from country *i* is the average share of country *i* in global exports of product *k* between the years 2009 and 2015. IMF (2017) also uses time dummies to isolate the impact of global trends. IMF (2017) finds that elasticities are negative and statistically significant for Latin America and for emerging Asia. The elasticities in Latin America are about one half of what they are in Asia, possibly reflecting the dominance of commodity exports in Latin America—most commodities are priced in dollars reducing the estimated elasticity.

7. This paper estimates the elasticities of product market shares with respect to real exchange rates for Uruguay only. Rather than using time dummies to isolate the potential impact of the time trend, we add the lagged value of the change in shares as an additional independent variable.[7] We also do not use sectoral weights, since those were needed for a multi-country estimation to ensure that the relatively small countries did not unduly affect the result.

8. Formally, we estimate the following model:

$$x_{ik}^{t} - x_{ik}^{t-1} = \alpha(x_{ik}^{t-1} - x_{ik}^{t-2}) + \beta(REER_{i}^{t-1} - REER_{i}{}^{t-2}) + const,$$

where x_{ik}^{t} is a share of (i) a country *i*'s export of product *k* at time *t* to (ii) the total world exports of product *k*; $REER_{i}^{t}$ is the real exchange rate of country *i* at time *t;* and (iii) $const$ *is* the constant.

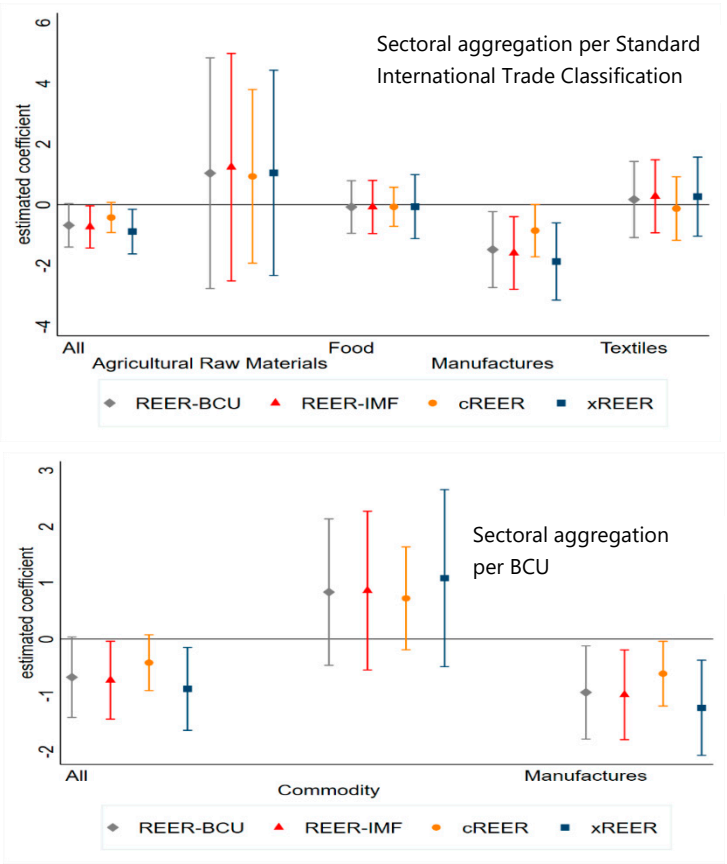
9. The resulting elasticities have the correct (negative) sign and are significant for the manufacturing products (Figure 5 and Tables 2 and 3):

- For the panel that is estimated across all products, the elasticities are negative and significant for two of the four measures of the REER, with values close to -0.8.
- For the panel estimated across the SITC product groups, the elasticities are negative and significant for the manufacturing products all measures of the REER except competitor-weighted, with the values between --1.5 and -1.9.
- For the panel estimated across the BCU product groups, the elasticity is negative and significant for the manufacturing products using any of the four REER measures, with the values between -0.7 and -1.3.
- The elasticities are not significant for textiles—one product group where Uruguay experienced a significant loss of market share—suggesting that other factors apart from the real exchange rate might have been at play. In particular, the model does not control for market access and market entry of global players (such as China)—as data on market access by product/sector and time are not available—which could bias the results.

[7]Time trend is correlated with the real effective exchange rate given trend appreciation.

- The impact of the competitor-weighted REER on export market shares is less pronounced than the impact of the export-weighted REER.
- The robustness check—when we exclude the products with the smallest (below the 5th percentile) and the largest (above the 95th percentile) shares—confirms the above conclusions (Tables 4 and 5).
- Finally, we conducted the same analysis incorporating the data for 2016 and 2017, which have recently become available. These new results (presented in Appendix II) confirm the above conclusions as well. Specifically, even though the magnitude of the new coefficients is somewhat lower, the elasticities for manufacturing remain negative and significant.

Figure 5. Uruguay: Global Market Share Elasticities: Point Estimates and 90-Percent Confidence Intervals 1/



Sources: Comtrade, Banco Central del Uruguay, and IMF staff calculations.
1/ Estimated for four different measures of REER: (i) export-destination-weighted (xREER); (ii) competitor-weighted (cREER), (iii) combined (REER-IMF); and (iv) calculated by the Banco Central del Uruguay (REER-BCU).

10. Our Uruguay-specific results are broadly in line with the group-wide results from IMF (2017), although the magnitudes obtained for Uruguay are larger. IMF (2017) finds elasticities on the order of -0.10 for Asia, -0.05 for LA5[8], about -0.15 for the manufacturing products and close to -0.07 for textiles, while commodities are shown to respond little to the real exchange rate movements.

11. With Uruguay's manufacturing exports sensitive to real exchange rate, measures are needed to maintain competitiveness. Despite the sustained appreciation since 2003, Uruguay has managed to increase its market share in certain sectors, mainly primary activities. At the same time some manufacturing sectors have experienced a decline in their market share. This paper shows that while Uruguay's exports are sensitive to changes in real effective exchange rate, this is mainly driven by the sensitivity of the manufacturing sector. Commodities and primary activities are not found to respond to real effective exchange rate (in line with findings for the region). In this context, as the real effective exchange rate will be determined by the fundamentals and global trends, measures that would ensure competitiveness are more structural in nature. These could include (i) closing infrastructure gaps; (ii) keeping inflation low and ensuring that real wages do not grow faster than productivity; (iii) further improving business environment and access to credit; and finally (iv) further diversifying export markets and products, with an eye towards reducing exposure to commodity super cycles and weather-driven supply shocks.

[8] Brazil, Chile, Colombia, Mexico, and Peru.

Table 2. Uruguay: Results by Product Group According to UN S2AG4

Explanatory variables	IMF			BCU
	Real Effective Exchange Rate	Export-weighted	Competitor-weighted	Real Effective Exchange Rate
	(1)	(2)	(3)	(4)
All	-.731*	-.881**	-.418	-.679
	(.417)	(.443)	(.299)	(.432)
Agricultural Raw Materials	1.24	1.03	.934	1.04
	(2.01)	(1.79)	(1.54)	(2.04)
Food	-.074	-.063	-.064	-.074
	(.513)	(.622)	(.376)	(.508)
Manufactures	-1.59**	-1.86**	-.853	-1.48*
	(.715)	(.759)	(.515)	(.747)
Textiles	.277	.273	-.125	.172
	(.692)	(.747)	(.601)	(.72)

Notes: This table reports the coefficient for the change in the REER, xREER, cREER, REER from BCU and REER used by Staff between URY and each country lagged one period. BCU data downloaded from BCU website on Nov 16, 2018. Staff data estimated using scenarios of CPI for some commercial partners. Each model contains the on-lag version of the dependent variable. Product groups were organized according to UN definition found in UN webpage; data attached in annex. Clustered by sector standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3. Uruguay: Results by Product Class According to BCU Classification

Explanatory variables	IMF			BCU
	Real Effective Exchange Rate	Export-weighted	Competitor-weighted	Real Effective Exchange Rate
	(1)	(2)	(3)	(4)
All	-.731*	-.881**	-.418	-.679
	(.417)	(.443)	(.299)	(.432)
Commodity	.586	.769	.485	.658
	(.729)	(.804)	(.438)	(.715)
Manufactures	-1.07**	-1.3**	-.669*	-1.02**
	(.489)	(.519)	(.355)	(.508)

Notes: BCU data downloaded from BCU website on Nov 16, 2018. Standard errors clustered by sector in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4. Uruguay: Robustness Test by Product Group According to UN S2AG4

Explanatory variables	IMF			BCU
	Real Effective Exchange Rate	Export-weighted	Competitor-weighted	Real Effective Exchange Rate
	(1)	(2)	(3)	(4)
All	-1.03*	-1.17**	-.678*	-1.13*
	(.556)	(.589)	(.402)	(.573)
Agricultural Raw Materials	1.06	1.32	.58	.108
	(2.46)	(2.52)	(1.87)	(1.81)
Food	.101	-.069	-.165	.032
	(.665)	(1.05)	(.6)	(.631)
Manufactures	-1.71**	-1.92**	-.95*	-1.65**
	(.775)	(.802)	(.555)	(.824)
Textiles	.082	.201	-.793	-.667
	(1.17)	(1.31)	(1.1)	(.976)

Notes: BCU data downloaded from BCU website on Nov 16, 2018. Standard errors clustered by sector in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5. Uruguay: Robustness Test by Product Class According to BCU Classification

Explanatory variables	IMF			BCU
	Real Effective Exchange Rate	Export-weighted	Competitor-weighted	Real Effective Exchange Rate
	(1)	(2)	(3)	(4)
All	-1.03*	-1.17**	-.678*	-1.13*
	(.556)	(.589)	(.402)	(.573)
Commodity	3.46	3.2	1.78	2.86
	(4.19)	(4.16)	(1.74)	(3.83)
Manufactures	-1.26**	-1.45**	-.862**	-1.31**
	(.563)	(.595)	(.41)	(.588)

Notes: BCU data downloaded from BCU website on Nov 16, 2018. Standard errors clustered by sector in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix I. Product Classifications

According to the Standard International Trade Classification (SITC, Revision 2), products are divided into seven broad groups (see Table A1).

Table A1. UN SITC Product Classification (Group)

Product Group Description	Product Code	Product Description
Agricultural Raw Materials	20	UN Special Code
Agricultural Raw Materials	21	Hides,skins and furskins,raw
Agricultural Raw Materials	23	Crude rubber (including synthetic and reclaimed)
Agricultural Raw Materials	24	Cork and wood
Agricultural Raw Materials	25	Pulp and waste paper
Agricultural Raw Materials	26	Textile fibres (except wool tops) and their wastes
Agricultural Raw Materials	29	Crude animal and vegetable materials,n.e.s.
Chemical	5	Chemicals and related products,n.e.s.
Food	0	Food and live animals
Food	1	Beverages and tobacco
Food	22	Oil seeds and oleaginous fruit
Food	4	Animal and vegetable oils,fats and waxes
Fuel	3	Mineral fuels,lubricants and related materials
Manufactures	5	Chemicals and related products,n.e.s.
Manufactures	60	UN Special Code
Manufactures	61	Leather,leather manuf.,n.e.s.and dressed furskisg
Manufactures	62	Rubber manufactures,n.e.s.
Manufactures	63	Cork and wood manufactures (excl.furniture)
Manufactures	64	Paper,paperboard,artic.of paper,paper-pulp/board
Manufactures	65	Textile yarn,fabrics,made-upart.,related products
Manufactures	66	Non-metallic mineral manufactures,n.e.s.
Manufactures	67	Iron and steel
Manufactures	69	Manufactures of metal,n.e.s.
Manufactures	7	Machinery and transport equipment
Manufactures	8	Miscellaneous manufactured articles
Ores and Metals	27	Crude fertilizers and crude materials (excl.coal)
Ores and Metals	28	Metalliferous ores and metal scrap
Ores and Metals	68	Non-ferrous metals
Textiles	26	Textile fibres (except wool tops) and their wastes
Textiles	65	Textile yarn,fabrics,made-upart.,related products
Textiles	84	Articles of apparel and clothing accessories
Machinery and Transport Equipment	7	Machinery and transport equipment

The *Banco Central del Uruguay* uses its own classification, which consists of three broad categories: primary activities, manufacturing industries, and electricity, gas, and water. Products are classified as part of manufacturing as long as there is an element of post-primary value added (see Table A2).

Table A2. BCU Product Classification (Class)

Primary Activities	Agriculture, Hunting And Related Service Activities
	Growing Of Crops; Horticulture, Agricultural Services Applied To These Crops
	Livestock; Ordinary Hunting And Related Services; Production Of Fur By Ordinary Hunting And Trapping, Livestock Services
	Forestry, Logging And Related Service Activities
Manufacturing Industries	Manufacture Of Food Products And Beverages
	Production, Processing And Preserving Of Meat And Meat Products
	Processing And Preserving Of Fish And Fish Products
	Manufacture Of Dairy Products
	Preparation Of Rice And Rice Products
	Manufacture Of Malt Liquors And Malt
	Manufacture Of Food Products And Beverages - Rest
	Manufacture Of Snuff
	Manufacture Of Textiles
	Preparation, Spinning, Weaving And Finishing Of Textiles
	Manufacture Of Wearing Apparel, Dressing And Dyeing Of Fur
	Tanning And Dressing Of Leather, Manufacture Of Luggage, Handbags, Saddlery, Harness And Footwear
	Tanning And Dressing Of Leather, Manufacture Of Luggage, Handbags, Saddlery And Harness
	Manufacture Of Wood And Of Products Of Wood And Cork Except Furniture, Manufacture Of Articles Of Straw And Plaiting Materials
	Manufacture Of Paper And Paper Products; Publishing, Printing And Reproduction Of Recorded
	Manufacture Of Coke, Oil Refining And Nuclear Fuel
	Manufacture Of Chemicals And Chemical Products
	Manufacture Of Basic Chemicals, Except Fertilizers And Nitrogen Compounds, Manufacture Of Plastics In Primary Forms And Of Synthetic Rubber
	Manufacture Of Fertilizers And Nitrogen Compounds, Manufacture Of Pesticides And Other Agrochemical Products
	Manufacture Of Pharmaceuticals, Medicinal Chemicals And Botanical Products
	Manufacture Of Soap And Detergents, Cleaning And Polishing Preparations, Perfumes And Toilet Preparations
	Manufacture Of Rubber And Plastic Products
	Manufacture Of Basic Metals, Manufacture Of Other Non-Metallic Mineral Products
	Manufacture Of Motor Vehicles, Trailers And Semi-Trailers Manufacture Of Other Transport Equipment
	Manufacturing - Rest
Electricity, Gas And Water	

Appendix II. Results with the Data for 2016 and 2017

Table A1. Uruguay: Results by Product Group According to UN S2AG4

Explanatory variables	IMF			BCU
	Real Effective Exchange Rate	Export-weighted	Competitor-weighted	Real Effective Exchange Rate
	(1)	(2)	(3)	(4)
All	-.651	-.681	-.47	-.623
	(.4)	(.419)	(.294)	(.425)
Agricultural Raw Materials	1.08	1.17	.748	1.59
	(1.85)	(1.75)	(1.43)	(2.36)
Food	-.025	.032	-.126	.095
	(.466)	(.529)	(.35)	(.482)
Manufactures	-1.4*	-1.47*	-.855	-1.43*
	(.719)	(.749)	(.516)	(.747)
Textiles	-.068	-.225	-.235	.05
	(.791)	(.806)	(.557)	(.654)

Notes: This table reports the coefficient for the change in the REER, xREER, cREER, REER from BCU and REER used by Staff between URY and each country lagged one period. BCU data downloaded from BCU website on Nov 16 2018. Staff data estimated using scenarios of CPI for some comercial partners. Each model contains the on lag version of the dependant variable. Sectors were organized according to UN definition found in UN webpage; data attached in annex. Clustered by sector standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A2. Uruguay: Results by Product Class According to BCU

Explanatory variables	IMF			BCU
	Real Effective Exchange Rate	Export-weighted	Competitor-weighted	Real Effective Exchange Rate
	(1)	(2)	(3)	(4)
All	-.651	-.681	-.47	-.623
	(.4)	(.419)	(.294)	(.425)
Commodity	.614	.713	.17	.472
	(.575)	(.683)	(.401)	(.646)
Manufactures	-1.04**	-1.1**	-.688*	-.94*
	(.481)	(.505)	(.353)	(.506)

Notes: BCU data downloaded from BCU website on Nov 16 2018. Standard errors clustered by sector in parentheses. *** p<0.01, ** p<0.05, * p<0.1

References

BusinessDictionary. No date. "Competitiveness." Retrieved January 18, 2019, from http://www.businessdictionary.com/definition/competitiveness.html.

English Oxford Living Dictionaries. No date. "Competitiveness." Retrieved January 18, 2019, from https://en.oxforddictionaries.com/definition/competitiveness.

International Monetary Fund (IMF). 2016. "Global Trade: What's Behind the Slowdown." *World Economic Outlook*, pages 63-119. Washington, DC, October.

———. 2017. "External Adjustment to Terms-of-Trade Shifts." *Western Hemisphere Regional Economic Outlook*, pages 55-80. Washington, DC, April.

Organization for Economic Cooperation and Development (OECD). 1992. *Technology and the Economy: The Key Relationships*. Paris, France.

World Economic Forum. 2017, September 27. "What Exactly Is Economic Competitiveness?" Retrieved January 18, 2019, from https://www.weforum.org/agenda/2017/09/what-is-economic-competitiveness/.

Zanello, Alejandro, and Dominique Desruelle. (1997). "A Primer on the IMF's Information Notice System." *IMF Working Paper 97/71*, International Monetary Fund, Washington, DC

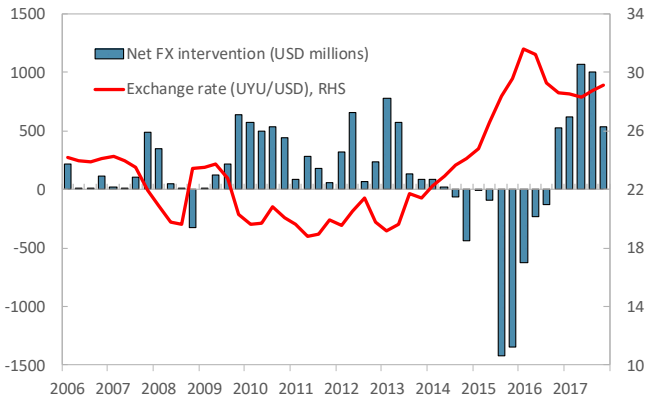
EFFECTIVENESS OF FOREIGN EXCHANGE INTERVENTION IN URUGUAY[1]

1. Uruguay has intervened in the foreign exchange (FX) market actively since the country moved to a floating exchange rate regime in 2002. In addition to a small wholesale exchange rate market (about 12 percent of GDP), there is a very small exchange forward market (about 3 percent of GDP). The central bank has mainly intervened in the spot market, but it also performs operations in the forward market. Interventions are not rule based, and there are not implicit or explicit ranges for intervention decisions (see Bucacos and others, forthcoming, for further details). In addition to direct market interventions, the central bank accommodates the foreign currency needs of the government (including large state-owned-enterprises) and portfolio shifts of large domestic institutional investors to avoid undue exchange rate volatility in a small FX market (with average daily turnover of about US$25 million). This leads to changes in reserves that overstate the size of interventions by the central bank, which is a common phenomenon in the region and in countries with small FX markets.

2. Capital flows to Uruguay have been volatile with periods of inflows followed by outflows. This volatile nature of capital flows reflects both push (global and regional economic conditions) and pull factors (domestic fundamentals) (Chapter 4 of the April 2017 *Western Hemisphere Regional Economic Outlook*).

3. Authorities responded to volatile capital flows with FX intervention, along with an active asset-liability management of the balance sheet of the public sector. The BCU has been intervening actively, by both selling and buying in the FX market, depending on the pressures (see Bucacos and others, forthcoming). Given the high degree of financial dollarization, an asset liability management approach is also a part of the risk management framework (Vicente and others, 2017).

Uruguay: Exchange Rate and FX Intervention



Sources: BCU and IMF staff estimates.

4. This paper complements earlier papers by using daily data to identify the effectiveness of intervention by the Central Bank of Uruguay (BCU).[2] Bucacos and others (forthcoming)—using monthly and weekly data—find that interventions have short-lived effects on the level of the

[1] Prepared by Yehenew Endegnanew.

[2] FX interventions in this paper refer to intervention conducted exclusively by the BCU and exclude any possible intervention by other government institutions. The paper does not also make distinction between sterilized and non-sterilized as well as direct and indirect interventions.

exchange rate (particularly for non-sterilized interventions). While direct interventions are found to be effective for FX sales (expected sign and statistically significant), FX purchases are found to prevent further appreciation (rather than depreciating the currency). This chapter, complements this work by using daily data to implement a two-stage approach to address the simultaneity problem between FX interventions and exchange rates (Tashu ,2014; Adler and Tovar, 2011). In the first stage, a simple revealed reaction function of the BCU's interventions is estimated. In particular, the reaction function assumes that intervention takes place when the level and volatility of the exchange rate deviate from a historical moving average (Sarno and Taylor, 2001; Galati et al, 2005; and Disyatat and Galati, 2007). For the baseline, one-year simple moving average is used. The exercise is replicated with 6-months simple moving average. The estimation is done separately for appreciation and depreciation pressures. In the second stage, the predicted values are used as instruments to estimate the effectiveness of intervention on the exchange rate. Daily data allows including the contemporaneous values of the exchange rate (rather than lagged values), which helps address any omitted variable problems.

5. The results suggest an asymmetry in the effectiveness of interventions. The first stage results show that exchange rate interventions are prompted by both excessive depreciation and appreciation. The second stage results suggest that while FX sales are successful in taming excessive depreciation, there is no clear evidence on FX purchases reversing appreciation pressures—which could reflect that purchases might have just prevented further appreciation.

A. Methodology

6. The paper employs an Instrumental Variable (IV) estimation method to examine the impact of FX interventions on the exchange rate. A major difficulty in examining the effectiveness of FX intervention is overcoming the endogeneity of FX intervention and movements in the exchange rate, since intervention affects the exchange rate and the decision to intervene is not independent of changes in exchange rates. To address this simultaneity bias, the paper applies an instrumental variable method that involves estimating a simple revealed reaction function and using predicted values of FX intervention from the estimated reaction function as an instrument to assess the impact of FX intervention on the exchange rate (see, for instance, Adler and Tovar, 2011; Tashu, 2014).

7. In the first stage, a simple reaction function is estimated. The paper uses the same-day exchange rates in the reaction function. Following the standard literature (for example, Sarno and Taylor, 2001; Galati et al, 2005; and Disyatat and Galati, 2007), the methodology assumes that the BCU intervenes when the level and volatility deviation from weekly average) are excessive—when the exchange rate deviates from its historical averages by one standard deviation (one-year moving average). In line with the BCU's discretionary intervention strategy, the model also assumes intervention decisions are unanticipated by the market. The regression model has the following form:

$$INT_t = \alpha_0 + \alpha_1(s_t - s_t^*) + \alpha_1(\sigma_t - \sigma_t^*) + \epsilon_t$$

where INT_t is the actual amount of FX intervention in millions of USD, s_t and s_t^* are logs of the actual and the historical average of the UYU/USD exchange rate, σ_t and σ_t^* are the actual and the historical average of the volatility of the exchange rate, ϵ_t is the random error term, and t is the time index.

8. The equation is estimated for FX purchases and FX sales separately to test asymmetry in reactions to excessive appreciations and depreciations. In the regression model, excessive deviations are defined by exchange rate movements that are outside of one standard deviation around the historical average. It is assumed that the BCU intervenes to prevent excessive appreciations if the opening exchange rate falls below the lower bound and intervenes to avoid excessive depreciations if the opening exchange rate exceeds the upper bound.

$$(s_t - s_t^*) = \begin{cases} (s_t - s_t^{*u})\ if\ the\ exchange\ rate\ rises\ above\ the\ upper\ bound \\ (s_t^{*l} - s_t)\ if\ the\ exchange\ rate\ falls\ below\ the\ lower\ bound \end{cases}$$

9. The regression model also assumes that the BCU intervenes to contain excessive daily changes. The volatility is defined in a way to capture discreate jumps. The BCU is expected to intervene if the volatility of the opening exchange rate, measured by the absolute value of the deviation of the opening exchange rate from the weekly average exchange rate, exceeds the historical average weekly standard deviation.

10. In the second stage, the impacts of FX interventions are estimated. Predicted values of interventions from the first stage regressions are used as instruments in the second stage, where regression equations for the level and volatility of the exchange rate are specified. The dependent variables are defined as the differences between the closing and the corresponding opening exchange rate levels. Both predicted values of FX purchase and FX sale enter the equations separately to test for potential asymmetry in their effectiveness.

$$\Delta(\ln er_t) = \beta_0 + \beta_1 \widehat{INT\_pur}_t + \beta_2 \widehat{INT\_sale}_t + \beta_3 Control + \epsilon_t$$
$$\Delta vol_t = \gamma_0 + \gamma_1 \widehat{INT\_pur}_t + \gamma_2 \widehat{INT\_sale}_t + \gamma_3 Control + \epsilon_t$$

where $\Delta(\ln er_t)$ is the percentage change between the closing exchange rate and the opening exchange rate, and Δvol_t is the difference between the closing session volatility and the opening session volatility. $\widehat{INT\_pur}_t$ is the predicted FX purchase in millions of USD, $\widehat{INT\_sale}_t$ is the predicted FX sale in millions of USD, and $Control$ includes the daily change in the common factor (principal component) of exchange rates of regional countries (Argentina, Brazil, Chile, Colombia, Mexico and Peru) and the daily change in the Chicago Board of Exchange Market Volatility Index (VIX).

B. Data Analysis and Results

Data Analysis

11. The data sources are the following. Daily FX intervention data are obtained from the BCU and refer to intervention conducted exclusively by the BCU and exclude any possible intervention by other government institutions. In addition, the data do not make distinction between sterilized and non-sterilized as well as direct and indirect interventions.[3] The FX Data for the opening and closing sessions exchange rate for Uruguay and the other regional countries are from Bloomberg. Finally, VIX data is obtained from Chicago of Board Options Exchange (CBOE) online database. The sample covers daily data for January 2006 to December 2017.

12. The BCU intervened in 70 percent of the total FX trading days. In the sample period (January 2006-December 2017), the BCU carried out intervention on 2050 days—FX purchases on 1500 days and FX sales on 550 days. The average size of daily FX purchases and FX sales were USD 4.2 million and USD 1.8 million, respectively.

13. FX sales have taken place primarily during days in which the level of the exchange rate deviated from its historical average (Table 1). A closer look at the exchange rate and FX intervention data indicates that about 62 percent of the FX sales were conducted during days when the opening exchange rate rose above the upper bound of the historical range. Roughly one-fifth of the FX sales occurred when the exchange rate volatility deviated from its historical range while the level of the exchange rate remained within or below historical range. The remaining FX sales were conducted when neither deviations of the level of or volatility of the exchange rate from the historical range were observed.

Table 1. Uruguay: Characterization of the Daily FX Intervention
(Jan 2006 to Dec 2017, in percent)

		$vol > vol^{Historical\ Range}$	$vol \leq vol^{Historical\ Range}$	***Total***
FX sale	$er > er^{H}$	25.1	37.3	***62.4***
	$er < er^{L}$	8.2	8.9	***17.1***
	$er^{L} \leq er < er^{H}$	10.4	10.2	***20.5***
	Total	***43.6***	***56.4***	***100.0***
		$vol > vol^{Historical\ Range}$	$vol \leq vol^{Historical\ Range}$	***Total***
FX purchase	$er > er^{H}$	7.6	8.5	***16.1***
	$er < er^{L}$	15.5	26.1	***41.6***
	$er^{L} \leq er < er^{H}$	15.7	26.5	***42.3***
	Total	***38.9***	***61.1***	***100.0***

Notes: *er* and *vol* stand for the exchange rate level and volatility, respectively. er^{H} and er^{L} represent the upper and lower bounds of the BCU's tolerable range for the level of exchange rate.

[3] For more on the different types and ways of FX intervention, please see Bucacos and others (forthcoming).

14. A smaller share of FX purchases have taken place during days in which the level of the exchange rate was stronger than the lower bound. Compared to FX sales, a lower proportion (about 42 percent) of FX purchases were conducted during days when the opening exchange rate deviated from the lower bound of the historical range. One-quarter of the FX purchases occurred during days when exchange rate volatility deviated from the historical range while the level remained within or above the historical range. The rest (35 percent) were conducted during days where there were no deviations from the exchange rate level or volatility ranges.

Regression Results

15. The results show FX interventions are prompted by excessive appreciation and depreciation (Table 2). FX sales and FX purchases are positively and statistically associated with deviations of the exchange rate level from the upper and lower bounds, respectively, of the historical range. The regressions imply that in response to a 1 percent deviation of the exchange rate with respect to the lower bound of the range, the BCU would purchase on average US$0.4 million. Similarly, for a 1 percent deviation of the exchange rate with respect to the higher bound of the range, the BCU would sell on average US$1.3 million. At the same time, deviations of the exchange rate volatility from the tolerable range appear not to prompt FX sale and purchase decisions.

16. The IV regression results show that there is an asymmetry in the effectiveness of interventions between FX sales and FX purchases (Table 3). FX sales are successful in reducing the exchange rate level whereas there is no statistically significant impact of FX purchases on the exchange rate level. The regression implies that a US$ 1 million sale by the BCU would appreciate the value of the Uruguayan peso by approximately 0.04 percent. These results are broadly in line with the ones obtained by Bucacos and others (forthcoming) using monthly and weekly FX intervention data. An asymmetry in the effect of intervention for sales is a very common finding (see A. Werner, and others forthcoming) and could reflect various considerations. FX interventions (both sales and purchases) seem to increase volatility, which could simply suggest that the BCU is willing to tolerate higher volatility in the FX market during the days it intervenes although some of the volatility impacts appear to be reversing the following day.

Table 2. Uruguay: Determinants of FX Intervention

Independent Variable	(1)	(2)
Dependent variable = FX purchase amount		
Excessive appreciation	.662	.41
	(6.31)***	(4.06) ***
Excessive volatility	-.034	-.007
	(-1.95)	(-.445)
FX purchase 1st lag	...	.208
		(11.5) ***
FX purchase 2nd lag	...	.183
		(10.1) ***
Constant	3.62	2.19
	(17.5)	(10.3) ***
No of observations	2972	2970
R2	.014	.108
F-stat	22.2	90.7
Dependent variable = FX sale amount		
Excessive depreciation	1.53	1.32
	(11.3)***	(9.45) ***
Excessive volatility	-.035	-.03
	(-1.46)	(-1.24)
FX sale 1st lag	...	.07
		(3.8) ***
FX sale 2nd lag	...	.063
		(3.46) ***
Constant	.264	.228
	(.898)	(.776)
No of observations	2972	2970
R2	.04	.049
F-stat	63.6	39.2

Notes: Numbers in parentheses are t-values. *** p<0.001, **p<0.01, *p<0.05

Robustness Tests

17. The results are robust to changes in the definitions of FX intervention and historical average exchange rates as well changes in the sample period (Annex). First, the regressions were estimated applying a stricter definition for FX intervention level that requires a minimum intervention amount of US$0.5 million and that considers any amount below that as zero. This could help exclude interventions not related to influencing the level of the exchange rate. Second, the historical average exchange rate was defined by a 6-month moving average instead of the 1-year one used. Third, the sample period was restricted to the 2010-2017 period. In all these different cases, similar results are obtained.

Table 3. Uruguay: Impacts of FX Intervention on Exchange Rate Level and Volatility[1]

	Change in the level of the exchange rate			Change in the volatility of exchange rate		
Explanatory variables	(1)	(2)	(3)	(1)	(2)	(3)
FX Purchase	-.003	-.002	-.002	.09	.181	.181
	(-.849)	(-.279)	(-.37)	(1.46)	(2.05)*	(2.04)*
FX Sale	-.015	-.04	-.039	.075	.708	.708
	(-3.67)***	(-4.39)***	(-4.4)***	(1.16)	(4.87)***	(4.87)***
FX Purchase 1st Lag		-.002	-.001		-.15	-.149
		(-.278)	(-.122)		(-1.69)	(-1.69)
FX Sale 1st Lag		.028	.027		-.717	-.717
		(3.08)**	(3.06)**		(-4.93)***	(-4.93)***
Change in ER LA 2/			.075			
			(6.04)***			
Absolute value of change in VIX						-.013
						(-.261)
Constant	.084	.079	.077	1.3	1.7	1.75
	(3.71)***	(3.28)**	(3.23)**	(3.54)***	(4.4)***	(4)***
No of observations	2970	2969	2969	2970	2969	2969
Adjusted R2	.004	.006	.018	0	.009	.008
F-stat	6.72	5.77	12	1.42	7.39	5.92

1/ Estimated using IV (2SLS) method. Predicted values of FX sale and purchase amounts from first stage regressions used as instruments.

2/ Change in principal component of exchange rates in Argentina, Brazil, Chile, Colombia, Mexico and Peru. Numbers in parentheses are t-values. ***p<0.001, **p<0.01, *p<0.05

C. Conclusion

18. The paper finds that there is an asymmetry in the effectiveness of FX sales and FX purchases. The results indicate that FX sales are effective in stemming excessive domestic currency depreciation (at daily frequency). In contrast, FX purchases appear not to reverse the level of the exchange rate, but they might have prevented further appreciations. These findings are consistent with literature and earlier findings on Uruguay.

References

Adler, G., and C. E. Tovar, 2011, "Foreign Exchange Intervention: A Shield Against Appreciation Winds?" IMF Working Paper No. 11/165 (Washington: International Monetary Fund.)

Bucacos, E., A. Graña, Licandro, G. and Mello, M., forthcoming, "On Forex Intervention in Uruguay and its effects, 2005 to 2017," in forthcoming Werner, A. Chamon, M., Hofman, D., Magud, N., forthcoming book, "Foreign Exchange Interventions in Inflation Targeters in Latin America."

Disyatat, P., and G. Galati, 2007, "The Effectiveness of Foreign Exchange Intervention in Emerging Market Countries: Evidence from the Czech Koruna," *Journal of International Money and Finance* (U.K.) Vol. 26, No. 3:383–402.

Galati, G., W. Melick, and M. Micu, 2005, "Foreign exchange market intervention and expectations: the yen/dollar exchange rate," *Journal of International Money and Finance* (U.K.) Vol. 24, No. 6:982–1011.

International Monetary Fund. 2017. "Drivers of Capital Flows and the Role of the Investor Base in Latin America." In *Western Hemisphere Regional Economic Outlook*. Washington: IMF, April, pp. 81–108.

Sarno, L., and M. P. Taylor, 2001, "Official Intervention in the Foreign Exchange Market: Is It Effective And, If So, How Does It Work?" *Journal of Economic Literature* (U.S.) Vol. 39, No. 3:839-68.

Tashu, Melesse, 2014, "Motives and Effectiveness of Forex Interventions: Evidence from Peru," IMF Working Paper No. 14/217 (Washington: International Monetary Fund.)

Vicente, L., Malacrida, F., and Zimet, F., 2017, "The Contribution of an ALM approach to monetary and fiscal policy: the case of Uruguay," *HSBC Reserve Management Trends 2017*.

Appendix I. Robustness Tests

Table A1a. Uruguay: Determinants of FX Intervention – with Minimum Amount Threshold

Independent Variable	(1)	(2)
Dependent variable = FX purchase amount		
Excessive appreciation	.663	.41
	(6.31)***	(4.06) ***
Excessive volatility	-.034	-.008
	(-1.97)*	(-.461)
FX purchase 1st lag	...	.208
		(11.5) ***
FX purchase 2nd lag	...	.183
		(10.1) ***
Constant	3.61	2.18
	(17.4)	(10.3) ***
No of observations	2972	2970
R2	.014	.108
F-stat	22.2	90.8
Dependent variable = FX sale amount		
Excessive depreciation	1.53	1.32
	(11.3)***	(9.45) ***
Excessive volatility	-.036	-.03
	(-1.46)	(-1.24)
FX sale 1st lag	...	.07
		(3.8) ***
FX sale 2nd lag	...	.063
		(3.46) ***
Constant	.258	.222
	(.878)	(.759)
No of observations	2972	2970
R2	.04	.049
F-stat	63.6	39.2

Notes: Numbers in parentheses are t-values. *** p<0.001, **p<0.01, *p<0.05

Table A1b. Uruguay: Impacts of FX Intervention on Exchange Rate Level and Volatility - with Minimum Amount Threshold[1]

	Change in the level of the exchange rate			Change in the volatility of exchange rate		
Explanatory variables	(1)	(2)	(3)	(1)	(2)	(3)
FX Purchase	-.003	-.002	-.002	.092	.182	.181
	(-.854)	(-.293)	(-.385)	(1.48)	(2.06)*	(2.05)*
FX Sale	-.015	-.04	-.039	.075	.708	.709
	(-3.67)***	(-4.4)***	(-4.4)***	(1.16)	(4.87)***	(4.87)***
FX Purchase 1st Lag		-.001	-.001		-.149	-.149
		(-.263)	(-.106)		(-1.69)	(-1.69)
FX Sale 1st Lag		.028	.027		-.717	-.717
		(3.08)**	(3.06)**		(-4.93)***	(-4.93)***
Change in ER LA 2/			.075			
			(6.04)***			
Absolute value of change in VIX						-.013
						(-.261)
Constant	.084	.078	.077	1.3	1.69	1.75
	(3.72)***	(3.29)**	(3.23)**	(3.54)***	(4.4)***	(3.99)***
No of observations	2970	2969	2969	2970	2969	2969
Adjusted R2	.004	.006	.018	0	.009	.008
F-stat	6.73	5.77	12	1.45	7.41	5.94

1/ Estimated using IV (2SLS) method. Predicted values of FX sale and purchase amounts from first stage regressions used as instruments.

2/ Change in principal component of exchange rates in Argentina, Brazil, Chile, Colombia, Mexico and Peru. Numbers in parentheses are t-values. ***p<0.001, **p<0.01, *p<0.05

Table A2a. Uruguay: Determinants of FX Intervention—with Sample Period 2010-2017

Independent Variable	(1)	(2)
Dependent variable = FX purchase amount		
Excessive appreciation	1.06	.643
	(4.22)***	(2.6) **
Excessive volatility	-.02	.006
	(-.802)	(.239)
FX purchase 1st lag	...	.193
		(8.69) ***
FX purchase 2nd lag	...	.164
		(7.36) ***
Constant	4.52	2.91
	(15.7)	(9.57) ***
No of observations	1973	1971
R2	.009	.084
F-stat	9.55	46.2
Dependent variable = FX sale amount		
Excessive depreciation	1.88	1.65
	(9.32)***	(7.88) ***
Excessive volatility	-.044	-.039
	(-1.21)	(-1.07)
FX sale 1st lag	...	.065
		(2.9) **
FX sale 2nd lag	...	.059
		(2.6) **
Constant	.161	.14
	(.352)	(.307)
No of observations	1973	1971
R2	.041	.048
F-stat	43.6	26

Notes: Numbers in parentheses are t-values. *** p<0.001, **p<0.01, *p<0.05

Table A2b. Uruguay: Impacts of FX Intervention on Exchange Rate Level and Volatility—with Sample Period 2010-2017[1]

	Change in the level of the exchange rate			Change in the volatility of exchange rate		
Explanatory variables	(1)	(2)	(3)	(1)	(2)	(3)
FX Purchase	-.001	-.002	-.002	-.024	.128	.129
	(-.12)	(-.327)	(-.421)	(-.322)	(1.27)	(1.28)
FX Sale	-.011	-.021	-.021	.13	.591	.591
	(-2.8)**	(-2.37)*	(-2.39)*	(1.97)*	(3.86)***	(3.85)***
FX Purchase 1st Lag		.003	.003		-.246	-.246
		(.469)	(.59)		(-2.44)*	(-2.44)*
FX Sale 1st Lag		.012	.012		-.532	-.532
		(1.32)	(1.35)		(-3.47)***	(-3.47)***
Change in ER LA 2/			.075			
			(4.87)***			
Absolute value of change in VIX						.009
						(.151)
Constant	.098	.088	.086	2.05	2.69	2.65
	(3.36)***	(2.82)**	(2.78)**	(4.04)***	(4.96)***	(4.45)***
No of observations	1971	1970	1970	1971	1970	1970
Adjusted R2	.003	.003	.015	.001	.009	.009
F-stat	4.18	2.57	6.82	2.38	5.51	4.41

1/ Estimated using IV (2SLS) method. Predicted values of FX sale and purchase amounts from first stage regressions used as instruments.

2/ Change in principal component of exchange rates in Argentina, Brazil, Chile, Colombia, Mexico and Peru.

Numbers in parentheses are t-values. ***p<0.001, **p<0.01, *p<0.05

Table A3a. Uruguay: Determinants of FX Intervention—with Tolerable Range Estimated by 6-month MA

Independent Variable	(1)	(2)
Dependent variable = FX purchase amount		
Excessive appreciationn	.847	.528
	(5.27)***	(3.44) ***
Excessive volatility	-.02	.002
	(-1.12)	(.104)
FX purchase 1st lag	...	.21
		(11.6) ***
FX purchase 2nd lag	...	.186
		(10.3) ***
Constant	3.69	2.21
	(17.7)	(10.3) ***
No of observations	2972	2970
R2	.009	.106
F-stat	14.7	89.4
Dependent variable = FX sale amount		
Excessive depreciation	1.07	.885
	(6.28)***	(5.16) ***
Excessive volatility	-.034	-.027
	(-1.32)	(-1.05)
FX sale 1st lag	...	.092
		(5.03) ***
FX sale 2nd lag	...	.086
		(4.69) ***
Constant	.985	.807
	(3.35)	(2.75) **
No of observations	2972	2970
R2	.012	.029
F-stat	19.7	23.1

Notes: Numbers in parentheses are t-values. *** p<0.001, **p<0.01, *p<0.05

Table A3b. Uruguay: Impacts of FX Intervention on Exchange Rate Level and Volatility - with Tolerable Range Estimated by 6-month MA[1]

	Change in the level of the exchange rate			Change in the volatility of exchange rate		
Explanatory variables	(1)	(2)	(3)	(1)	(2)	(3)
FX Purchase	-.001	.001	0	.063	.136	.136
	(-.261)	(.165)	(.081)	(1.03)	(1.56)	(1.55)
FX Sale	-.012	-.025	-.025	.123	.381	.382
	(-2.36)*	(-3.36)***	(-3.32)***	(1.5)	(3.12)**	(3.13)**
FX Purchase 1st Lag		-.002	-.001		-.118	-.117
		(-.349)	(-.204)		(-1.34)	(-1.34)
FX Sale 1st Lag		.018	.017		-.358	-.357
		(2.37)*	(2.23)*		(-2.93)**	(-2.93)**
Change in ER LA 2/			.075			
			(6.01)***			
Absolute value of change in VIX						-.014
						(-.289)
Constant	.07	.062	.062	1.33	1.69	1.75
	(3.02)**	(2.52)*	(2.51)*	(3.54)***	(4.25)***	(3.91)***
No of observations	2970	2969	2969	2970	2969	2969
Adjusted R2	.001	.002	.014	0	.003	.003
F-stat	2.8	2.85	9.53	1.43	3.24	2.61

1/ Estimated using IV (2SLS) method. Predicted values of FX sale and purchase amounts from first stage regressions used as instruments.

2/ Change in principal component of exchange rates in Argentina, Brazil, Chile, Colombia, Mexico and Peru. Numbers in parentheses are t-values. ***p<0.001, **p<0.01, *p<0.05.