

Cultural and Financial Dollarization of Households in Uruguay

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Abstract

In this paper, we analyze factors associated with the financial and cultural dollarization of households in Uruguay. We estimate cultural dollarization with data from the 2013 financial survey of Uruguayan households, particularly using the currency reporting option available to respondents. Financial dollarization, meanwhile, is estimated as the share of US dollar-denominated bank assets in total assets. We find that the level of dollarization of bank savings is mainly explained by the size of savings and household wealth. We also observe that our proxy variable for cultural dollarization is associated with wealth and home ownership. Other factors that influence cultural dollarization are age and years of formal education, which are positively and significantly correlated with the use of the US dollar as a unit of account and asset valuation. Larger households, on the other hand, are less culturally dollarized. The evidence points to the key role played by the pricing system in the dollarization culture.

Keywords: dollarization, financial decisions, households, indebtedness, saving.

JEL classification: E, D1, D4.

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1. INTRODUCTION

After 15 years of policy actions aimed at reducing dollarization, Uruguay continues to be one of world's most dollarized countries (Catão and Terrones, 2016). Dollarization of household savings, although it might be justified as a risk management strategy, is a behavior seldom observed in most countries. In environments such as Uruguay's, external shocks are commonplace. This generates high volatility in the real exchange rate, and there is a negative correlation between the real exchange rate and real wages. Household saving in dollars can be seen as a way of diversifying risks stemming from wage flows and the value of real assets that are highly correlated with wages, such as housing and human capital. Despite these benefits of the dollarization of household saving, this behavior is relatively unusual in the international environment, where the majority of household financial saving is in domestic currency.

Cultural dollarization is much less common than financial dollarization. We understand cultural dollarization as the phenomenon by which agents use the dollar as tenure in circumstances where local currency is used in most countries. In Uruguay, we are accustomed to government officials or ordinary individuals expressing amounts in dollars when they wish to give an idea of large sums. For instance, when a minister in Uruguay talks about their budget, or the head of the Directorate General of Taxation refers to total tax collection, the amounts are commonly expressed in foreign currency. Such practices are not normal in other countries. In fact, they are almost only seen in Uruguay.

In this empirical analysis, we study what financial and cultural dollarization are associated with in Uruguayan households. This type of study is different in several ways. First, there are not many studies on households' portfolio decisions, especially concerning the composition of portfolios by currencies, given the lack of financial information regarding household balance sheets. Second, the 2013 financial survey of households in Uruguay allows for differentiating the currency assets are denominated in from that used for reporting their value. This enables us to separate the real dollarization of the portfolio from the cultural practice of reporting by currencies, which we use as a proxy variable for cultural dollarization. We mainly focus on aspects such as denomination by currency of assets and liabilities, as well as households' income and expenditure

flows. Besides analyzing the proportion of household assets, mainly bank savings, that are denominated in dollars, we also study the factors associated with the fact that Uruguayans think in dollars, even in cases where this is not justified from a financial point of view.

Note that we refer to factors associated to cultural dollarization and not the causes of dollarization. Showing the contribution of different causal factors for dollarization would require a set of longitudinal data that is not available to us. Uruguay only has household financial data for the years 2011 and 2013, deriving from the two editions of the household financial survey conducted by the Instituto Nacional de Estadísticas. There is also no data available from other countries for similar periods that allows us to focus on this topic from an international cross-sectional perspective. Hence, we confine ourselves to seeing what data from the household survey can tell us in the hope of being able to link those results to some key determining factor. To do this we assess the dollarization phenomenon in two dimensions. On the one hand, an objective dimension that is reflected in portfolio decisions to hold dollar denominated bank savings. On the other hand, a subjective or cultural dimension implied by the fact that Uruguayans value or use the dollar as a unit of account, even when it concerns assets or liabilities not necessarily denominated in said currency.

We find that the level of dollarization of bank savings is mainly explained by the size of savings and household wealth. In particular, female household heads display greater dollarization in their savings. Moreover, we find that our proxy variable for cultural dollarization is associated to wealth and being a homeowner. Other factors that influence cultural dollarization are age and years of formal education, variables that are positively and significantly correlated with the use of the dollar as a unit of account and asset valuation. Meanwhile, the largest households are less culturally dollarized. We understand that the weight of real assets in wealth, and of these in dollarization and cultural dollarization, suggests that the dollarization of high value asset prices in Uruguay (housing and automobiles) is a key factor for explaining cultural dollarization. Furthermore, all the factors reinforcing the idea that large amounts should be expressed in dollars would contribute to deepening cultural dollarization.

This study reveals there is an opportunity for dedollarization policies for pricing systems, as well as for financial education and public communication policies.

The rest of the paper is organized as follows. Section 2 describes the data employed and the variables defined. Section 3 reviews the models used and the results obtained. Section 4 presents the conclusions.

2. HISTORICAL BACKGROUND

Just as in any economy open to external trade, Uruguayan agents have always presented asset and liability positions in foreign currency. However, Uruguay began to undergo a strong process of dollarization in the 1950s. To understand why dollarization is a cultural phenomenon, it is worth making a brief review of the events that led up to this process. A brief overview of the history of dollarization and the financial reform process at the start of the 21st century is presented below. We also describe progress made in matters of reducing dollarization, and define the problem of cultural dollarization.

2.1 Dollarization and Financial Fragility: Origins and Reform

Licandro and Licandro (2003) explain the origins of dollarization in Uruguay as a combination of accumulated macroeconomic management mistakes (inflationary financing accompanied by successive failures to stabilize inflation with a fixed exchange rate and sudden sharp exchange rate depreciations); incomplete markets (lack of effective hedging against alternatives to dollar inflation, failure of the index-linked unit of currency); coordination problems and externalities (failure to include the systemic impact of dollarization in private risk concessions); incentives from public banks to develop dollarization (Tealde, 2007); and learning the role of dollar hedging in tackling real exchange rate shocks (Güenaga et al., 2004; and Achugar et al., 2004). The combined result of all these incentives led to Uruguay becoming one of the most dollarized countries in the world.

Dollarization and currency mismatches are described in the literature as one of the Uruguayan economy's main weaknesses up until 2002, when it was hit by the crisis in Argentina (see Licandro, 2003; and De Brun and Licandro, 2005). During this crisis, the financial system lost 42% of its deposits. This caused a credit crunch that would lead Uruguay's GDP to contract by over 20% from the start

of the crisis in 2001 until the debt renegotiation of 2003, on top of a negative regional demand shock.

Once the bank run had been overcome, and after generating a sustainable fiscal outlook by restructuring Uruguay's sovereign debt in 2003, the country set about implementing a strategy for reducing the financial weaknesses derived from dollarization. This strategy (Licandro and Licandro, 2003) was based on two pillars: recognizing risks through financial system regulation and supervision, and reconstructing markets in domestic currency. The first pillar included, among others, the creation of deposit insurance with risk premiums adjusted to currency risk and coverage spreads (coverage of the insurance in domestic currency was initially triple the coverage in foreign currency); changes to liquidity and reserve requirements in recognition of Banco Central del Uruguay's greater capacity to provide lenders of last resort services in pesos; changes to credit risk regulation preventing clients that could not withstand depreciations of 60% in real terms from obtaining the highest credit ratings; and changes to pension fund portfolio and insurance company regulations to achieve better currency matching. In the second pillar, the most important measure—floating the currency—was unintentional. However, progress was also made by creating the indexed unit (IU), (an indexation alternative based on the Unidad de Fomento used in Chile); issuing securities in indexed units by the Central Bank as well as the Central Government; and changing the activities of public banks that supported development of the IU and restricted the profit extraction mentioned by Tealde (2007) from the consumer credit segment in domestic currency and changed mortgage credit indexation to the IU, among others.

2.2 Progress in Reducing Financial Weakness and Dollarization

Outstanding progress has been achieved in matters of reducing financial weaknesses stemming from dollarization, but the results in terms of dedollarization have been disappointing, even though the strategy highlighted in the previous section was implemented within an extremely favorable international macroeconomic setting. In fact, changes in developed countries' energy policies (reorientation towards biofuels) and the growth of Chinese demand, led to very substantial increases during the period 2003-2013 in the prices of

Uruguay's export commodities. In 2009, the reduction of monetary policy rates around the world added to these increases, leading to an unprecedented expansion in Latin American economies. In this environment, domestic agents experienced a previously unseen period of appreciation in the nominal exchange rate, which fell from 32.4 Uruguayan pesos in September 2002 to 18.3 Uruguayan pesos in July 2011. As for inflation, after the correction of relative prices took it temporarily above 20% in 2003, it rapidly returned to single digits, reaching 3.5% by June 2005.

In this context, although considerable progress was made in currency mismatches, dollarization—especially that of bank deposits—only fell from 90% to 80% of total deposits. Among the progress made is a change in the role of domestic currency in transactions, which is illustrated in figure A.1, the dedollarization of public debt (Figure A.2, Annex 1), a reduction in firms' financial mismatches (Figure A.3), the equalization of external finance premiums for currencies reported in Licandro and Mello (2012), and a reduction in the dollarization of credit (Figure A.4). Nevertheless, as can also be seen in the latter figure, the dollarization of deposits has changed very little.

Despite regulatory incentives and a favorable environment, Uruguay was not able to generate a reconstruction of markets in pesos comparable to that of other countries with similar financial and risk characteristics. Figure A.5 shows that during the same period, countries such as Costa Rica, Peru, and Bolivia were much more successful in constructing markets in domestic currency, as evidenced by their share of M2 (total deposits in domestic currency) in gross domestic product (GDP).

The absence of a reaction from dollarization is a cause for concern, due to its impact on long-term financial stability and—potentially—long-term economic growth. Indebtedness in domestic currency is the natural way to hedge against real exchange rate shocks. When there is a negative shock, such as a sudden halt in capital flows, the real exchange rate of fundamentals should depreciate. In the presence of nominal rigidities and a degree of monetary flexibility, this leads to temporary adjustments in inflation that offset indebtedness in domestic currency. This property, highlighted by Bohn (1990) for developed countries, was analyzed in countries with liability dollarization for the case of public debt by Calvo and Guidotti (1990) and Goldfajn (1997), and for the case of Uruguay's public debt by Licandro and Masoller (2000). The link to economic growth stems from

the impact of inflation on the development of the financial system in domestic currency. Rousseau and Wachtel (2002), for instance, use a series of rolling panel regressions—to find an inflation threshold beyond which the financial depth of an economy has a negative effect on growth.

2.3 Dollarization Culture and Persistence

2.3.1 What Factors Might Be Behind the Persistence of Dollarization in Uruguay?

First, although Uruguay has managed to keep inflation at historically low levels, it still has relatively high inflation by international standards—in addition to problems of monetary policy credibility. In fact, over the last ten years inflation has averaged 8%, one point above the inflation target range and three points higher than the middle of said band. Inflation expectations have also remained systematically above the band, as illustrated in Figure 6 of the Annex, implying that the failure to meet the inflation target has eventually affected the Central Bank's credibility. The lack of stability in the currency has affected agents' confidence in it, and has prevented indexing practices, such as holding foreign currency denominated assets, being abandoned.¹

Second, banks continue to have an attitude of extracting profits in domestic currency. By international comparison there is a large spread between average bank deposit rates and interbank market rates. Under an inflationary setting, the real interest rates received by depositors are highly negative, which discourages deposits in domestic currency. Initiatives have been implemented that attempt to generate competition among banks for small savers using the vehicle of investment funds. However, despite offering higher interest rates, these initiatives have not attracted significant support among depositors.² The persistence of these interest rate spreads in domestic currency demonstrates the decision of banks to charge their costs in such activities where they face little competition, and where the

¹ Real interest rates in pesos have been highly negative, but the financial system provides the option to deposit in units indexed to inflation with close to zero rates.

² Although the funds are invested in low risk instruments, households probably still lack confidence in them.

clear leadership of public banks has set the tone (see Mello, 2009).

Third, households have learnt the advantages of holding their assets in foreign currency (dollars). The majority of household assets are normally indexed to wages. This occurs with households' wages, human capital, and their main asset, housing. In a country where real exchange rate shocks predominate, and where the covariance of the real exchange rate and wages is negative, the dollar is perfect for hedging against real exchange rate shocks. Perceptions also persist of asymmetric adjustments in the exchange rate: that when it appreciates it does so slowly, but when it depreciates it does so much faster. Furthermore, dollarization appears at the same time as inflation, in the presence of nominal interest rate ceilings established by the usury law, and in the absence of substitute indexation mechanisms, such as the *unidad de fomento* in the case of Chile.

The latter assessment should make us wonder why households in other small open economies are not dollarized like in Uruguay. One simple answer might be that in other countries inflation is a transitory nonrepetitive phenomenon. By the mid-1990s, Uruguay was classified as a chronic-inflation country due to its repeated failure to stabilize inflation. Each failed plan, because it was based on a fixed exchange rate, ended in a sudden depreciation of the exchange rate and a resurgence of inflation. Even when households do not have incentives to use foreign currencies under normal conditions, in environments such as those described for Uruguay, households quickly learn the asymmetry of asset yields and their cyclical properties.

Another factor which takes place in practice is that dollarization is a cultural phenomenon. This statement goes hand in hand with that saying money in the broad sense has cultural components. It is not the aim of this paper to give an overview of historical, sociological, anthropological, and psychological literature on money, but the link between culture and money has been demonstrated in all these social sciences.

From an economics point of view, the widely established relation between culture and money is difficult to prove due to a lack of appropriate information for substantiating this link.

In the following section, we employ a unique set of data to try and study cultural and financial dollarization among Uruguayan households and its determinants.

3. DETERMINANTS OF DOLLARIZATION OF HOUSEHOLDS IN URUGUAY

The household financial survey provides a unique set of data for understanding the scope and factors determining the dollarization of Uruguayan households. On the one hand, the data it provides on the composition of households' portfolios allows for studying factors associated to the financial dollarization of households. On the other hand, a group of specific questions allows for making a preliminary approximation of cultural dollarization. In fact, besides providing data on the composition of households' portfolios, the survey also includes the currency in which such wealth is reported. Below is a brief description of the dataset that enabled us to define the proxy variables for cultural dollarization used in this study.

3.1 Data Description

We use a cross-sectional database based on a combination of the second edition of the Financial Survey of Uruguayan Households (EFHU) conducted in 2013 and the 2012 Continuous Household Survey (ECH). The sample of households from the 2012 ECH is the one used in the 2013 EFHU, therefore making it possible to merge the two surveys. The EFHU was conducted during the second quarter of 2013, and 3,489 households were interviewed. Both surveys have nationwide coverage, meaning the sample is representative of the whole country.

For our objectives, it was advantageous to clean this database, eliminating households with highly inconsistent answers, as well as those without answers to questions on income, assets, and loans. Once the cleaning process had been completed in accordance with our interests, we were left with a sample of 2,993 households.

To assess whether eliminating observations could generate significant bias in the sample, we estimate the main statistical moments and mean of four variables that the majority of households gave answers about, and were highly relevant to our analysis: *percentage of bank savings in dollars, percentage of bank savings in Uruguayan pesos, expenditure on food, and household income*.³ Comparing the moments of these variables between both samples shows that the average and

³ Tables with descriptive data for these variables can be found in Annex 2.

median values of the cleaned sample are higher. The bias in these variables after eliminating observations is around 2%. This explains why most households with inconsistent or very few answers are the ones that do not possess any assets or liabilities and report very low or zero income.

The 2013 EFHU covers the largest amount of data possible with respect to the financial and economic realities of Uruguayan households. The survey was divided into the following sections:

- Housing and related loans
- Other properties and related loans
- Financial assets
- Nonmortgage loans
- Payment media
- Consumption and saving
- Insurance policies
- Income and employment history
- Household businesses
- Demographic characteristics

The study focuses on two dimensions, one financial and the other cultural. The financial dimension refers to the position of foreign currency in household assets, particularly bank savings. Cultural dollarization refers to the use of the dollar as a unit of account, even though it is not necessarily the dominant currency in the household.

3.1.1 Household Assets

Assets included in the survey are divided into real assets and financial assets. Real assets are housing, other properties, automobiles, motorcycles and other vehicles, livestock, jewelry, and household appliances. Household financial assets are mainly bank savings, although they also include other financial instruments, such as bonds, participation in investment funds, and stocks, among others. The tables in Annex 3 show the cultural dollarization of real assets, that is the proportion of answers expressed in dollars. Table 1 shows a summary of this information, and it can be seen how higher value assets are expressed in dollars to a greater extent.

Table 1**DOLLARIZATION OF REAL ASSETS, IN PERCENTAGES**

Housing	95.44
Other properties	97.78
Automobiles	97.32
Motorcycles	77.05
Jewelry	72.73
Livestock	71.43
Household appliances	35.66

With respect to financial assets, we need to assess the two dimensions of dollarization: what proportion of financial assets are in dollars and what proportion of the valuation of financial savings is expressed in dollars, even though these are not necessarily dollar-denominated.

Table 2 shows the distribution of households according to the currency in which they hold their bank savings (zero if they are in pesos, and one if in dollars). Almost 70% of Uruguayan households with bank savings have amounts in dollars. Furthermore, savers represent 20% of households, meaning approximately 14% of all Uruguayan households have financial savings in dollars.

Table 2**HOUSEHOLDS IN THE SAMPLE WITH BANK SAVINGS IN DOLLARS**

Number and percentage

<i>Dummy variable for bank savings in dollar</i>	<i>Frequency</i>	<i>Percentage</i>
0	162	30.06
1	377	69.94
Total	539	100.00

The share of respondents who report the value of their financial assets in dollars is 67.27% (zero if they answer in pesos, and one if in dollars; see Table 3). Joint analysis of tables 2 and 3 reveals that 377 households have deposits in dollars, while 407 report their bank savings in this currency.

Table 3

BANK SAVINGS REPORTED BY CURRENCY		
Number and percentage		
	<i>Frequency</i>	<i>Percentages</i>
0	198	32.73
1	407	67.27
Total	605	100.00

This inconsistency leads us to the first way of estimating cultural dollarization. We elaborate a variable that measures the mismatch between the currency in which individuals report their savings and the currency in which they actually hold most of their savings. This variable takes the value one if the individuals report their savings in dollars and the share of their savings in Uruguayan pesos is 50% or higher, and zero if there is no mismatch. Table 4 shows that 11.57% report their savings in dollars despite them being mostly denominated in Uruguayan pesos.

Table 4

MISMATCH BETWEEN THE CURRENCY REPORTED AND DENOMINATION OF BANK SAVINGS		
Number and percentage		
<i>Cultural dollarization</i>	<i>Frequency</i>	<i>Percentages</i>
0	535	88.43
1	70	11.57
Total	605	100.00

3.1.2 Household Liabilities

If we focus on household liabilities, we see that close to 35% of Uruguayan households have some kind of loan (Table 5). Moreover, 7.78% of households report mortgage loans and 31.8% nonmortgage loans (Table 6).

Table 5

HOUSEHOLDS WITH LOANS Number and percentage		
<i>Dummy variable for households with loans</i>	<i>Frequency</i>	<i>Percentages</i>
0	1,937	64.72
1	1,056	35.28
Total	2,993	100.00

Table 6

HOUSEHOLDS WITH NONMORTGAGE DEBT Number and percentage		
<i>Dummy variable for households with nonmortgage debt</i>	<i>Frequency</i>	<i>Percentages</i>
0	2,041	68.19
1	952	31.81
Total	2,993	100.00

From a dollarization perspective, it is important to analyze non-mortgage loans because households with mortgage credit in dollars only represent 12% of households with mortgages, or less than 1% of households in the sample. Table 7 shows the dollarization of Uruguayan households' nonmortgage loans. It can be seen how the majority of household borrowing is in domestic currency. Slightly less than 8% of households have some proportion of their nonmortgage debt in dollars, equal to 2.75% of total households.

Table 7**DOLLARIZATION OF NONMORTGAGE DEBT**

	<u>Frequency</u>	<u>Percentages</u>	<u>Accumulated</u>
0.00	980	92.80	92.80
2.53	1	0.09	92.90
2.60	1	0.09	92.99
4.76	1	0.09	93.09
5.41	1	0.09	93.18
6.35	1	0.09	93.28
7.52	1	0.09	93.37
27.25	1	0.09	93.47
42.11	1	0.09	93.56
55.00	1	0.09	93.66
57.14	1	0.09	93.75
87.72	1	0.09	93.84
88.40	1	0.09	93.94
88.89	1	0.09	94.03
89.55	1	0.09	94.13
91.07	1	0.09	94.22
94.70	1	0.09	94.32
94.74	1	0.09	94.41
95.24	1	0.09	94.51
97.46	1	0.09	94.60
98.08	1	0.09	94.70
98.50	1	0.09	94.79
98.61	1	0.09	94.89
98.76	1	0.09	94.98
99.75	1	0.09	95.08
100.00	52	4.92	100.00
Total	1,056	100.00	

If we consider financial flows of household income and expenditure, the percentage of households that use the dollar as their main currency is 8.82% (zero if the peso is the main currency, and one if it is the dollar; see Table 8).

Table 8

DOLLARIZATION OF HOUSEHOLD FINANCIAL FLOWS
Number of households and percentages

<i>Dummy variable for household financial flows in dollars</i>	<i>Frequency</i>	<i>Percentages</i>
0	2,729	91.18
1	264	8.82
Total	2,993	100.00

Considering the different measures of dollarization described above, it can be concluded that dollarization mainly takes place in the valuation and denomination of household assets, and to a lesser extent in liabilities and income and expenditure flows.

One hypothesis for the fact that Uruguayans value and hold assets in dollars despite not having any important inflows or loans in that currency, might be that households wish to maintain open positions in dollars to take advantage of an eventual depreciation in the domestic currency. Uruguay's history shows that real depreciations of the domestic currency are accompanied by sharp drops in real wages, meaning holding open positions in dollars is a way to hedge financially against the risk of falling wage income.

3.2 Financial and Cultural Dollarization and their Determinants

As an initial approach in pursuit of the factors that determine the dollarization of financial assets, we observe the interaction between different socioeconomic variables and the phenomenon we wish to explain. Table 9 illustrates the decision to have bank savings in dollars and income distribution. The number of households that have assets in dollars (when the variable takes the value 1) clearly increases

Table 9**DEPOSITS IN DOLLARS AND INCOME DISTRIBUTION**

Number of households

<i>Dummy variable for bank savings in dollars</i>	<i>Income quintiles</i>					<i>Total</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
0	9	22	32	48	51	162
1	18	16	30	84	229	377
Total	27	38	62	132	280	539

with income, even though the preference for holding assets in dollars is present at all income levels.

Table 10 shows the interaction between household decisions to have assets in dollars and education divided by years of formal education quintiles. The higher the formal education the greater the holdings of financial savings in dollars. It can be seen how years of education in the sample go from a minimum of 1 to a maximum of 20 years, meaning quintiles 4 and 5 correspond to households where the head has a tertiary education. Table 11 shows that among households with a university degree the proportion of those holding financial saving in dollars is 82.69%.

Table 10**DECISION TO HAVE BANK SAVINGS IN DOLLARS AND FORMAL EDUCATION**

Number of households

<i>Dummy variable for bank savings in dollars</i>	<i>Education quintiles</i>					<i>Total</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
0	18	23	33	35	53	162
1	25	22	81	59	190	377
Total	43	45	114	94	243	539

Table 11

HOLDINGS OF BANK SAVINGS IN DOLLARS AND UNIVERSITY DEGREE			
Percentages			
<i>Dummy variable for bank savings in dollars</i>	<i>Dummy variable for university degree</i>		<i>Total</i>
	<i>0</i>	<i>1</i>	
0	35.25	17.31	30.06
1	64.75	82.69	69.94
Total	100.00	100.00	100.00

Table 12

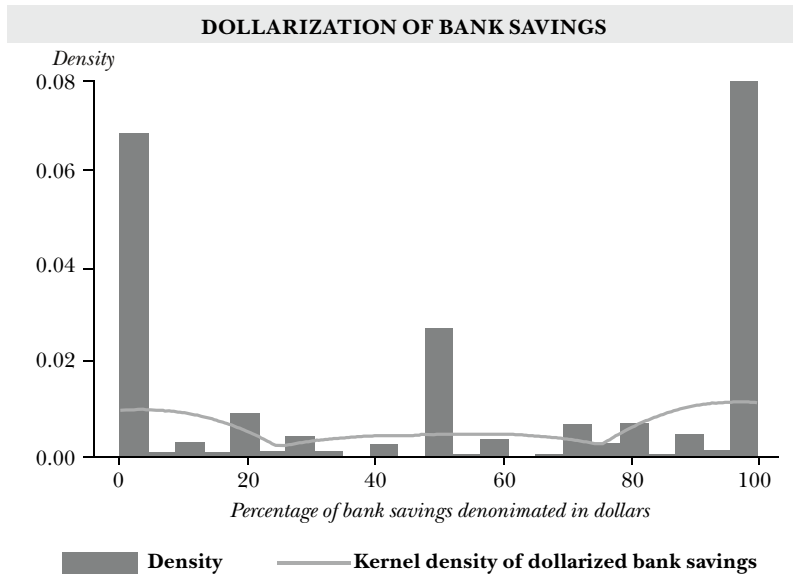
DECISION TO HAVE BANK SAVINGS IN DOLLARS AND AGE						
<i>Dummy variable for bank savings in dollars</i>	<i>Age quintiles</i>					<i>Total</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
0	42.1	25.8	24.8	25.2	28.9	30.1
1	57.9	74.2	75.2	74.3	71.1	69.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

In Table 12 we can observe how age and the tendency to have bank savings in dollars (when the dummy variable takes the value of one) are positively related. This is linked to wealth, given that there is a positive relation between age and household wealth.

Our variable of interest for studying financial dollarization is *the level of dollarization of bank savings*. We choose savings as a study variable because it is the one that exhibits the greatest differences as compared to countries without dollarization, where saving is almost practically nondollarized. This differs from bank deposits because respondents are asked not to include their transaction account balances.

Figure 1 shows the distribution of the dollarization variable for bank savings. It shows that although it is a continuous variable between 0 and 100, the answers that accumulate higher probability for those who report having assets in dollars are 0, 50, and 100. For households that have bank savings in dollars, dollarization is high, reaching an average of 76%.

Figure 1



3.2.1 Estimation and Results of Financial Dollarization Determinants

Empirical analysis implies modelling the decision to have financial savings and the level of dollarization of said savings. To this end we use several main estimation methods. We firstly estimate using ordinary least squares (OLS) and instrumental variables (two-stage least squares, 2SLS). We focus on estimating a tobit model given that the dependent variable is truncated between 0 and 100. We also estimate a two-stage Heckman model, where in the first stage a probit model is estimated for the decision to have bank savings, and in the second a model for the level of dollarization of financial savings.

Table 13 shows the estimations for the *determinants of bank savings dollarization*. In accordance with the selection process for the variable

Table 13

DETERMINANTS FOR DOLLARIZATION OF BANK SAVINGS

	Ordinary least squares	Two-stage least squares	Tobit model with instrumental variables	Heckman model
<i>Main</i>				
Bank savings, in logs	0.663 (0.440)	-19.834 (15.368)	56.908 ^c (21.388)	3.834 ^c (1.318)
Financial declared burden	-0.333 ^b (0.152)	-0.290 (0.340)	-0.896 (0.943)	-0.408 ^b (0.180)
Transaction accounts	2.736 ^b (1.146)	7.579 (4.772)	-12.514 (11.166)	4.229 ^c (1.422)
Income plus age, in logs	10.106 ^c (2.274)	28.774 ^b (13.901)		11.219 ^c (2.467)
Constant	-76.864 ^c (25.868)	-165.309 ^b (79.799)	-313.383 ^b (130.770)	-126.131 ^c (33.636)
Bank savings, in logs				
Financial declared burden			-0.001 (0.015)	
Transaction accounts			0.313 ^c (0.111)	
Total expenditure (-1)				
			0.443 ^c (0.146)	

Table 13 (cont.)

	Ordinary least squares	Two-stage least squares	Tobit model with instrumental variables	Heckman model
Log total income			0.332 ^b (0.161)	
Age of household head			0.014 ^b (0.007)	
Constant			-0.106 (1.929)	
<i>Proxy variable for bank savings</i>				
Bank savings, in logs				0.306 ^c (0.012)
Financial declared burden				-0.019 ^c (0.004)
Proxy variable for credit card				0.322 ^c (0.108)
Transaction accounts				0.254 ^c (0.031)

Main education					0.031 ^b (0.013)
Income plus age, in logs					0.191 ^c (0.060)
Constant					-4.585 ^c (0.661)
Mills ratio					
λ					21.345 ^c (7.957)
Observations	609	578	583		2,936
Uncensored observations			194		
Censored observations on the left			191		
Censored observations on the right			198		
P-value	1.32e-09	0.0199809	0.0113584		1.44e-07
R ²	0.0751962	.	.		
Adjusted R ²	0.0690716	.	.		

Note: ^a p -value < 0.10, ^b p -value < 0.05, ^c p -value < 0.01

to be explained, a Heckman estimation should be the preferred specification. In this model, the inverse Mills ratio is significant at the 99% level, implying that the probit model for the *bank savings* selection variable is significant, and explains the differences between those who have and do not have bank savings accounts.

The two-stage tobit model is the specification that presents the greatest differences because only the size of bank deposits is significant for explaining dollarization. Deposit size is the endogenous variable in this specification. The insight from this is that savings deposits and the currency they are made in are jointly determined by other factors, such as the value of the foreign currency and the need to hedge against real wage shocks. To control for these two specifications that consider the truncated or limited aspect of the dependent variable, we also estimate the model by ordinary least squares and two-stage least squares.

Analysis of the estimated models suggests that the level of dollarization is mainly explained by the size of savings, household income linked to the age of the household head, and negatively by the burden of household indebtedness. That is, households with higher available income and larger bank balances are more dollarized.

In addition, there is a positive and significant correlation between having transaction accounts as well as savings accounts and the dollarization of deposits. In the same way as having a credit card, this variable functions as a variable for access to the financial system, as shown by the positive and significant coefficient in the selection equation for the estimated Heckman model. Moreover, we see that the education level of the household head is a factor that determines having savings in the financial system, but not the level of dollarization of such savings.

3.2.2 Estimation and Results of Cultural Dollarization Determinants

To explore *cultural dollarization*, we elaborate a variable that measures to what extent Uruguayan households value assets in dollars that are not necessarily denominated in that foreign currency. This variable is *the dollarization of assets excluding bank savings*.⁴ We understand that,

⁴ Note we do not use the mismatch between bank asset denomination and reporting currencies presented in Table 4 as a proxy variable because we would only have 70 positive observations.

in so far as the value of assets is more related to the domestic market than to the value of the foreign currency, reporting the value of those assets in dollars is a demonstration of cultural dollarization.⁵

We use a tobit model to estimate the determinants of cultural dollarization, given that the dependent variable is truncated above 100, and controlled by performing ordinary least squares and two-stage least squares estimations.

Table 14 shows the models estimated for cultural dollarization based on the dollarization of real assets. The best specification for this is the tobit model with the variable limited at 0 and at 100. As a control, the model was also estimated by OLS and 2SLS. In the estimation using instrumental variables (2SLS) the variable measuring nonreal estate assets was made endogenous.

Cultural dollarization is positively correlated to wealth, even when excluding households' most important real asset, which is housing. Households that are homeowners are more likely to value and denominate their assets in dollars. Furthermore, it can be seen that the interaction variables between age and education and between age and income are positively and significantly correlated with cultural dollarization. The youngest individuals appear less dollarized, probably because they have lower incomes.

Income, wealth, being a homeowner, and age are the main factors that determine the cultural dollarization of households in Uruguay. That is, those that are more inclined to measure their wealth in dollars. Meanwhile, the largest households are less dollarized, which is explained by the fact that households with higher numbers of members are less likely to be homeowners.

We interpret the relation between cultural dollarization and home ownership as an indication of the link between cultural dollarization and the pricing system. Our proxy variable for cultural dollarization is obviously already included in the pricing system because the majority of the assets that households were asked to value are highly dollarized by the pricing system. Prices of household appliances, jewelry, and livestock, among others, exhibit a significant level of dollarization in Uruguay (see Licandro, 2016). Housing prices are also dollarized. All in all, this dollarization of the pricing system can be observed for all high-value items, thereby generating a direct association between large values and the use of the dollar

⁵ In other countries the prices of these assets are reported in local currency.

Table 14

DETERMINANTS OF CULTURAL DOLLARIZATION				
	<i>Ordinary least squares</i>	<i>Two-stage least squares</i>	<i>Tobit model</i>	<i>Tobit model with instrumental variables</i>
<i>Main</i>				
Non-real estate assets	8.94 ^c (0.500)	11.505 ^c (1.795)	15.431 ^c (0.822)	19.553 ^c (2.809)
Dummy housing variable	39.048 ^c (1.355)	38.142 ^c (1.609)	56.877 ^c (2.186)	54.813 ^c (2.565)
Age of household head	0.136 ^c (0.050)	0.215 ^b (0.087)	0.226 ^c (0.080)	0.396 ^c (0.137)
Number of household members	-1.399 ^c (0.417)	-1.357 ^c (0.428)	-2.453 ^c (0.675)	-2.430 ^c (0.678)
Education plus age, in logs	7.093 ^c (1.626)	6.802 ^c (1.798)	11.574 ^c (2.627)	9.822 ^c (2.871)
Income plus age, in logs	2.855 ^c (1.068)	0.578 (1.993)	4.391 ^b (1.704)	0.388 (3.112)
Constant	-111.266 ^c (9.895)	-108.017 ^c (11.689)	-230.208 ^c (16.240)	-215.141 ^c (18.957)

Nonreal estate assets

Dummy housing variable	0.305 ^c (0.051)
Age of household head	-0.039 ^c (0.002)
Number of household members	-0.048 ^c (0.016)
Education plus age, in logs	0.355 ^c (0.059)
Income plus age, in logs	0.845 ^c (0.050)
Total household income	-0.000 ^c (0.000)
Value of all real assets	0.000 ^c (0.000)
Dummy variable for married	0.540 ^c (0.052)
Dummy variable for businesses	0.088 (0.064)
Household income	0.000 ^a (0.000)
Constant	-2.134 ^c (0.470)

Table 14 (cont.)

	Ordinary least squares	Two-stage least squares	Tobit model	Tobit model with instrumental variables
Observations	2,774	2,637	2,774	2,774
Uncensored observations			1,710	1,710
Censored observations on the left			902	902
Censored observations on the right			162	162
P-value	0	0	0	1.1e-289
R ²	0.42257	0.42295		
Adjusted R ²	0.42132	0.42164		

Note: ^a p-value < 0.10, ^b p-value < 0.05, ^c p-value < 0.01

as tenure. These results support the hypothesis of Licandro (2016) as regards the role of the pricing system and public communication in the persistence of dollarization in Uruguay.

4. CONCLUSIONS

In this empirical study, we pursued the factors that determine the financial and cultural dollarization of households in Uruguay. We mainly focus on aspects such as the denomination currency of assets and liabilities, as well as households' income and expenditure flows. Besides analyzing the size of the share of household assets denominated in dollars, mostly bank savings, we also study factors associated with the fact that Uruguayan households think in dollars, even in cases where such behavior is unjustified from a financial point of view. We find that the level of dollarization of bank savings is mainly explained by the size of the savings and household wealth. In particular, the savings of female household heads display higher dollarization. We also find that our proxy variable for cultural dollarization is associated with wealth and home ownership. Other factors that influence cultural dollarization are age and years of formal education, which are positively and significantly correlated with the use of the dollar as a unit of account and asset valuation. Meanwhile, larger households are less culturally dollarized. We understand that the weight of real assets in wealth, and of these in dollarization and cultural dollarization, suggests that the dollarization of high-value assets prices in Uruguay (housing and automobiles) is a key factor explaining cultural dollarization. Moreover, all the factors reinforcing the idea that large amounts should be communicated in dollars would contribute to deepening cultural dollarization.

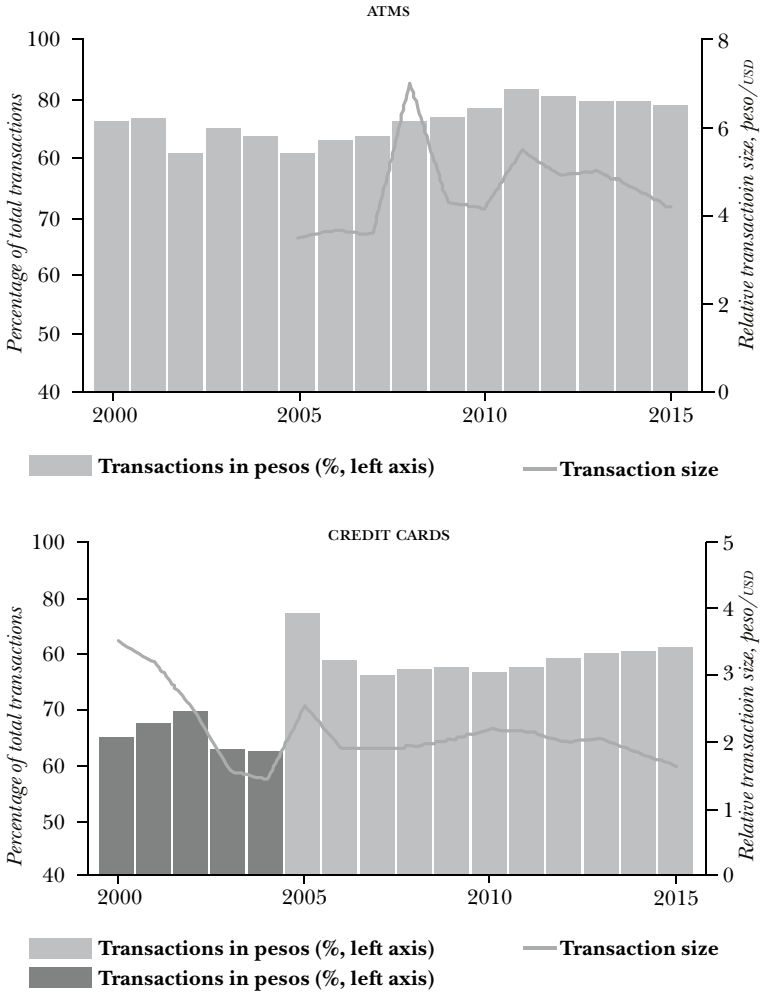
The results of this paper support those of Licandro (2016) in the sense that it demonstrates how the state should have a specific policy to combat cultural dollarization if it wishes to progress with the development of a domestic financial system in local currency that provides the necessary exchange and liquidity insurances for preserving financial stability. The most important measures requiring consideration are the complete de-dollarization of public communication and incentives, as well as Peru's experience in matters of de-dollarizing the pricing system already suggested in Licandro and Licandro (2004). This study proposes assigning a role to financial education and public communication policies.

ANNEX

Annex 1. Figures

Figure A.1

GROWING PARTICIPATION OF URUGUAYAN PESOS IN TRANSACTIONS



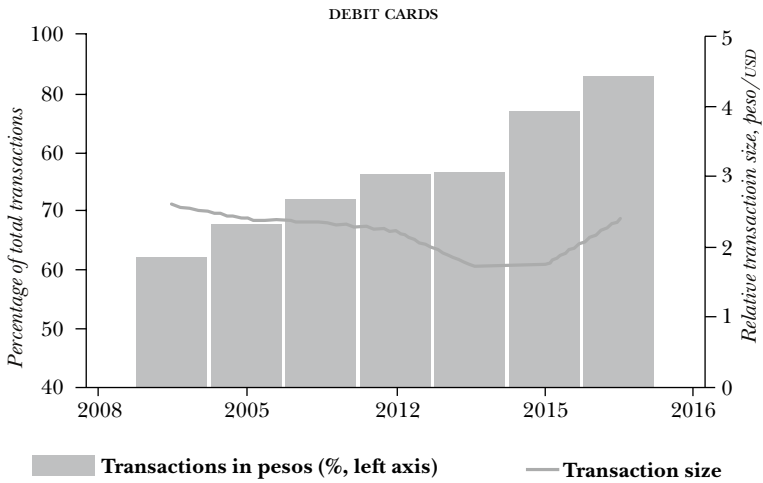
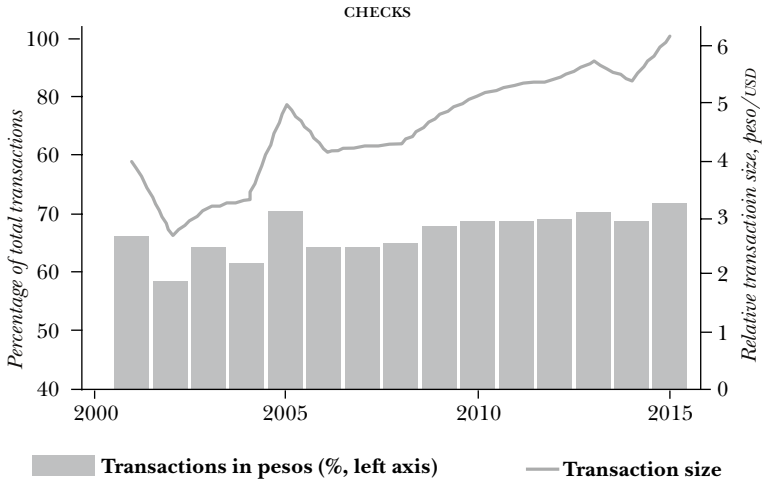
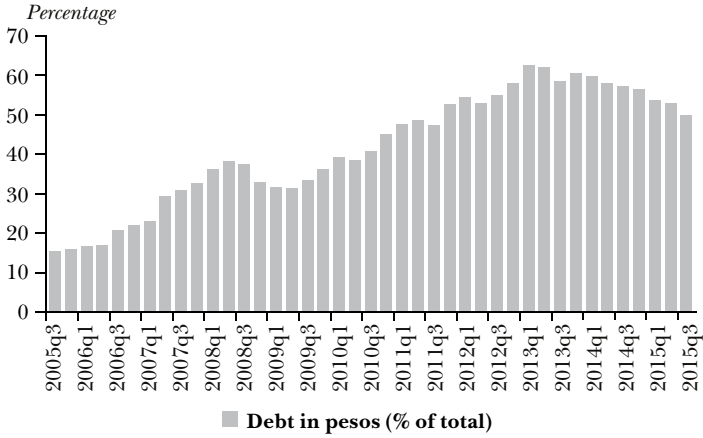


Figure A.2

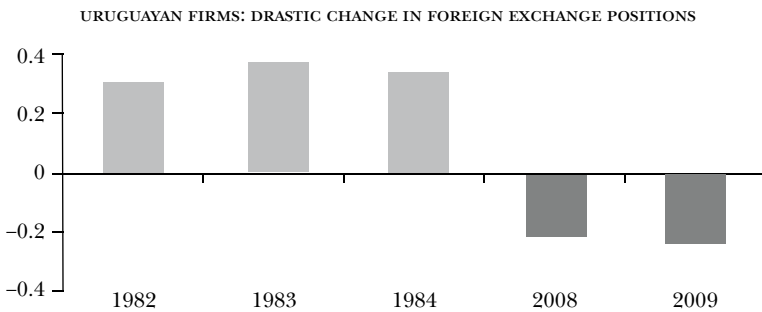
PUBLIC DEBT DEDOLLARIZATION



Source: BCU.

Figure A.3

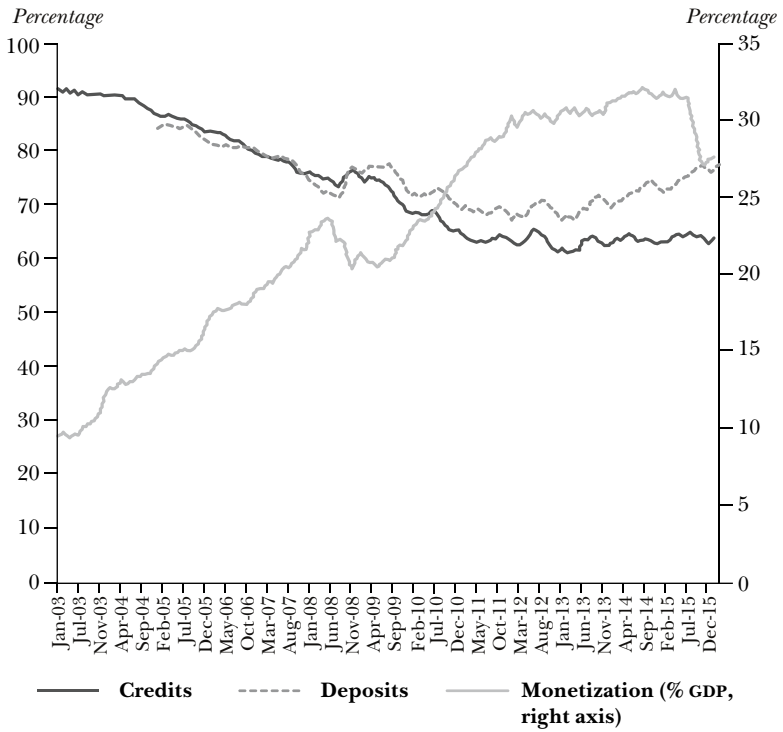
URUGUAYAN FIRMS: REDUCTION IN CURRENCY MISMATCHES



Source: INE.

Figure A.4

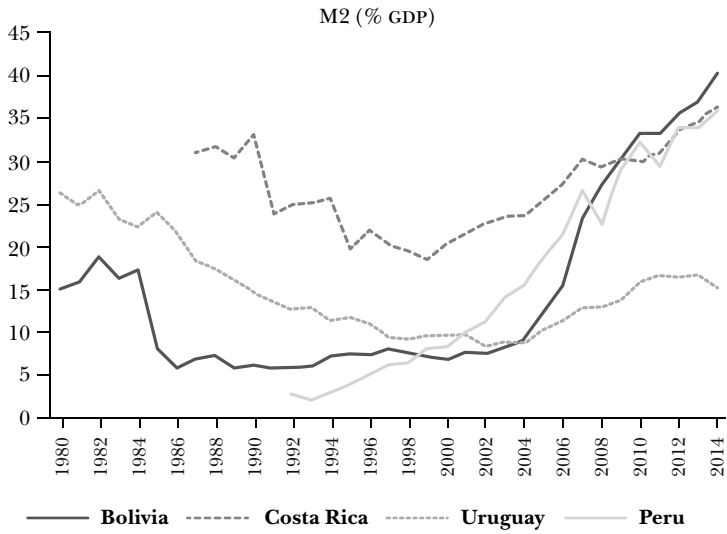
URUGUAY: MONETIZATION AND DOLLARIZATION OF DEPOSITS AND CREDITS



Source: BCU.

Figure A.5

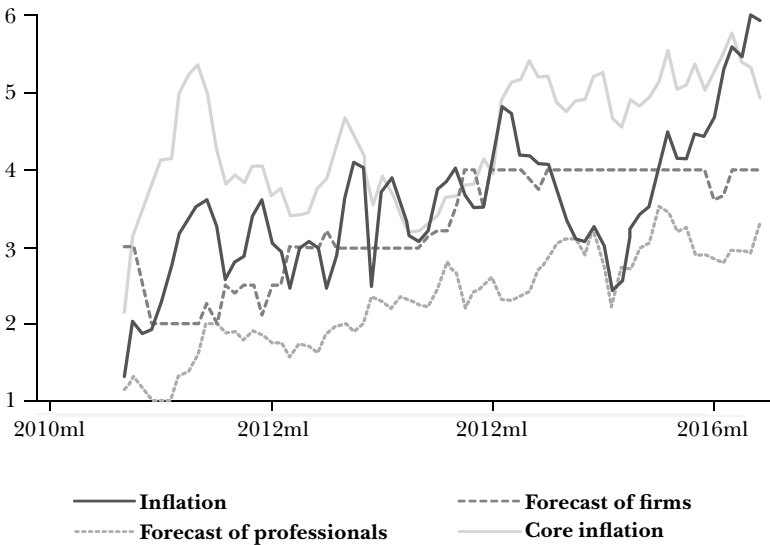
MONETIZATION IN SELECTED COUNTRIES



Source: Own calculations based on IMF data.

Figure A.6

URUGUAY: DISACHORING OF INFLATION AND EXPECTATIONS



Source: Borraz and Orlik (2016).

Annex 2. Main Moments of the Complete sample and Filtered sample of Variables Reported by Respondents

DOLLARIZATION OF BANK SAVING

	<i>Complete sample</i>	<i>Filtered sample</i>
Mean	50.276	51.094
Median	43.075	43.060
Standard deviation	42.909	42.980
Minimum	0	0
Maximum	100	100
Observations	689	616

WEIGHTING OF BANK SAVING

	<i>Complete sample</i>	<i>Filtered sample</i>
Mean	42.429	43.300
Median	30	30
Standard deviation	42.934	43.150
Minimum	0	0
Maximum	100	100
Observations	688	616

EXPENDITURE ON FOOD

	<i>Complete sample</i>	<i>Filtered sample</i>
Mean	11,678	11,865
Median	9,560	9,800
Standard deviation	8,335	8,367
Minimum	0	0
Maximum	80,000	80,000
Observations	3,264	2,844

REPORTED INCOME		
	<i>Complete sample</i>	<i>Filtered sample</i>
Mean	37,002	37,779
Median	28,900	29,600
Standard deviation	47,048.72	41,858.92
Minimum	0	0
Maximum	1,000,000	1,000,000
Observations	3,252	2,993

Annex 3. Dollarization of Respondents' Asset Valuation

	<i>Dummy variable for housing valued in USD</i>			<i>Dummy variable for other real estate valued in USD</i>	
	<i>Frequency</i>	<i>Percentage</i>		<i>Frequency</i>	<i>Percentage</i>
0	75	4.56	0	3	2.22
1	1,568	95.44	1	132	97.78
Total	1,643	100	Total	135	100

	<i>Dummy variable for automobiles valued in USD</i>			<i>Dummy variable for motorcycles valued in USD</i>	
	<i>Frequency</i>	<i>Percentage</i>		<i>Frequency</i>	<i>Percentage</i>
0	34	2.68	0	9	22.50
1	1,234	97.32	1	31	77.50
Total	1,268	100	Total	40	100

	<i>Dummy variable for jewelry valued in USD</i>			<i>Dummy variable for livestock valued in USD</i>	
	<i>Frequency</i>	<i>Percentage</i>		<i>Frequency</i>	<i>Percentage</i>
0	21	27.27	0	20	28.57
1	56	72.73	1	50	71.43
Total	77	100	Total	70	100

	<i>Dummy variable for bank savings denominated in USD</i>			<i>Dummy variable for household appliances valued in USD</i>	
	<i>Frequency</i>	<i>Percentage</i>		<i>Frequency</i>	<i>Percentage</i>
0	162	30.06	0	1,523	64.34
1	377	69.94	1	844	35.66
Total	539	100	Total	2,367	100

Note: Zero indicates valuation in pesos, and one in dollars.

Annex 4. Dollarization of Bank Savings Models

<i>Variable</i>	<i>Observations</i>	<i>Mean</i>	<i>Standard deviation</i>	<i>Minimum</i>	<i>Maximum</i>
Age of household head	2,993	52.794	16.225	8	101
Education of household head	2,993	10.599	4.117	1	20
Dummy variable for housing	2,993	0.566	0.496	0	1
Number of household members	2,993	3.006	1.635	1	15
Female	2,993	0.602	0.490	0	1
Dummy variable for married or in union	2,993	0.586	0.493	0	1
Household income	2,993	1,888.960	2,092.95	0	50,000
Total household income including flows from businesses	2,993	2,096.530	2,611.37	0	60,000
Total income, in logs	2,993	7.205	1.271	0	11.002
Value of all real assets	2,993	72,480.1	151,793	0	4.0e+06
Real assets, in logs	2,993	9.591	2.373	0	15.202
Real assets other than housing, in logs	2821	8.023	1.604	1.609	13.361
Total wealth, in logs	2785	9.876	2.211	1.609	16.309
Transaction accounts	2,993	0.987	1.325	0	12
Credit cards	2,993	1.451	1.732	0	20
Dummy variable for owning credit cards	2,993	0.630	0.483	0	1
Credit card debt	2,993	29.158	154.331	0	2,900
Reported financial restriction	2,993	10.992	20.117	0	105
Bank savings, in logs	475	8.878	1.606	1.504	12.707
Percentage of bank savings denominated in USD	619	51.053	43.040	0	100
Dollarization of real assets	2,993	61.878	44.152	0	100
Education plus income, in logs	2,936	9.609	1.104	4.652	13.567
Education plus age, in logs	2,993	6.178	0.506	3.091	7.305
Income plus age, in logs	2,936	11.258	0.834	7.920	15.319

References

- Achugar, J. A., I. Pérez Volpe, and S. Rondeau (2004), *Dolarización bancaria en el Uruguay: un ejercicio de simulación de medidas regulatorias para reducirla*, tesis para obtener el título de licenciado en Economía de la Facultad de Ciencias Económicas y de Administración de la Universidad de la República Oriental del Uruguay, 169 p.
- Bohn, H. (1990), “Tax Smoothing with Financial Instruments”, *American Economic Review*, vol. 80, núm. 5, diciembre, pp. 1217-1230, < <http://www.jstor.org/stable/2006771>>.
- Calvo, G., and P. Guidotti (1990), “Indexation and Maturity of Government Bonds: An Exploratory Model”, en R. Dornbusch, y M. Draghi (eds.), *Capital Markets and Debt Management*, New York University Press.
- Catão, L. A. V., and M. E. Terrones (2016), “Dollar Dependence”, *Finance and Development*, vol. 53, núm. 3, septiembre, pp. 48-51, < <http://www.imf.org/external/pubs/ft/fandd/2016/09/pdf/catao.pdf>>.
- De Brun, J., and G. Licandro (2005), “To Hell and Back-Crisis Management in a Dollarized Economy: The Case of Uruguay”, en A. Armas, A. Ize y E. Levy-Yeyati (eds.), *Financial Dollarization: The Policy Agenda*, cap. 7, pp. 147-176, Springer.
- Encuesta Financiera de Hogares (2013), <<http://cienciasociales.edu.uy/departamentodeeconomia/efhu-acceso-a-datos/>>.
- Goldfajn, I. (1997), *Public Debt Indexation and Denomination: The Case of Brazil*, mimeo, presentado en la conferencia “Indexation, Inflation and Monetary Policy”, del Banco Central de Chile, agosto.
- Güenaga, M., S. Hernández, and F. Rovira (2004), *El financiamiento de la vivienda en el Uruguay y la determinación del costo para la sociedad por medio del estudio del Banco Hipotecario del Uruguay*, tesis de grado para obtener el título de licenciado en Economía de la Facultad de Ciencias Económicas y de Administración de la Universidad de la República Oriental del Uruguay, 195 p.
- Heckman, J. J. (1979), “Sample Selection Bias as a Specification Error”, *Econometrica*, vol. 47, núm. 1, pp. 153-161, enero, < <http://www.jstor.org/stable/1912352>>.

- Licandro, G. (2003), “Lecciones de la experiencia del régimen de bandas en Uruguay”, Banco Central de Venezuela, *Revista Foros*, núm. 8, pp. 155-175.
- Licandro, G. (2016), *Dolarización del sistema de precios y la comunicación pública en Uruguay*, mimeo.
- Licandro, G., and J. A. Licandro (2003), “Building the Dedollarization Agenda: Lessons from the Uruguayan Case”, *Money Affairs*, Centro de Estudios Monetarios Latinoamericanos, vol. XVI, núm. 2, pp. 193-218, julio-diciembre, <http://www.cemla.org/PDF/moneyaffairs/pub_monaff_XVI_02.pdf>.
- Licandro, G., and J. A. Licandro (2004), *Una agenda de reformas para el sistema financiero uruguayo*, Universidad de la República, Facultad de Ciencias Sociales, Departamento de Economía y Universidad para la Paz,
- Licandro, G., and A. Masoller (2000), “La composición óptima por monedas de la deuda pública uruguaya”, *Revista de Economía del Banco Central del Uruguay*, vol. VII, núm. 2, noviembre, pp. 135-180.
- Licandro, G., and M. Mello (2012), *Canal de hojas de balance en Uruguay: ¿Acelerador financiero, freno o ambos?*, Documento de trabajo del Banco Central del Uruguay, núm. 2012/015, 37 p. <http://www.bcu.gub.uy/Comunicaciones/Jornadas%20de%20Economía/t_licandro_gerardo_2013.pdf>.
- Mello, M. (2009), “Estimación de economías de escala y alcance para el sistema bancario uruguayo con datos de panel”, *Revista de Economía del Banco Central del Uruguay*, vol. 16, núm. 2, noviembre, pp. 185-218.
- Rousseau, P. L., and P. Wachtel (2002), “Inflation Thresholds and the Finance-growth Nexus”, *Journal of International Money and Finance*, vol. 21, núm. 6, noviembre, pp. 777-793, <[https://doi.org/10.1016/S0261-5606\(02\)00022-0](https://doi.org/10.1016/S0261-5606(02)00022-0)>.
- Tealde, E. (2007), *Subsidios cruzados en el mercado de crédito*, tesis de grado para obtener el título de licenciado en Economía, Facultad de Ciencias Empresariales, Universidad Católica del Uruguay Dámaso Antonio Larrañaga.
- Tobin, J. (1958), “Estimation of Relationships for Limited Dependent Variables”, *Econometrica*, vol. 26, núm. 1, enero, pp. 24-36, <<http://www.jstor.org/stable/1907382>>.

