Financial dollarization in Argentina: historical perspective and analytical approaches

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BANCO CENTRAL
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Outline

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2 | Dollarization in historical perspective

3 | Real returns and store of value

4 | Analytical exercises: basic portfolio approach, ambiguity aversion

5 | Concluding remarks

Note: all views are the presenters' own and do not necessarily represent those of the Central Bank of Argentina

1 | Motivation

-Focus: **dollarization process of Argentine non-bank private sector' assets**.

-Driver: **deterioration of store of value role** experienced by the local currency.

-Process began in the early 1940s, had two clearly identifiable stages:

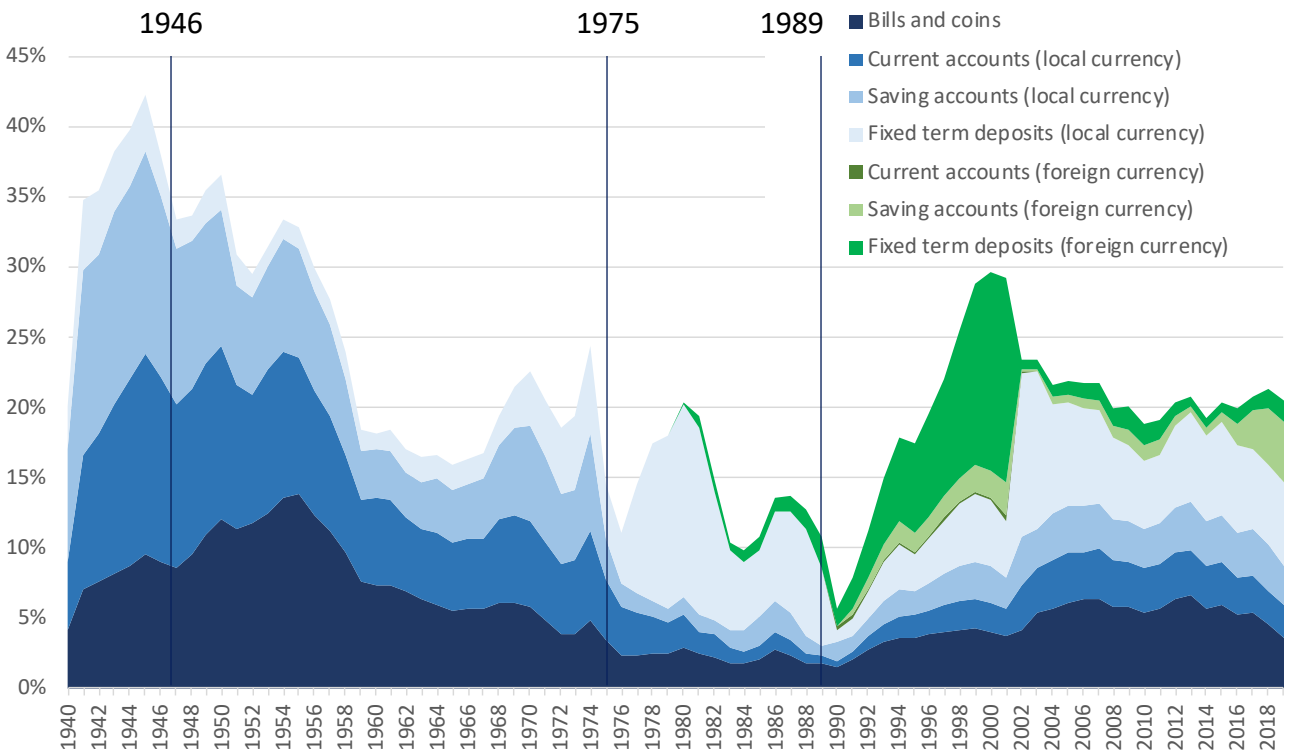
-Mid-1940s to mid-1970s: financial repression, growing inflation. Lower real returns of the main stores of value in local currency.

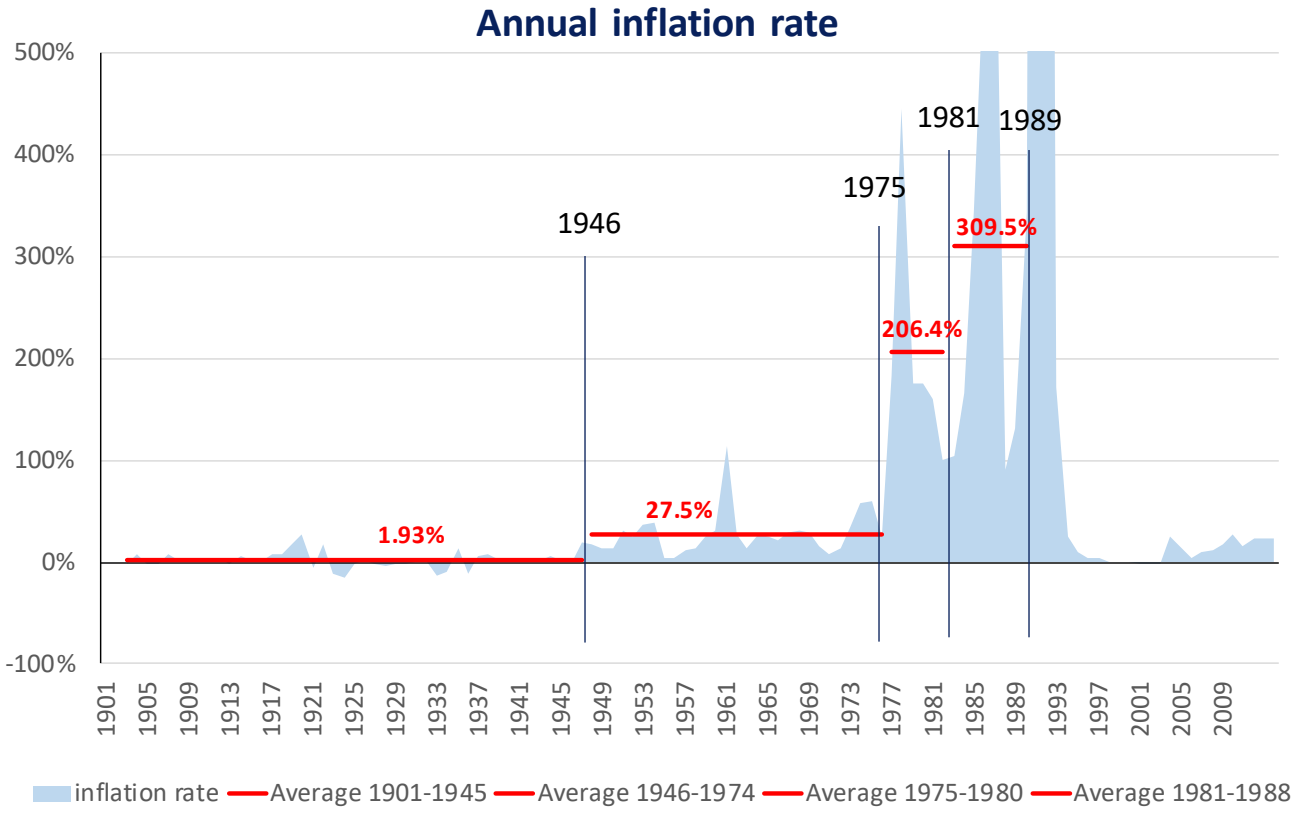
-Mid-1970s-early 2000s. Extreme macroeconomic volatility (disruptive currency shocks, two hyperinflation process), successive changes in institutional monetary and exchange arrangements.

-Based on Corso et al (2013), Corso (2015), Corso and Della Paolera (2020)

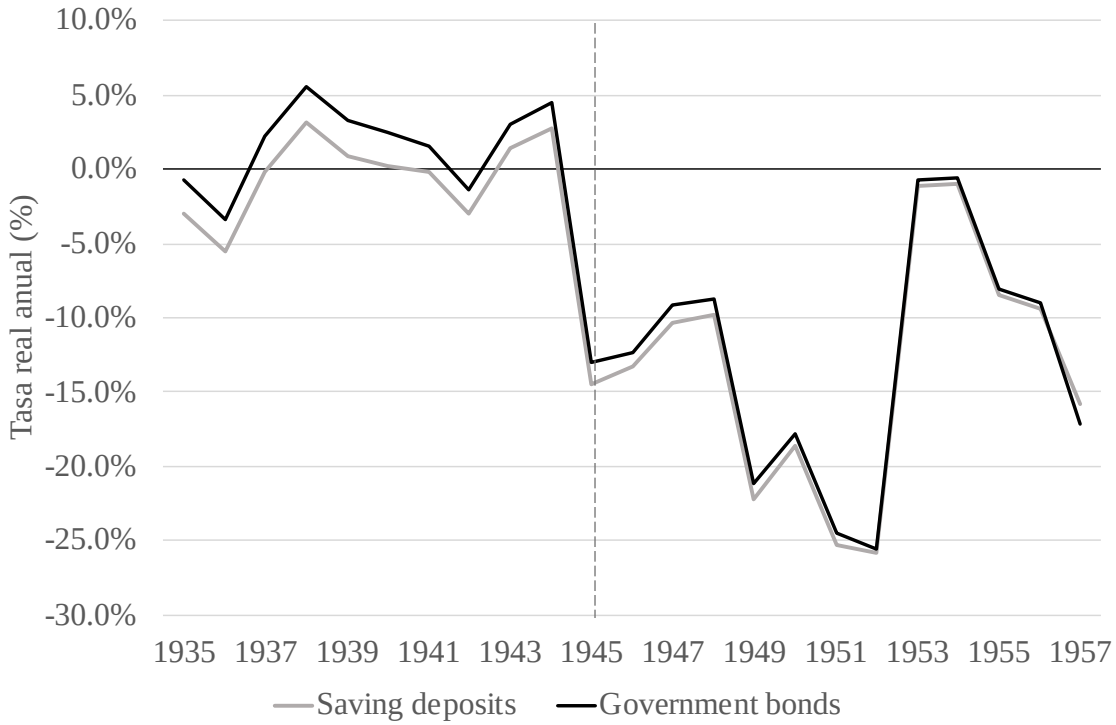
2 | Dollarization in historical perspective

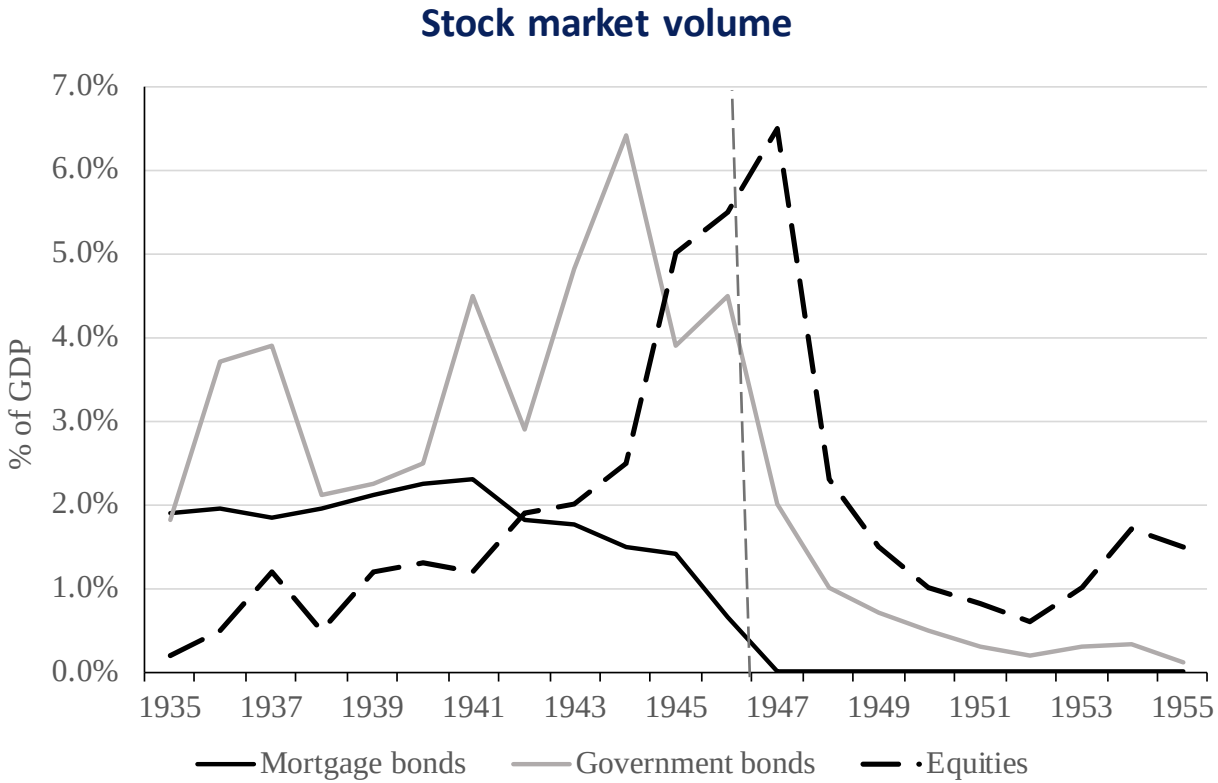
Broad money - private (% GDP)




Annual inflation rate
500%
400%
300%
200%
100%
0%
-100%
1946
1975
1981
1989
309.5%
206.4%
27.5%
1.93%
1901
1905
1909
1913
1917
1921
1925
1929
1933
1937
1941
1945
1949
1953
1957
1961
1965
1969
1973
1977
1981
1985
1989
1993
1997
2001
2005
2009
inflation rate
Average 1901-1945
Average 1946-1974
Average 1975-1980
Average 1981-1988

Real returns in local currency deposits and government bonds




Stock market volume
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
% of GDP
1935
1937
1939
1941
1943
1945
1947
1949
1951
1953
1955
Mortgage bonds
Government bonds
Equities

Financial assets of private sector (non banks) 1941

Financial Assets	Nominal value		
	Local currency (Millon)	Share of total assets	% of GDP
Bills and coins	1147	14.4%	7.1%
Deposits	4058.9	51.1%	25.2%
Current accounts	1543.5	19.4%	9.6%
Saving accounts	2125.1	26.8%	13.2%
Time deposits	390.3	4.9%	2.4%
Government bonds	1325.9	16.7%	8.2%
Mortgage bonds	1300.2	16.4%	8.1%
Equities	112	1.4%	0.7%
Total	7944	100.0%	49.3%

Source: Corso, E. A. (2015)

Financial assets of non bank private sector — Sept. 2020

	$ Millions	US$ Millions	% of total financial assets	% of GDP
External assets	**25611863**	**336224**	**67.3%**	**88.4%**
Direct investment	3020567	39653	7.9%	10.4%
Portfolio investment	5036920	66123	13.2%	17.4%
Other	17554376	230448	46.1%	60.6%
Domestic deposits	**5680412**	**74571**	**14.9%**	**19.6%**
Denominated in foreign currency	1229465	16140	3.2%	4.2%
Denominated in local foreign currency	4450947	58431	11.7%	15.4%
Bills and Coins	**1488467**	**19540**	**3.9%**	**5.1%**
Government bonds	**2337385**	**30684**	**6.1%**	**8.1%**
Denominated in foreign currency	1121945	14729	2.9%	3.9%
Denominated in local currency	1215440	15956	3.2%	4.2%
Equities	**2925984**	**38411**	**7.7%**	**10.1%**
Total	**38044110**	**499430**	**100.0%**	**131.3%**

Assets of non bank private sector — Dic. 2012

Assets	MM, in us$	% delGDP	% of total assets
Total assets considered	**600.9**	**193.5%**	**100.0%**
Real estate	**283.4**	**91.2%**	**47.2%**
Domestic	274.3	88.3%	45.7%
Abroad	9.0	2.9%	1.5%
Financial Assets	**317.6**	**102.2%**	**52.8%**
Domestic	124.0	39.9%	20.6%
Bills and Coins	29.4	9.5%	4.9%
Deposits	60.4	19.5%	10.1%
in Arg. $	54.9	17.7%	9.1%
in US$	5.6	1.8%	0.9%
Equity	34.3	11.0%	5.7%
External assets (incl. out of system)	193.5	62.3%	32.2%
Portfolio	170.6	54.9%	28.4%
Others	22.9	7.4%	3.8%

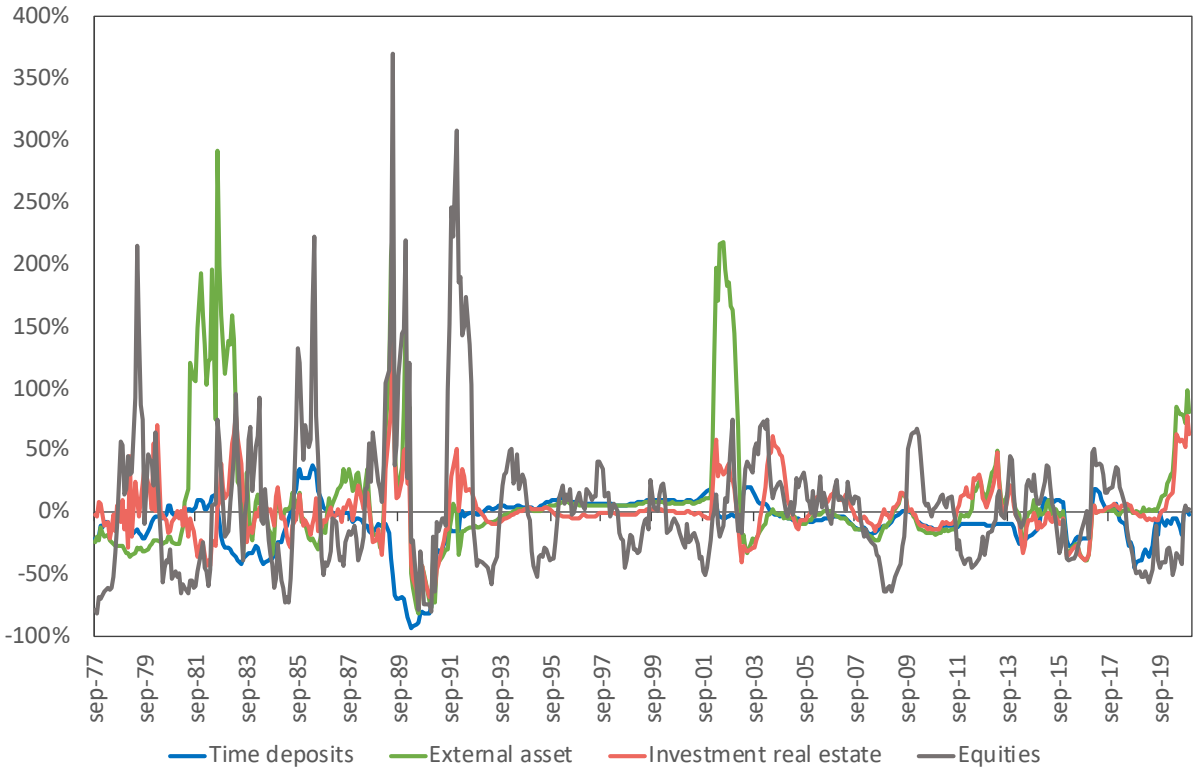
Source: Corso, E. A. (2015)

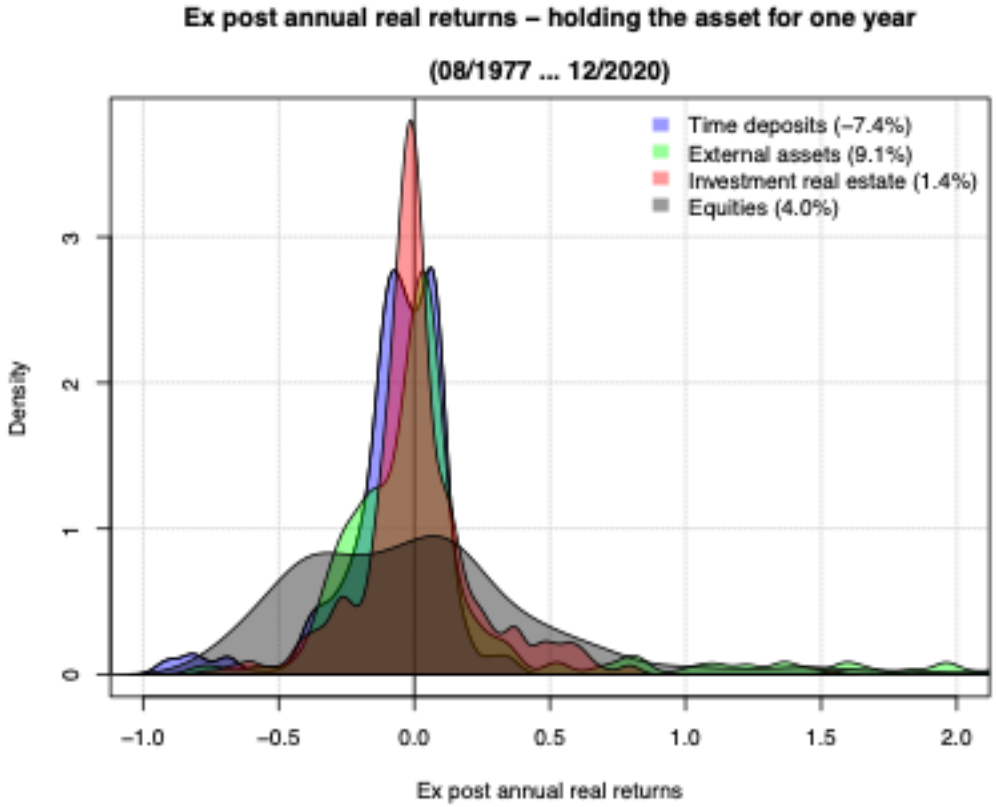
Assets	MM, in us$	% delGDP	% of total assets
Total assets considered	**600.9**	**193.5%**	**100.0%**
Domestic real estate	274.3	88.3%	45.7%
Equity	34.3	11.0%	5.7%
External assets (incl. out of system) + local deposits in us$	208.1	67.0%	34.6%
Cash + Total deposits in local currency (M3)	84.2	27.1%	14.0%

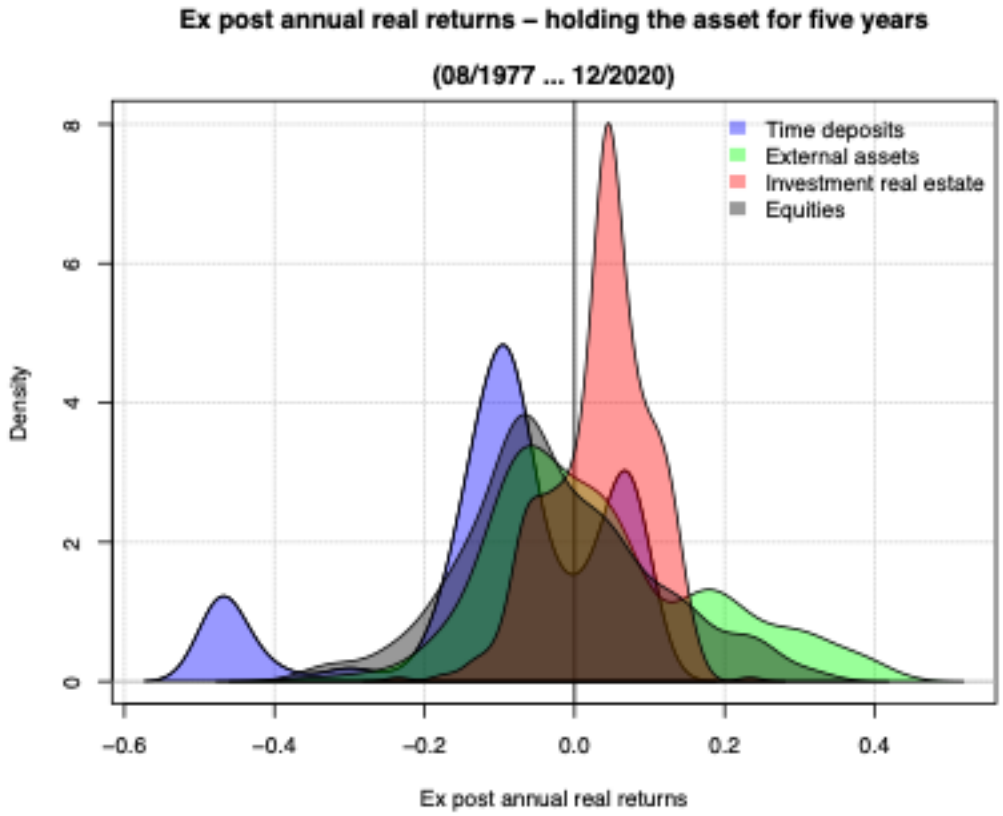
Source: Corso, E. A. (2015)

3 | Real returns and stores of value

Ex post annual real return (period of holding 1 year)




Ex post annual real returns – holding the asset for one year
(08/1977 ... 12/2020)
Time deposits (–7.4%)
External assets (9.1%)
Investment real estate (1.4%)
Equities (4.0%)
Density
0
1
2
3
–1.0
–0.5
0.0
0.5
1.0
1.5
2.0
Ex post annual real returns


Ex post annual real returns – holding the asset for five years
(08/1977 ... 12/2020)
Time deposits
External assets
Investment real estate
Equities
Density
0
2
4
6
8
−0.6
−0.4
−0.2
0.0
0.2
0.4
Ex post annual real returns

4 | Analytical exercises

1. The first exercise consists of carrying out a basic exercise of optimal portfolio selection based on the unconditional distribution of the ex post real returns for the period 1976-2012.
2. This is a static exercise, in which a representative private agent assigns its optimal portfolio for a given forecast horizon, based on the direct maximization of expected utility. We will assume that this agent forms expectations based on the empirical distribution corresponding to the period 1976-2012.
3. The exercises presented in the table assume complete divisibility of asset holdings and the absence of rebalancing costs.
4. The table shows the results obtained for different holding periods.
5. As can be seen, for all holding periods greater than one year, the demand for investment real state strictly dominates the remaining stores of value.
6. In the case of the one-year holding period, real estate assets and external assets are the main store of value in the portfolio of the represented agent.
7. Two elements deserve to be particularly highlighted. First, the higher the risk aversion, the greater the share of real estate assets in the portfolio. Second, time deposits denominated in local currency are not part of the optimal portfolio.
8. From the perspective of the portfolio approach, it will be necessary to assume rebalancing costs in order to obtain that time deposits denominated in local currency can be part of the optimal asset holdings.
9. We then carry out the same portfolio allocation exercise again, but assuming rebalancing costs. The rebalancing cost vector was calibrated, based on the characteristics of the assets considered.

Portfolio demands (without transaction costs)

Holding period (HP) = 1 year	Relative risk aversion coefficient			
	1	2	3	4
Time deposit	0.0000	0.0000	0.0000	0.0000
External asset	0.6377	0.3840	0.2972	0.2449
Investment real state	0.1151	0.4724	0.5881	0.6520
Equities	0.2473	0.1436	0.1147	0.1030

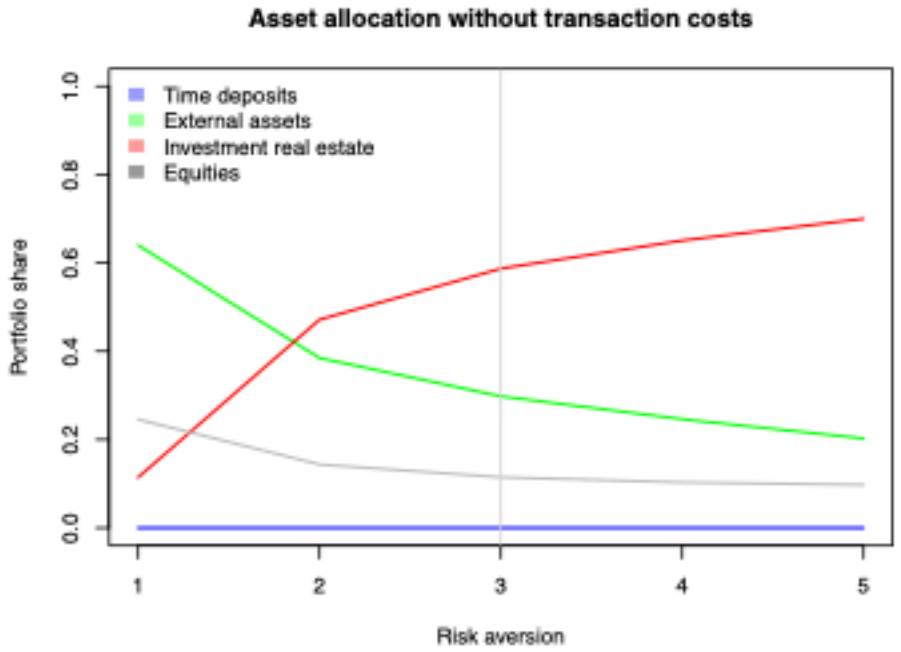
Holding period (HP) = 5 years	Relative risk aversion coefficient			
	1	2	3	4
Time deposit	0.0000	0.0000	0.0000	0.0000
External asset	0.2382	0.0960	0.0443	0.0000
Investment real state	0.7618	0.9040	0.9557	1.0000
Equities	0.0000	0.0000	0.0000	0.0000

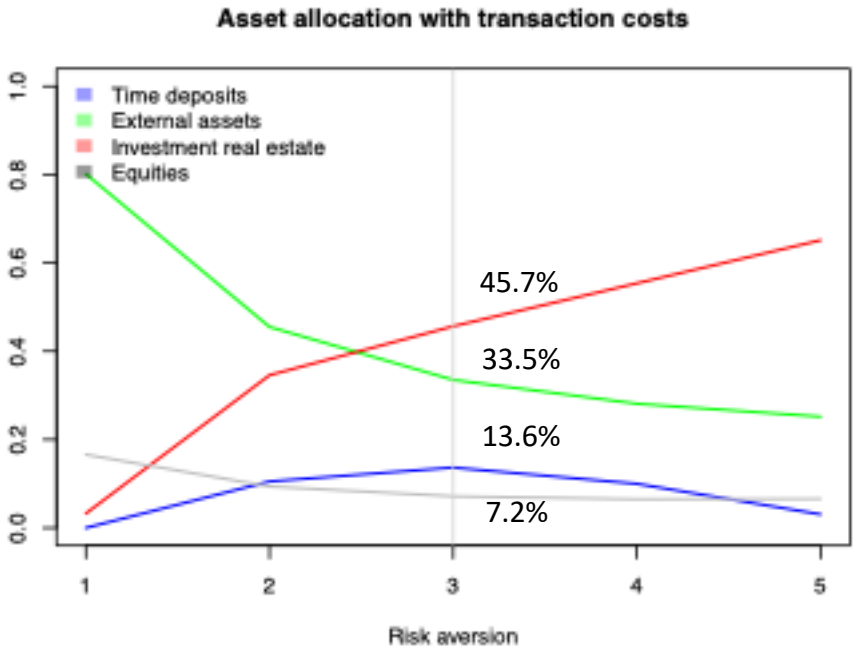
Holding period (HP) = 10 years	Relative risk aversion coefficient			
	1	2	3	4
Time deposit	0.0000	0.0000	0.0000	0.0000
External asset	0.0000	0.0000	0.0000	0.0000
Investment real state	1.0000	1.0000	1.0000	1.0000
Equities	0.0000	0.0000	0.0000	0.0000

Holding period (HP) = 20 years	Relative risk aversion coefficient			
	1	2	3	4
Time deposit	0.0000	0.0000	0.0000	0.0000
External asset	0.0000	0.0000	0.0000	0.0000
Investment real state	1.0000	1.0000	1.0000	1.0000
Equities	0.0000	0.0000	0.0000	0.0000

1. The following graphs compare the optimal holdings obtained with and without transaction costs for a one-year holding horizon. It is important to remember that this is not an econometric exercise. The objective of calibrating a rebalancing cost vector is to show that conditional to the empirical distribution considered, it is the only way to obtain optimal demands for time deposits denominated in local currency.
2. With regard to the characteristics of the store of value in Argentina, there is an additional aspect that deserves to be highlighted. The recurrence with which changes have occurred in the monetary and exchange regimes throughout the country's economic history may not be neutral. Indeed, it can be an additional element when rationalizing the characteristics of the assets demanded.
3. We will represent this aspect using preferences that contemplate aversion to ambiguity. By ambiguity, we refer to the fact that the agent must decide his optimal portfolio allocation without knowing which probability distribution will effectively govern the behavior of returns for the holding period considered. In this case, to determine his portfolio allocation, the agent will assign subjective probabilities on each of the probability distributions considered feasible (each element of set M -of feasible distributions-). Under ambiguity aversion, the optimal portfolio will differ from that obtained under a portfolio problem that considers subjective second-order probabilities. The aversion for ambiguity penalizes those subjective distributions that differ the most from the rest of the distributions considered in the set M. In other words, the greater the ambiguity aversion, the greater the demand for those assets whose distribution of returns shows less changes between the different monetary - exchange regimes contemplated in the set of subjective distributions M. Investment real estate show this characteristic.
4. Indeed, as we have seen in the graphs corresponding to the unconditional empirical distributions (for the entire sample period), the real returns of real estate assets concentrate their probability mass in a smaller domain of real returns than the rest of the assets. considered.

Empirical distribution 08/1977 – 12/2012 – Holding the assets for one year

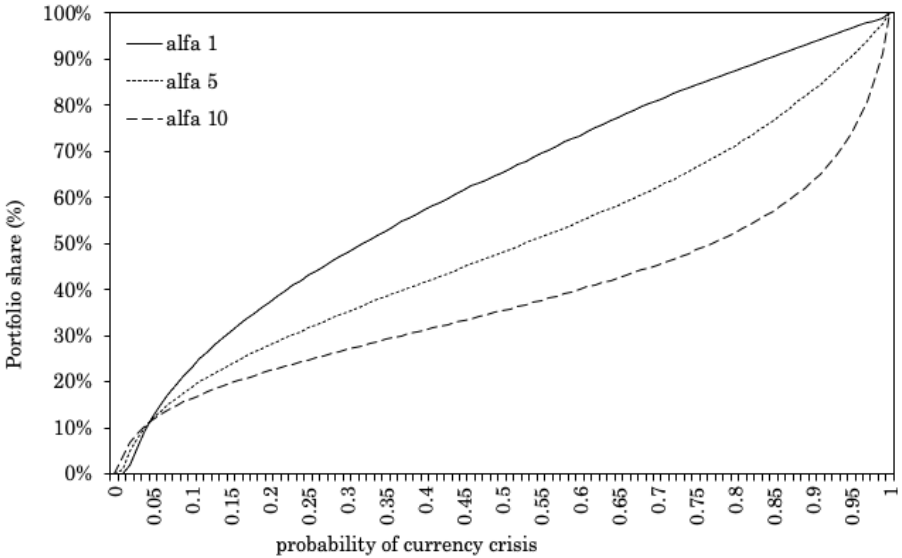




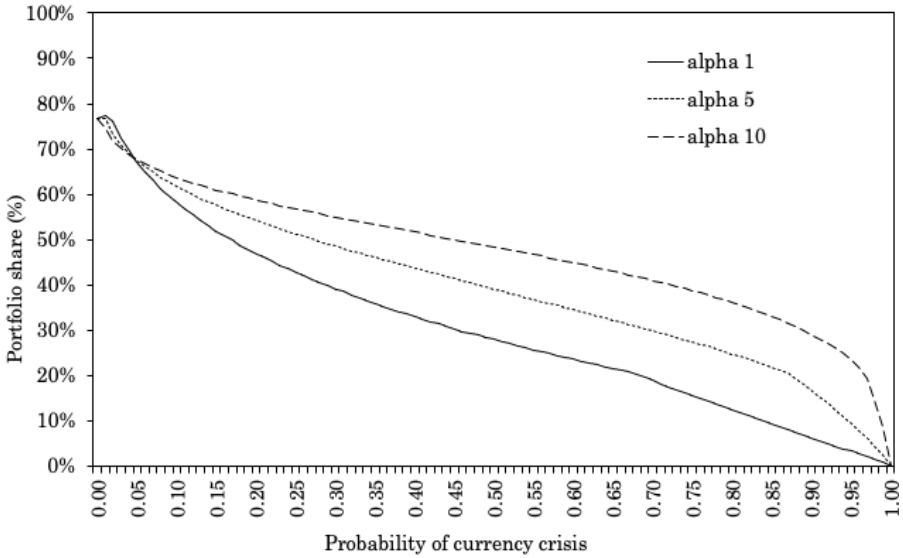
Aternative empirical distributions (elements of set M)	Time deposits (local currency) (a) (%)	External assets (US dollars) (b) (%)	Investment real estate (%)	Equities (%)
January 1981/December 1983 (prototypical currency crisis)				
Mean	-12.23%	89.54%	0.14%	-10.03%
Median	-1.87%	109.83%	-7.89%	-16.93%
Standard deviation	19.07%	79.83%	31.72%	46.89%
January 2003/December 2012 (current period)				
Mean	-5.48%	-3.45%	2.01%	2.33%
Median	-6.67%	-5.40%	-1.19%	6.14%
Standard deviation	7.86%	16.00%	18.18%	32.92%

Source: Central Bank of Argentina and Federal Reserve System.
Notes: (a) Domestic term deposits in local currency. 30/59 days.
(b) Market yield on US Treasury securities at 1 year constant maturity.

Optimal demand for external assets
(denominated in US dollars)



Optimal demand for investment real estate



5 | Concluding remarks

Conclusion

- Based on our historical analysis, we can identify two central elements behind the asset dollarization of the Argentine non-bank private sector.

- The first, is the inflationary history of the economy. This constitutes a central element in the initial stage of the dollarization process. In fact, the significant reduction in financial intermediation observed between the mid-1940s and early 1970s did not require particularly disruptive events. An average inflation rate of the order of 22% per year was sufficient, with nominal returns on the reserves of value in local currency, below it.

- The second element is the recurrence with which high-magnitude currency crises were observed.

- The recurrence of these shocks implied that the evolution of the exchange rate becomes a central variable for the dynamics of the contractual structure of the economy.

- The dollarization of the private sector portfolio arose as part of a set of adaptive behaviors of agents exposed to a persistent inflationary environment and recurring exchange rate shocks.

- Conventional portfolio theory is a useful framework for rationalizing value reserve decisions in Argentina. As we have seen throughout the presentation, the empirical distribution of real returns has a lot to tell us about the underlying reasons behind the Argentines' reserves of value.
  - Using the empirical distribution of real returns for 1977-2012, dollar-denominated assets and investment real estate are chosen as the main stores of value in a conventional portfolio decision exercise. Additionally, the demand for time deposits denominated in local currency are part of the optimal portfolio only in the presence of transaction costs.
- Finally, adding preferences that contemplate ambiguity aversion to our analytical framework is useful to rationalize the choice of non-financial stores of value.
  - Under the assumption of preferences that contemplate ambiguity aversion, dollar-denominated assets and investment real estate continue to be demanded as the main stores of value. However, investment real estate has a characteristic that makes it particularly attractive. The empirical distribution of their returns is relatively stable under alternative monetary and exchange rate schemes.
- Caveat: partial equilibrium.

Thank you!