ASYMMETRIC MONETARY UNION AND REAL VOLATILITY. THE CASE OF ARGENTINA*

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Abstract*: This study gives a non-traditional framework for the evaluation of the convenience of an asymmetric monetary association (such as dollarization), from the point of view of the country that gives up its monetary sovereignty.*

In the analytical part we discuss the relationship between nominal volatility, real volatility and country risk. Given the social loss function of the policymaker, we determine the necessary conditions for dollarization to improve social welfare. We concentrate in the analysis of two main aspects: 1) the degree of synchronization existing between the cycle of the leader and associated country, and 2) the effect and relative importance of the trade and financial channels.

We perform an application of our analytical framework to the case of Argentina using the coefficient of cyclical correlation, calculated for four different methodologies. The effect and relative importance of the financial channel and the trade channel were extracted from the impulse-response functions and variance decompositions of a VEC Model. JEL Classification: C5, F3

In a sequence of different paper we address the numerous effects of an asymmetric monetary union between a big country an a normal one. In some of them we discuss a general framework based on a game theory approach Carrera (1995) and Carrera and Lavarello (1995) and in others we discuss from a point of view of an optimal currency area (OCA), Carrera (1999), Carrera, Féliz and Panigo (1999), Carrera and Sturzenegger (2000). Using a game theory approach we demonstrated the conditions under which these association is welfare improving for each type of countries, using the OCA theory approach we evaluate cost and benefit of such arrangement.

In this paper a crucial rol are played by the exchange rate regime the symmetry of shocks, and the channels of shocks transmission We want to focus on the rol of exchange rate regime and, specifically, in the transmission of shock in an asymmetric monetary union (as dollarization) affects the real volatility.

We focus our analysis on the relationship between dollarization and volatility. We show how recent literature has attributed importance mainly to nominal volatility, like the case of excessive nominal volatility caused by central bank's discretionary policy (political shocks), or the nominal volatility needed for nominal contracts to work as a mechanism of hedging against economic shocks. We introduce the effects of real volatility and its direct influence on country risk. While dollarization directly reduces the risk of devaluation, its effects on the country risk are ambiguous. To make a precise statement with respect to the final effect of dollarization in financial terms, we must find out the sign and magnitude of its effect on the real volatility of the economy and thus on country risk.

In the analytical part of the paper we discuss the concepts of real and nominal volatility, the behavior of the channels of transmission of external shocks and the relationship between real volatility and country risk. We define the objective function of the policymaker and establish the necessary conditions for dollarization to reduce the aggregate risk (that is, the sum of devaluation risk plus country risk).

In the empirical section we apply this analytical framework to the case of Argentina. To estimate the association of the business cycles we use coefficients of cyclical correlation

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calculated from four different de-trending methodologies. The effect and relative magnitude of the financial and trade channels were extracted from the impulse-response functions and variance decompositions of a Vector Error Correction Model (VECM). We analyze the stability of the results altering the order of the variables, re-estimating the model with rolling sub-samples and changing the deterministic component in the error correction mechanism.

How does the US' cycle transmit in the context of an asymmetric monetary union?

With the aim of simplifying the theoretical and empirical analysis, we may decompose the channels of transmission into two great groups: the financial channel and the trade channel.

The financial channel is related to the effects of the international interest rate on the level of capital flows to the emerging economies. In the trade channel, on the other hand, the effect of fluctuations in the business cycle of the leading economy (the United States) is transmitted through the movements in the trade flows (due to changes in quantities as well as in the terms of trade).

The problem of the policymaker confronted with the alternative of dollarization

The adoption of a more rigid exchange rate system such as dollarization could reduce real volatility if it acted as an automatic stabilization mechanism of the economy. This is a very important issue since a risk averse policymaker will prefer a more stable growth rate since this reduces the country risk perceived by (also risk averse) investors.

To make an evaluation of the aggregate effect of dollarization, we want to specify which are the necessary conditions to ensure that dollarization will increase social welfare. We assume that the policymaker wants to minimize a social loss function that represents the external and financial fragility of the country where the control variable is the degree of rigidity of the exchange rate system. Table 1 resumes the previous discussion. With synchronized cycles ($\rho_{GDP_{AC/USA}} > 0$) the financial channel (FC) reduces the volatility of the cycle and the trade channel (TC) increases it. On the contrary, with cycles negatively correlated, the FC increases real volatility and the TC reduces it.

Table 1 Change in the volatility of AC GDP

		Cyclical correlation	
Channel of transmission		$\rho_{GDP_{AC/USA}} > 0$	$\rho_{GDP_{AC/USA}} < 0$
TC	$\frac{\partial GDP_{AC}}{\partial M_{USA-AC}} > 0$	*A* ↑ *real volatility*	*B* ↓ *real volatility*
FC	$\frac{\partial GDP_{AC}}{\partial i^*} < 0$	*C* ↓ *real volatility*	*D* ↑ real volatility

From this framework of analysis we may establish the following two propositions:

Proposition 1:

Assuming the usual mechanisms for the transmission of the business cycle in a center-periphery framework, dollarization will reduce real volatility and thus the country risk if and only if one the following conditions are fulfilled: a) if correlation between business cycles is positive, the financial channel should dominate the trade channel. b) if the correlation between the cycles is negative, the trade channel should dominate the financial one.

Proposition 2:

Dollarization will improve social welfare if the weight given by the policymaker (society) to the reduction in the aggregate risk (devaluation risk plus country risk) is greater than the loss of social welfare due to the reduction in the number of available instruments to cover for risk.

Analysis of the long run equation

From the estimation of the autorregresive vectors model in an error correction representation, with one cointegrating vector and 7 lags, we obtain the following long run relationship between the variables (normalized for IPIARG):

$$IPIARG_t = 2.40 + 0.70*IMPOUA_t - 0.77*FEDRATE_t + \varepsilon_t$$

(t-values) (3.39) (2.94) (-2.20)

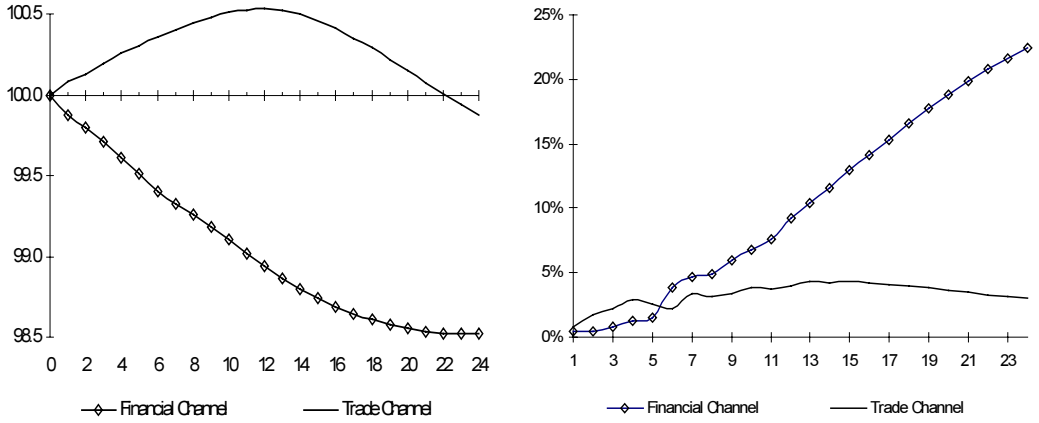
As we can see, every coefficient is significative at a 95% confidence level and have the expected signs, according to equations (16) and (17) in our analytical framework.

The residuals of the ECM are stationary and second, the coefficients that represent the speed of adjustment for each equation with respect to the long run error are negative and less than 1 (one) in absolute value. This implies that the system will not be explosive. These results show the robustness of the long run relationship between IPIARG and the different channels of transmission of the business cycle and.

Analysis of the effects of the trade and financial channel on IPIARG through impulse-response functions

Examining the response of IPIARG to a shock of one standard deviation on FEDRATE and on IMPOUA we find the signs needed to determine the impact of the financial channel and the trade channel on Argentina's economy. In figure 3 we see that the different channels affect IPIARG. The financial channel has a negative effect on IPIARG, while the trade channel has a positive effect on it. There are important differences as regards the intensity and duration of these effects. As it can be seen, while the effect of shocks transmitted through the trade channel tend to disappear in the long run, shocks transmitted through the financial channel have a permanent effect.

F 3. IPIARG response to one standard innovation in[2]: F 4. Percent IPIARG variance due to:



Relative size of the different channels. A variance decomposition approach

The variance decomposition will allow us to estimate the relative importance of the trade and financial channels. Figure 4 shows that the results of the variance decomposition are similar to those coming from the analysis of the impulse-response functions. The financial channel dominates the trade channel and the differences in explicative power between both channels increases in the long run.

While the trade channel can never explain more than 5% of total IPIARG variance, the financial channel explains almost 25% of this variance in the long run.

The joint analysis of the impulse-response and the variance decomposition indicate that in the event of a positive shock to the economy of the United States, the negative impact

[2] Note 1: For better illustration we present the results normalized at 100 in i=0.
Note 2: The standard deviation in the trade channel is of 13% (approximately U$S300 million) while in the financial channel the shock is of 2.5% (approximately 13 basic points).

of the increase in FEDRATE on IPIARG dominates the positive effect of the increase in IMPOUA.

The final result of dollarization on real volatility will now depend on the sign of the coefficient of correlation between the cycles of Argentina and the US.

Correlation between the cycles

According to our findings thus far (the financial channel, which affects negatively IPIARG, is relatively more important than the commercial one, which affects it positively) if the cycles are synchronized (positively correlated) dollarization would reduce the volatility of Argentina's business cycle (real volatility), reducing the country risk. This would be leaning the balance towards a position where the benefits of leaving the Peso would outweigh its costs (see equations 20 and 25).

Following the methodology presented in 7.2.2, we analyze the cyclical correlation between Argentina and USA business cycle for the period 1991:1-1999:10

In table 3 we present the contemporaneous coefficients of correlation of the cycles of IPIARG and IPIUSA according to the 4 different specifications.

In general, we find that for the period under analysis (1991:4 1999:10) the contemporaneous correlation between the business cycles of these countries is important and positive. The average value of the coefficient of contemporaneous correlation for the different specifications of the cycle is 0.24 (overall mean). Meanwhile, if we only take into account the combinations that belong to the principal diagonal on table 3 (that is, we analyze the correlation coefficients of the cycle calculated with the same specification for both countries) the average coefficient is even higher, 0.32 (specific mean).

To evaluate the temporal evolution of the correlation between the business cycles we calculated the coefficients of correlation with a "rolling" methodology.

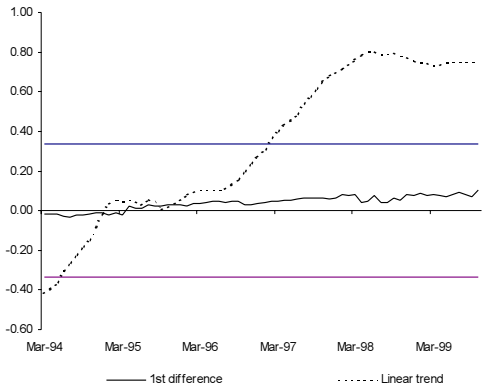
We analyze only two specifications: a) the first differences and c) assuming a linear trend. This allows us to establish extreme bands for the estimation of the cyclical correlation. The first one resulting from assuming a completely random trend in the series, and the other assuming, on the contrary, a completely deterministic trend for the series. These two specifications are presented in next Figure.

Table 3 Argentina's cycle - USA's cycle

coef - Contemporaneous correlation coefficients[3]

		Industrial production index (ARGENTINA)			
		First difference	Linear trend	Linear trend with Endogenous Structural Break*	Hodrick-Prescott filter
Industrial production index (USA)	First difference	0.088	0.035	0.018	0.030
	Linear trend	0.043	0.304	0.473	0.375
	Linear trend with Endogenous Structural Break*	-0.017	0.538	**0.568**	0.453
	Hodrick-Prescott filter	-0.142	0.478	0.334	0.329

F 5 Rolling crossed correlation IPIARG - IPIUSA[4]



Conclusions

The main results are:

1) The financial channel has a negative impact on Argentina's output.
2) The trade channel impacts positively on Argentina's output.

[3] Overall mean 0.24 Specific mean 0.32. * For Argentina the structural break was detected in 95:2. For the United States the break appeared in 93:8

[4] Note: The horizontal lines indicate the upper and lower limits of significativity of the coefficients at a 95% confidence level.

3) The financial channel dominates the trade channel (the financial channel is the main means of transmission of shocks from the United States).
4) These results are robust to several stability tests for the VECM: changes in short run restrictions, different specifications of the deterministic component in the long run relationships and change in the sample of estimation.
5) The cycles of Argentina and the United States are on average positively correlated.
6) The correlation between the cycles is unstable through time and through different de-trending methodologies.

With these results, the first impression is that dollarization in Argentina would reduce the devaluation risk and also, it could reduce the real volatility of the economy and consequently the country risk.

However, such strong result in the case of Argentina has to be interpreted carefully. The decision whether or not to dolarize an economy has to take into account the social value attached to the loss of an instrument of risk diversification such as the exchange rate policy.

Furthermore, Argentinean policymakers should not take such an important decision without considering other alternatives that could even be more convenient. This issue requires, however, deeper discussion, which is in the line of our future research. While the "rolling" coefficient based on the first difference shows a relatively stable behavior in the period and very close to 0, the estimations based on assuming a linear trend show extreme volatility, although on average the coefficients are positive. This would confirm the previous results that indicate the existence of a significantly positive contemporaneous correlation between the business cycles of Argentina and that of the United States.

The extreme volatility showed by the "rolling" coefficients in the short period under analysis raises serious doubts with respect to the usefulness of the most common specifications of the cycle (linear trend, for example) to define, with a certain degree of certainty, the question relating to Argentina's convenience to leave its domestic currency in favor of the dollar.