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WAS THE ARGENTINE *CORRALITO* AN EFFICIENT MEASURE?: A NOTE *

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Abstract

Theoretical banking literature has largely explored the role of financial intermediaries in the economy, market failures (banking panics) in the banking sector and the need for bank regulation. However, most models of banking panics and regulation have not been empirically tested.

The Argentine 2001 crisis, with a large deposit withdrawal and the regulation introduced (suspension of convertibility) constitutes a scenario in order to apply some of the theoretical predictions.

In particular, the paper applies Samartín (2002) to the particular case of Argentina. After the estimation of the most important parameters, the model predicts that suspension of convertibility seems to have been the most efficient intervention measure to stop the massive deposit withdrawals.

Keywords: Argentina, Banking Panics, Deposit Insurance, Suspension of Convertibility.
JEL Classification: G21, G28.

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1 Introduction

The financial system has traditionally been vulnerable to the problem of bank runs, in which many or all depositors at a bank attempt to withdraw their funds simultaneously. If these withdrawals at a particular bank then spread to many or all banks in the banking system they generate a banking panic, with important consequences on both the financial and the real sector of the economy.[1]

In the 1980s and 1990s several countries experienced banking panics or periods in which their banking systems stopped functioning and these economies evidenced important real effects.[2] More recently, at the end of 2001, Argentina experienced a banking panic, which resulted in one of the most important financial crisis in its history.

Given the relevance of these recent phenomena, the adequate regulatory design of the financial system has become again an important topic of discussion among politicians, regulators and academics.

From a theoretical perspective, the literature has focused on analyzing the rationale behind the existence of financial intermediaries, the causes of banking panics and the different regulatory measures in order to prevent them (a comprehensive survey of this literature can be found in Gorton and Winton, [2002]). However, none of these papers has been empirically tested.

The main features of the Argentine crisis, allow us to empirically apply one of the models developed in the theoretical literature. In particular, this paper will try to analyze if the regulatory measure which was implemented (suspension of convertibility, or also know as *corralito*) has been an efficient tool in order to prevent banking panics.

The structure of the paper is as follows: section 2 gives a brief overview of the economic and regulatory situation in Argentina and a description of the crisis in 2001. Section 3 is devoted to discuss two measures that have traditionally been used by banks in order to prevent panics: suspension of convertibility and deposit insurance. A welfare comparison of the above measures, in the case of Argentina, is carried out in section 4. Finally, concluding remarks are presented in section 5.

[1] One example of such crises is the Great Depression (1929-1933), which had a significant impact on the banking system of the US, where more than one third of the banks failed (see Gorton and Winton, [2002]).

[2] Lindgren, Garcia and Saal [1996] find that 73 per cent of the IMFs member countries suffered banking crises between 1980 and 1996.

2 The 2001 Argentine crisis

Argentina is no exception to the financial crises suffered by several developing countries in the last decade (Mexico, Thailand, Russia and Brazil). The country faced a variety of economic and financial shocks during the 80s and 90s.

More recently, at the end of 2001, its banking system experienced a large deposit withdrawal, that was dealt with by imposing a suspension of convertibility policy.

In order to understand this suspension measure implemented by the Argentine government it is important to present a summary of the economic and regulatory environment and the structure of the financial system at that date.

It should be mentioned that the economic environment and the hyperinflation of 1989-90 destroyed the financial system (Calomiris and Powell, [2000]) and derived in a structural reforms plan that included banking regulation, privatization, financial liberalization and free international capital flows.

In this sense, although the Convertibility Law (Ley Convertibilidad[3]) helped to recover the macroeconomic stability, it caused a strong appreciation of the exchange rate, with the consequent loose of international competitiveness. This, in turn, derived in a progressive deterioration of the model and the end of the currency board.

By the end of 2001, the financial system had 108 financial institutions, which managed loans and deposits for about 76.274 and 82.346 US million dollars respectively. As a consequence of the Mexican crisis of 1994, the system evidenced several changes, which caused an important concentration and internationalization process,[4] and the implementation of several intervention measures aiming to stimulate its soundness and solvency.

A distinguishing feature of the financial system at the end of 2001 was the high degree of *dolarization*, as 64 per cent of deposits and 70 per cent of loans were denominated in US dollars. This particular feature and the asymmetric treatment of assets and liabilities after the devaluation contributed to worsen the negative effect on the financial institutions balance sheets.

Regarding deposit insurance, it was originally created in 1979, and eliminated from the system in 1992. Three years later, in 1995, it was re-established. This new system consisted on a fund privately managed by Sedesa S.A. (Seguro

[3]Law $N23928$ (March 1991), which settled the obligation of the Central Bank to exchange pesos for dollars at one to one parity.

[4]As an indicator of concentration, it should be mentioned that in 2001 the five largest financial institutions (in terms of assets) concentrated 48 per cent of total assets. On the other hand, concerning the internationalization process, it is worth mentioning that foreign financial institutions managed 48 per cent of loans and 52 per cent of total deposits.

de los Depsitos S.A.[5]). At the end of 2001 the fund had an available balance of about 270.88 US million dollars, equivalent to 0.4 per cent of total deposits of the financial system.

In 2001 there was a strong and sustained withdrawal of deposits, which worsened in the weeks previous to the suspension of convertibility policy. The financial system lost 22 per cent of its total deposits. Several factors[6] caused these withdrawals, most of them related to the individual perception of an imminent end of the currency board[7] and the consequent inability by the banks to fulfill the dollar denominated liabilities. It should be mentioned that during this period the insurance coverage was increased up to 30.000 US dollars. However, due to the inability to stop the massive deposit withdrawal, the banking system suspended convertibility of deposits into currency at the end of 2001.

3 Measures to prevent banking panics

To avoid the negative externalities and the high social cost related to banking panics it is necessary to introduce regulatory measures that bring stability to the financial system and protect depositors and investors. Examples of these measures are suspension of convertibility and deposit insurance.

Concerning suspension of convertibility, it is an intervention measure that was frequently used in the U.S. during the nineteenth and early twentieth centuries and consists on the banks refusal to exchange currency for demand deposits upon demand. Gorton [1985] points out that during this period convertibility was suspended up to eight times in the US.

An interesting aspect is that, even though this measure implied a violation of the deposit contract, neither depositors nor the banks were against it. It was understood as a temporal measure to stop banking panics. During this period, the bank tried to solve the liquidity problem and with the suspension, depositors recovered the confidence in the system by recognizing the institutions in trouble. Hence, by suspending convertibility, banks can signal to depositors that continuation of investments is mutually beneficial.

Regarding deposit insurance, the rationale behind it, is the argument that banks are inherently flawed institutions, being prone to banking panics. Consequently, the government should provide deposit insurance and regulate bank

[5]See http://www.sedesa.com.ar

[6]The main factors were: the deep recession that started at the end of 1998, the high price of foreign currencies in the future markets, the government's difficult access to international funding, the high lobbying pressures of the productive sector to abandon the fixed exchange rate.

[7]Rigorously speaking, the Convertibility Law was not a fixed exchange rate regime, since there was no obstacle to an appreciation of the peso with respect to the dollar. However, in practice, it functioned as a currency board.

risk taking.

The spread of government deposit insurance is a recent phenomenon[8] and a consequence of the widespread banking crisis suffered during the 80s and 90s by several countries.

Although deposit insurance may avoid banking panics, giving stability to the banking system, it also creates a moral hazard problem as banks have incentives to invest in riskier assets and on the other side depositors' incentives to monitor their banks disappear as their deposits are insured (see Merton [1977]).

4 A welfare comparison

The purpose of this section is to present a welfare comparison between the two above described measures: suspension of convertibility and deposit insurance. To do so, we apply a model developed by Samartin [2002] to the recent Argentine financial crisis, described in the previous section.[9]

4.1 Analytical framework

The model considers a three-period economy and one single commodity. On the consumer side, there exist a continuum of ex-ante identical agents in the interval [0,1] that are endowed with one unit of this consumption good in period 0. In period 1, they are subject to a non-observable liquidity shock and they can be either of two types. The difference between types is that type 1 agents[10] derive relatively more utility from consumption in period 1 with respect to type 2 agents. Individuals have power utility functions, with a constant relative risk aversion coefficient denoted by γ.

It is assumed that a random fraction ($\tilde{\alpha}$) of type 2 depositors receive a perfectly informative signal about the bank's asset return.[11] This signal can be interpreted as a relevant economic variable that affects the value of the bank (in contrast to the CAPM this source of systematic risk is not known by all agents). The rest of type 2 individuals do not acquire information and try to infer the state of nature from the behaviour of the other agents.

[8] Gorton and Winton (2002) point out that two thirds of the deposit insurance programs in the world have been established in the last fifteen years. See also Demirgc-Kunt and Detragiache [2002] or Cardone [1998] for a description of insurance systems around the world and Europe, respectively.

[9] For a detailed version of this model see Samartin [2002].

[10] Type 1 individuals have liquidity needs and the bank is able to insure them. The proportion of this kind of individuals is random and takes a value t_1 with probability r and t_2 with probability $1-r$ (and $t_1 < t_2$).

[11] This random variable may take a value α with probability q and 0 with probability $1-q$.

Finally, in period 0, the bank can invest in a technology that yields a random return ($\tilde{R}$) in period 2.[12] As mentioned before, this return is affected by an exogenous risk factor.

The time structure of the model is summarized as follows: in period 1 individuals deposit their endowment in the bank, which has a comparative advantage in investing in the risky asset. In exchange, the financial intermediary offers a contract that provides them with flexibility in order to adjust their consumption pattern to their liquidity needs.

The withdrawal decision of type 1 consumers is trivial. As these agents face liquidity needs at date 1, they will always choose to withdraw the money from the bank. Among type 2 individuals, there is a fraction of them that has acquired information about the banks asset. The model establishes conditions such that their optimal decision is to withdraw the deposits when they receive a negative signal and to maintain their funds otherwise. Finally, the rest of type 2 individuals are not informed and behave according to the size of the queue that they observe at the bank, that is, they try to infer the state of nature from the number of individuals that withdraw their deposits in the first period. However, this size can be large enough due to both a negative information shock (some type 2 individuals have received a bad signal) or to a liquidity shock (high proportion of type 1 individuals). This noisy signal may induce the non informed depositors to sometimes erroneously withdraw their funds from the bank.

Conditions for both information-induced and pure panic runs to occur are summarized in theorem 1 of Samartin [2002].

Having established the characteristics of the equilibrium with banking panics, let us now assume that when individuals try to withdraw their deposits in period 1, the bank announces a suspension of convertibility policy at the level of the highest proportion of type 1 consumers. This suspension will be desirable in good states or when there is no information; and on the contrary, it will generate a cost in bad states or when some type 1 individuals do not receive the promised consumption level (liquidity cost). The expected utility with suspension of convertibility is compared with the one obtained with a deposit insurance system, measure that is described below.

An alternative to suspension of convertibility is to have a deposit insurance system. This insurance guarantees that whenever the bank fails (i.e., in those states of nature in which the low return is realized) individuals will be covered by the insurance fund. This mechanism is designed in order to give stability to the banking system, since it removes the incentives of informed individuals to acquire information and hence to run on the bank as they are always assured the promised consumption level. However, the deposit insurance has a cost, that is, whenever the low return is realized, other sectors have to supply the difference

[12] This random variable may take a value $0 < R_l < 1$ with probability p and $R_h > 1$ with probability $1 - p$.

(this is can be seen as a deadweight tax, and denoted by the variable λ).[13] Since λ is an exogenous variable, the results are presented as a function of a level of λ^*, for which the two measures deliver the same utility. Hence, if the value of the deadweight tax is λ^* per cent or lower, the deposit insurance arrangement is best. Otherwise, suspension of convertibility should be preferred.

Some of the conclusions obtained in Samartin [2002] are summarized in Figure 1. This figure shows the deadweight tax as a function of the relative risk aversion coefficient (γ). As it can be observed, for low levels of this coefficient (values below a critical γ) suspension of convertibility is always best, even though deposit insurance could be provided at zero cost. However, as risk aversion increases (above the critical γ) deposit insurance improves with respect to the suspension measure. As previously mentioned, if the deadweight tax is λ^* per cent or lower, the deposit insurance arrangement is best, otherwise suspension of convertibility is more efficient.

Finally, it can be shown that this critical value is affected by other exogenous parameters of the model, such as the bank's asset expected return ($\overline{R}$), or its dispersion (σ^2). Both, a decrease in the dispersion in the bank asset or an increase in its expected return cause a higher value for the critical γ. Also increasing the proportion of type 1 consumers reduces the critical value. Finally, variations in the proportion of informed agents, or its probability, do not influence the critical γ.

4.2 Application to the case of Argentina

The main features of the recent Argentine crisis (i.e., a banking panic, the implementation of a suspension of convertibility policy and the existence of a deposit insurance system), allow us to apply the previously described model to this particular case.

The application requires the estimation of two important parameters that determine the choice of the most efficient policy measure: the deadweight tax (λ) and the relative risk aversion coefficient (γ). Other relevant parameters in the analysis are the expected return and the volatility of the bank's asset.[14]

Those parameters have been estimated for the period April 1995 to December 2001 (the six previous years to the crisis). The main reasons for selecting this period are the high sensitivity of the results to variations in the economic environment and the fact that the main features of the financial system in December 2001 were a consequence of the changes experienced after the Mexican crisis in 1994. Finally, the deposit insurance system was re-established in 1995.

[13] Using the Laffont and Tirole [1986] approach, it is assumed that a transfer C from the regulatory agent to the bank will generate a social cost of $(1 + \lambda)C$.

[14] Concerning the rest of the parameters (proportions of each type of agents) we assume reasonable values for them, presenting those that were used in Samartín [2002] simulations.

Hereafter, the values for the most important parameters are estimated.

Regarding the relative risk aversion coefficient, it has been estimated with a particular asset valuation model, like the Consumption Capital Asset Pricing Model (CCAPM) with a power utility function. The analysis approximates the relative risk aversion coefficient using data relative to the market Sharpe Ratio and the volatility of the consumption growth rate in a particular economy.[15] As already mentioned, this proxy assumes a power utility function, as the one used in Samartin [2002] and can be written as:

$$\left|\frac{E(R_m) - R_f}{\sigma(R_m)}\right| = \sqrt{e^{\gamma^2\sigma^2(\Delta \ln C_{t+1})} - 1} \approx \gamma\sigma(\Delta \ln C) \tag{1}$$

Where:

- $\overline{R}$= Expected market return
- r_f= Risk free asset return
- $\sigma(R_M)$= Standard deviation of the market return
- γ= Relative risk aversion coefficient
- $\sigma(\ln C)$= Volatility of the consumption growth rate

Hence, isolating the risk aversion coefficient in [1] it is obtained:

$$\gamma \approx \frac{\frac{E(R_m)-R_f}{\sigma(R_m)}}{\sigma(\Delta \ln C)} \tag{2}$$

As mentioned above, the coefficient is approximated with data relative to the expected market return and its volatility, the risk free rate and the volatility of the consumption growth rate.

The proxy for the market return is the return on the Buenos Aires Stock Exchange General Index (Indice General de la Bolsa de Buenos Aires -IGBBA-) .[16]The choice of the risk free rate for Argentina, corresponds to the return on U.S. Treasury Bills with maturity of one year. This choice is due to the lack of a domestic asset that fulfils the required conditions and some features of the Argentine economy in the analyzed period which allowed a wide access to the international capital markets at a relative low cost. Among these particular features were the fixed exchange rate established by the Convertibility Law which derived in a dual currency economy, the lack of restrictions to the free

[15]For more details and a formal demonstration see Cochrane [2001].
[16]See Appendix A for a description of the data used in the analysis.

international capital flows and the relative low transaction costs to change from one currency to the other.

The average annual real return on the IGBBA for the analyzed period is 4.97 per cent with a standard deviation of about 33.38 per cent . Since the annual real return on Treasury Bills has averaged 2.5 per cent, the market premium is 2.48 per cent and the historical market Sharpe Ratio 0.074. The per capita consumption growth rate has averaged 1.51 per cent with a standard deviation of about 4.77 per cent. Hence, the relative risk aversion coefficient in the analyzed period is 1.56.

It is worth mentioning that the market return series are affected by some outlier values.[17]If those values are eliminated from the sample, the risk aversion coefficient increases to 3.82, due to the higher Sharpe Ratio in absolute terms (increases from 0.074 to 0.18). On the overall, the results obtained point out to an approximate variation range: $1.56 < \gamma < 3.82$.

The estimates of the relative risk aversion coefficient in the case of Argentina are considered reasonable,[18] and present some evidence against the equity premium puzzle observed in several markets like the American and the Spanish ones,[19] among others. The equity premium puzzle refers to the inability of the basic asset valuation model with consumption to replicate market premiums compatible with reasonable values of the relative risk aversion coefficient and the observed volatility of the consumption growth rate. The main explanations for this regularity are: a low consumption growth volatility, a high observed market premium and a relative low volatility of the market return.

Concerning the bank's asset expected return and volatility, they have been approximated by the average and variance of returns for the consolidated banking system. In the period 1995-2001 banks averaged an annual return on assets of about 0.12 per cent with a variance of returns of 4.16 per cent. These values determine a critical gamma of 4.8 (see figure 2). The estimation of the relative risk aversion coefficient described above ranges from 1.56 to 3.82. Therefore, the model suggests that the suspension measure implemented was the most efficient one.

Finally, with respect to the deadweight tax, as can be seen in figure 2, suspension of convertibility turns out to be the preferred policy, independent on the value of the deadweight tax (even if deposit insurance could have been provided at zero cost). As already mentioned in section 2 the insurance system

[17]Those outlier values were due to the economic stability and the fast development of the capital market generated by the structural reforms implemented: transition to an open economy, privatization of state companies and the pension system, free international capital flows, etc.

[18]See Cochrane [2001] and Gollier[2001] for discussions concerning reasonable values of the coefficient.

[19]For a description of the equity premium puzzle in those markets see Cochrane[2001] and Marin and Rubio [2000].

had funds for equivalent 0.4 per cent of total deposits of the financial system, which implies that a transfer of resources from the regulatory agent to the banks would have needed, in this second alternative.

5 Concluding Remarks

This paper attempts to empirically apply the model developed by Samartin [2002], to the particular case of Argentina. This model presents a welfare comparison between two traditional measures to prevent banking panics: suspension of convertibility and deposit insurance.

The features of the recent Argentine crisis (i.e., a general banking panic, the implementation of a suspension of convertibility policy and the existence of a deposit insurance system) constitute an interesting scenario in order to apply the above mentioned model.

Samartin [2002] predicts that suspension of convertibility should be the preferred measure to cope with panics for values of the relative risk aversion coefficient (γ) below a critical one. If γ is greater than this critical one, then deposit insurance turns out to be a better policy as long as the deadweight tax is not too high (below λ^*). The estimation of the relative risk aversion coefficient in the case of Argentina is $1.56 < \gamma < 3.82$, and the estimation of the critical γ is 4.8. These results imply that the suspension measure implemented turned out to be the most efficient tool, even if deposit insurance could have been provided at zero cost.

Finally, in a general context, this work questions the assumed stability attributed to deposit insurance systems, which justify their existence in the banking systems in spite of their implied costs. In this sense, the Argentine crisis has demonstrated that deposit insurance had not been an efficient tool -at least in this case- to prevent banking panics, which open again the debate about the reforms needed in deposit insurance systems (see Calomiris [1999] or Boyd, Chang and Smith, [2002]), or whether insurance is desirable in all countries, independently of the degree of development of the financial system.

This debate is also of interest in the face of recent regulatory changes, as the New Basel II capital Accord, which will obviously affect the design and regulation of financial systems. It might also be worth re-examining deposit insurance in the light of these changes.

A Data description

- Per capita consumption growth rate: annualized growth rate of the quarterly series of private non seasonal consumption obtained from National Accounts published by Instituto Nacional de Estadísticas y Censos de Argentina [INDEC]. The population data are also estimates of the INDEC.
- Market return: annualized real return on the monthly series of the Indice General de la Bolsa de Buenos Aires.
- Risk free rate: annualized real return on Treasury Bills (monthly series) with maturity one year published by the U. S Federal Reserve.
- Expected return and volatility of the bank's asset: average return on assets (ROA) and variance of returns estimated from monthly data from the consolidated balance sheet of the financial system (Banco Central de la Repblica Argentina).

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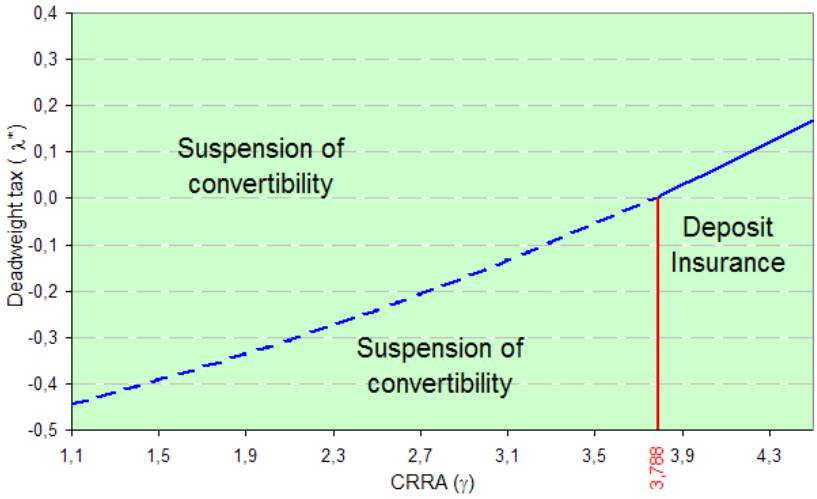

Figure 1: Suspension of Convertibility versus Deposit Insurance (Samartin, 2002)

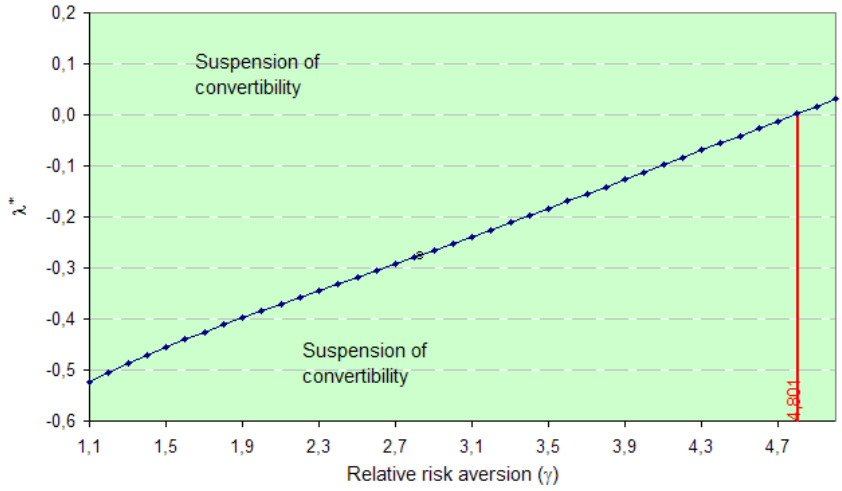

Figure 2: Simulations in the case of Argentina