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DETERMINING THE CAUSES OF BANK RUNS IN ARGENTINA DURING THE CRISIS OF 2001

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Abstract

We use monthly panel data information on Argentine banks to try to explain the variation in deposits during the 2001 crisis. The variables used are related to the solvency condition of the bank, whether it is public or private, interest rates for each bank and macroeconomic variables referred to general economic conditions. We use our empirical results to attempt to determine whether the bank run is best explained by a self-fulfilling prophecy theory or if fundamentals matter. We find that bank fundamentals show statistically significant coefficients, and with expected sign, providing evidence in favor of the solvency theory.

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I. Introduction

There are two main competing theories to explain bank runs. Friedman and Schwartz (1963) argue that panics come primarily from the lack of confidence on the bank sector, originated for example, in the bankruptcy of a big bank or in the lost of confidence in the local currency. In either case, the panic is focused in the banking system and ends in a generalized withdrawal of deposits, which in turn results in an important monetary contraction. Models based on this theory verify a run with Nash equilibrium characteristics, where economic agents run because they believe that the rest of the population will run, and running turns out to be the optimal strategy. In this kind of models there is no explanation of how a run situation is reached, so these are usually referred to as sunspot models.

In the second theory, Kindleberger (1978), the crises are part of a cycle that affects both the financial and real sector of the economy. This theory states that during the upturn of the cycle the financial sector extends credit to the real sector, based on expectations of sustained future growth. With the passage of time, the financial sector become highly leveraged, and when a downturn occurs, the creditors can not repay their loans, a financial crisis takes place, and the banks do not have enough reserves to confront losses. In sum, what explains a bank run are bank fundamentals: real shocks and insolvency problems are the cause of panics.

Of the first group of models, probably the most important is Diamond and Dybvig (1983) which presents a model where bank runs are the rational response to agents beliefs. If the consumer thinks that the bank does not have the necessary resources to attend the deposits retirements in a period, a run occurs. With *sequential servicing*, any bank may suffer a massive withdrawal if enough individuals believe that others will run that bank. Then everyone runs so as not to be late in the queue. In this model, under certain circumstances a bank run can be avoided by the introduction of deposit insurance or by the threat of partial or total suspension.

In line with the solvency theory, various models with asymmetric information find that depositors do not withdraw their money from banks because to sudden resources needs, but because they believe that the bank is insolvent. Gorton (1985) builds a model where bank returns are uncertain and individuals keep deposits if the expected return is greater than the return on holding cash. With complete information, people would know if deposit returns were lower than cash. If that is the case, they would retire their deposits and the bank would close. If information is incomplete, the consumers receive an imperfect signal about bank returns. This can generate situations where solvent banks close, while other banks survive even though they would not with complete information. There is an asymmetric information problem because banks know their returns, while depositors do not, or at least not totally. Negative real shocks and perceptions about bank solvency cause panics and the resulting bank runs.

There is empirical evidence suggesting that bank runs are not random events (sunspots) or at least that the option as to which banks are run is not random in Calomiris and Gorton (1991). Calomiris and Mason (1997) review the Chicago

bank panic of 1932 and argue that only the weaker banks (i.e., the insolvent ones) experienced runs. A study done at the Central Bank of Argentina, D'Amato, Grubisic and Powell (1997), on the Tequila Effect in Argentina during 1995 also suggests that the financially weaker banks where those which suffered runs and had to close.

Catena and McCandless (2000) develop a model based on Diamond and Dybvig with stochastic conditions returns on bank assets that depositors observe imperfectly. They find a unique equilibrium in the space of bank fundamentals. This model joins both theories about bank runs. Both the demand for liquidity and the returns on assets play an explicit roll in bank run determination. The authors show, as historic evidence suggests, that it is more probable that banks close in periods of perfectly anticipated higher demands for liquidity.

Diamond and Rajan (2002) show that a bank failure might cause generalized liquidity problems and provoke the collapse of the entire system. The contagion effect that arises, in this model, is not caused by contractual or informational relationships among banks, but occurs because a bank failure can lead to the contraction of the common liquidity fund. The authors propose a robust sequential intervention by the government, for which there is an important trade-off between the costs of the system's collapse and the costs associated with an unnecessary intervention. The authors analyze how insolvency problems interact with liquidity problems and how one can cause the other. They find that the contagion possibility of problem banks occurs because of the structure of bank lending – they finance non-liquidity assets with demand deposits. But this is also the kind of structure that let the banks supply liquidity. Ex-ante there is no clear solution to this problem. Neither it is totally clear the optimal form of ex-post intervention. All that can be said without knowing the exactly parameters involved, is that liquidity provision probably won't make things worse for the banking system.

In this paper, we work with panel data for the period January-November 2001 (with two subsamples for January-June and July-November) and individual monthly cross-section regressions for the critical period after July. We find that:

a) In all panels several bank fundamentals (interest rate, non performing loans, loans, exposition to sovereign risk, net financial income and dummies allowing differentiation by type of bank), have statistically significant coefficients with the sign that one would expect from the solvency theory;
b) In the monthly cross-section estimations, bank fundamentals are jointly significant in every month, although which variables are individually significant vary from month to month.

The paper is organized as follows: in Section II we analyze with some perspective the macro-financial situation in Argentina during 2001 –the period under analysis–; in Section III the variables used are defined; in Section IV we describe the econometrics methods used; in Section V we present our results. Finally Section VI contains our conclusions.

II. Macro-Financial Situation in Argentina During 2001

After more than ten years with a Currency Board, two and a half years of recession and a year of continuing deterioration of the government, the Argentine economy began 2001 with a high level of uncertainty. Although this article focuses in the first eleven months of 2001, we find it interesting to begin with a brief description of the period prior to the analysis of this paper.

The nineties started with 19 consecutive quarters of economic expansion until the Mexican devaluation in December 1994, known as the Tequila Effect, led to a considerable change in GDP trend. Nevertheless, the financial roots of the crisis allowed a relatively fast recovery. This new period of growth lasted 11 quarters, until the Russian devaluation and the Asiatic crisis, accompanied by the Brazilian devaluation provoked a significant recession, showing once again the vulnerability of the Argentine economy to external shocks.

Such was the situation in December 1999, when President De la Rúa assumed power. To the external shocks mentioned above, one needs to add domestic considerations. Expectations turned strongly negative and the impossibility to restart growth increased doubts about debt sustainability. The resignation of the vice-president in October 2000 made things even worse and weakened in a remarkable way the government. Sovereign risk (as measured by the spread of Argentine dollar external bonds over Treasuries) showed the first significant increase from the beginning of De la Rúa government.

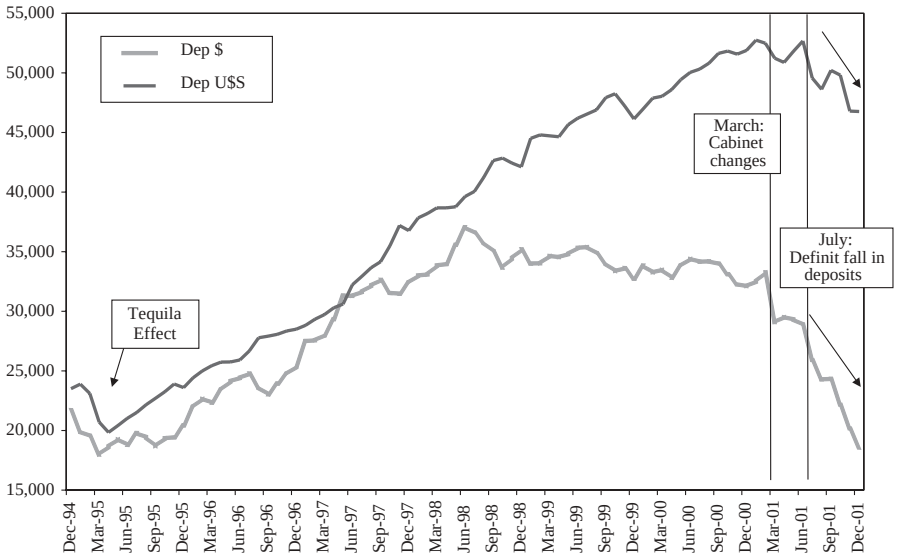
In the face of declining market confidence and the failure to meet IMF targets for the first quarter, in early March the Minister of Economy resigned and another Minister took place for only 20 days and left due to an unsuccessful attempt to lower the fiscal expenditure. Cavallo, who had been Minister of Economy during President Menem's first term and was widely known as the "Father of the Convertibility", replaced him. All these events had strong implications –in terms of uncertainty– on the evolution of economic policy and the financial system. These implications were reflected in a mini bank run in the first quarter of 2001.

Another negative signal for the markets, viewed as a decline in Central Bank independence, was Cavallo's replacement of the Central Bank President in April. In June, the original convertibility had disappeared. In addition, a preferential exchange rate for commercial transactions was announced, so that Argentina had a dual exchange rate. To all these events one must add the fact that for the first time Argentina could not rollover its debt at a reasonable spread. The deterioration in expectations became generalized, both inside and outside the country. Country risk rose sharply and rumors about possible resignations – of the President and ministers– spread rapidly. In July the second bank run of the year started what turned out to be a process of no return (see graph).

The measures taken from that moment on: zero deficits, cuts in salaries and pensions, and a *Mega-canje* (debt exchange), failed to restore confidence and bank deposits continued to flee, becoming even more severe in November. The response was a set of restrictions on deposits withdrawal implemented on Decem-

ber 2, which came to be called the "*corralito*". Our analysis concentrates in this latter period. The following graph shows the performance of deposits in pesos and dollars since 1994.

TOTAL DEPOSITS IN PERSPECTIVE
(END OF PERIOD, IN MILLIONS)



III. The Variables

Before entering strictly in the analysis of the methodology and the data, it is worth clarifying that the complete period under analysis is the first 11 months of 2001. The critical period is the one that includes the months from July to November – in July the first big run occurred. December was excluded from the data set because the last run took place by the end of November and in December restrictions on the financial system were implemented, changing the regime. Thus, one would not expect the behavior of variables in December to be comparable with the rest of the sample. Since the first six months of the year could be considered more "normal", we include a separate analysis of the first half of the year (i.e., the period January-June).

Given that the Argentine financial system during 2001 was bi-monetary –with a high degree of dollarization– we analyze the evolution of peso deposits (*Deposit $*) separately from dollar deposits (*Deposit US$*). We constructed one set of models (in pesos and another in dollars) for the full sample, another for the first six months and one for the last five months of our sample.

We restrict our analysis to thirty-day private term deposits because we believe that these are the most susceptible to runs and least influenced by unrelated disturbances. First, time deposits do not contain as large a seasonal component as do sight deposits. Since a large fraction of salaries are paid through sight deposits, these may be less responsive to runs. Thirty-day term deposits were chosen because 30 days is the shorter term available and is the maturity with the largest volume of deposits. The behavior of private sector deposits differs significantly from that of the public sector and it is not clear how to interpret their aggregate behavior. In any case, public sector thirty-day term deposits were equal to only about 4 per cent of private at the beginning of the period.

It should be noted that, as the dependent variable is term deposits, this implies that there is a lag in public reaction to changes in the economic conditions or bank fundamentals. As a result, it is crucial the use of lags in the models to capture this temporal restriction.

We classify the explanatory variables in two major groups. In the first, we put variables that change through time and affect all banks in a similar way. These we call "macro-variables". In the second group, we put bank specific variables –what we think of as "fundamentals"– and these vary by across banks and through time.

Macro variables included are: the monthly seasonally adjusted change in the economic activity level index (*Activity*) as constructed by INDEC, which is an indicator of the real side of the economy, and six month non deliverable forwards (*ndf6*) quoted in New York as proxy of expectations on the future evolution of the exchange rate (ARG$/US$) six months ahead. We do not include variables such as the overnight inter-bank rate (call rate) or the usual sovereign risk variables because of the very high correlation between those variables and the non deliverable forward (0.9 and 1.0, respectively).

We expect deposit react positively to activity performance and negatively to devaluation expectations, as increases in activity should imply better banks portfolio and higher devaluation risk could result in balance sheet problems.

Bank fundamentals variables come from balance sheet data with the exception of the interest rates. In addition, we included dummy variables to differentiate among public, foreign and privatized banks. Table 1 summarizes briefly the variables used.

The bank sample contains 51 retail banks that were active during the relevant period. Since we do not have interest rate observations for some banks in all months, the banks included in each exercise varies from 46 to 49 in cross section regressions and between 49 and 51 in panel data regressions.

IV. Econometric Methodology

Data analysis was conducted in two steps. First, we used panel techniques to study the data from the complete period (Jan-Nov) and, separately, from the first six months of 2001 and from the critical period of July to November. We were

TABLE 1

FUNDAMENTALS DESCRIPTION

Deposit $	Monthly percentage change in term deposits of private sector denominated in pesos.
Deposit US$	Monthly percentage change in term deposits of private sector denominated in dollars.
Exposure	Fraction of public bonds and loans to the public sector to total assets.
Problemloan	Monthly percentage change in problem loans.
Rate $	Interest rate on 30 days deposits in pesos.
Rate US$	Interest rate on 30 days deposits in dollars.
Fincome	Ratio of net financial income to total assets.
Loan $	Loans in pesos as fraction of total loans.
Loan US$	Loans in dollars as fraction of total loans.
Rating	Bank rating conducted by the Central Bank as of June 2001.
Dumpub	1 if the bank is public, 0 otherwise.
Dumfor	1 if the bank is foreign capital, 0 otherwise.
Dumpupri	1 if the bank was public and now privatized, 0 otherwise.

looking to see how the determinants of private sector time deposits changed as the crisis intensified. Second, we did a month by month cross-section analysis of the critical period, to look more closely at what determined deposit changes.

Given that we had a dynamic panel (we included the first and second lag of the dependant variable for the models in pesos and up to the third lag for the ones in dollars), we used a Arellano-Bond technique with instrumental variables.

As mentioned before, we chose two horizons to run the different models. First, we considered the complete period and, second, we focused the analysis in the months that follow the July bank run (i.e., what we call the critical period).

Three factors determined the selection of the estimation method. First, characteristics proper to the data. We need to choose a procedure that allows for the presence of non-observable factors of the banks. Second, particular properties of the dependant variable should be taken into account. Deposit performance has a naturally cyclical dynamics, so that the methodology should permit that variable to show inertial behavior. The third aspect –frequently not taken into account in empirical work but highly important– is the so called “reversed causality”. That is, as some explanatory variables are probably jointly determined with the dependant variable (term deposits), the endogeneity of such variables has to be controlled.

Taking these factors into account, the proper estimator is the Generalized Method of Moments estimator (GMM) for dynamic panel data models proposed by Arellano and Bond (1991). This estimator allow one to control for the non-

observable characteristics of banks and the potential endogeneity of the explanatory variables.

The Arellano and Bond method takes the first difference of all the variables of a dynamic panel model which has k lags of the dependant variable as regressors. Through this first difference bank specific effects are eliminated, but, by construction, correlation is introduced between the differences in the lag dependant variable and the differences in the errors. To solve this problem, Arellano and Bond propose the use of lags of the explanatory variables in levels –including dependant variable lags– as instruments.

The GMM estimators will be consistent if the lags of the explanatory variables in levels are valid instruments for the explanatory variables in differences. That is, when the error term does not have serial correlation and the independent variables are weakly exogenous. These two characteristics are evaluated through a second order serial correlation test and a Sargan test for over-identification restrictions, respectively. With the Sargan test one evaluates jointly model specification and the validity of instruments.

$$\Delta dep_{it} = \alpha + \sum_{h=1}^{H} \beta_h \Delta dep_{it-h} + \sum_{k=1}^{K} \sum_{t=0}^{t} \gamma_j r_{it-j} + \sum_{k=1}^{K} \sum_{t=0}^{T} \delta_{kt} x_{it}^{k} + \sum_{m=1}^{M} \sum_{t=0}^{T} \varepsilon_{mt} W_t^m + \mu_{it}$$

with $\mu_{it} = \mu_i + \nu_t + e_{it}$

And regressors:

– Predetermined: $E(x_{it}\, v_{is})$ 0 for $s < t$

– Strictly exogenous: $E(x_{it}\, v_{is}) = 0$ for all s, $t = 1, 2....T$

In the second part of section V we show the results of cross-section regressions using OLS, where we take into account the need for robust estimations of the standard deviations[1] to control for possible heteroskedasticity problems. In all cases –deposits in pesos and dollars– robustness tests indicate that every estimated model is well specified and that coefficient estimations are robust. These results can be seen in Table 4 for the change in deposits in pesos and in Table 5 for the change in deposits in dollars.

V. Results

5.1 Dynamic panel regressions

In the first column of Tables 2 and 3, we show the results of the analysis of the first 11 months of 2001 for deposits denominated in local currency (*Deposit $*) and dollars (*Deposit US$*), respectively. In the second column of Tables 2

(pesos) and 3 (dollars), are the results for the first six months of the year and in the third column we give the results for the critical period.

Some general comments first. Note that given the degrees of freedom of the models, in all cases the p value of the Sargan Test is one, so we can reject the null hypothesis that the model is badly specified. As the model is in differences, we check for the existence of second order autocorrelation. From an Arellano-Bond test on the residuals, we can reject second order autocorrelation in every period and sample that we use.

First we consider the model for deposits in pesos. We discuss the results for the "macro" variables, *Activity* and *ndf6*, which in a fixed exchange rate regime can be considered the market's evaluation of the level and probability of a devaluation. Then we look at the variables that we believe describe the bank fundamentals and should help explain differences among banks.

Both of the macro variables are significant in all of the three samples for deposits in pesos. As expected, the sign on *Activity* is strongly positive (somewhat less so in the critical period) and the sign on *ndf6* is negative for all periods and strongly so for the entire period and the critical period, when the expectations of a devaluation were growing. Both of these variables can be interpreted as affecting bank fundamentals. Declines in *Activity* are likely to worsen the portfolio of all banks. Increases in *ndf6* (six month non-deliverable forwards) imply that the probability of a devaluation is increasing and, for a banking system heavily dollarized and with a lender of last resort only in pesos, this can generate serious balance sheet problems.

The signs (negative) and values for the autoregressive components of the model imply a process of possible overshooting with a correction in the following period or two. The autoregressive processes are convergent with a cycle in the full and critical samples. In the first half of the year, the first lag is not significantly different from zero. This suggests that individuals were not responding to new information as rapidly in the first half of the year as in the critical period and therefore did not need to correct as much for overshooting.

The results for the micro variables also provide strong support to the bank fundamentals hypothesis of bank runs. In each sample, a large number of the micro variables are strongly statistically significant and, although the specific variables that are significant change with the sample, they change in a way consistent with what one might expect from the micro foundations of banking.

The coefficient on dollar deposits tells us that during the first half of the year, individuals were, in general, not changing banks, but were changing their deposits from pesos to dollars at the margin. The coefficient on lagged dollar deposits in all samples says that peso deposits followed the pattern of dollar deposits with a one month lag (and in less than equal amounts). Those banks that gained or lost dollar deposits, suffered a similar change in peso deposits a month later.

During the quieter first half of the year, neither financial income nor interest rate differences among banks help to explain pesos deposit changes but both become significant during the critical period. Banks with higher relative financial income attracted deposits as did those who were willing and able to pay higher

interest rates. The results with the cross section regressions will help to clarify this result.

Loans $, the fraction of total loans that are in pesos, are not significant until the critical period when the lagged value does help to explain peso deposits. As the expectations of a devaluation rises, those banks with a higher fraction of peso loans are better protected from the solvency problems that a devaluation could create and are better risks for peso deposits.

The role of the government becomes clearer looking at banks' exposure to government debt and comparing the results for public, private domestic, and private foreign banks. Those banks with higher government debt were consider better risks during the first half of the year, but this variable, *Exposure*, ceases to be significant in the critical period. During the critical period, higher government loans meant greater risk to government default but also might be interpreted as implying a higher probability of a government rescue. Large public and private domestic banks held substantial government debt in the critical period, while foreign banks tended to reduce their exposure. The dummy for public banks supports this conjecture as it is positive in the first half of the year and later becomes not significant.

TABLE 2

PANEL DATA MODELS IN PESOS

	a) January-November	b) January-June	c) July-November
Deposit $ LD	**−0.1296** **	−0.0079	**−0.3737** ***
Deposit $ L2D	**−0.2634** ***	**−0.2710** **	**−0.3076** ***
Deposit US$ D	−0.0274	**−0.8992** **	0.1530
Deposit US$ LD	**0.3895** ***	**0.3951** ***	**0.4505** ***
Rate $ D	**0.0062** *	0.0054	**0.0155** ***
Fincome LD	0.1315	0.0863	**7.4993** *
Loans $ D	0.0569	−0.0434	−0.0358
Loans $ LD	0.0887	−0.1581	**0.7547** ***
Problemloan L2D	0.0000	−0.0728	0.0000
Exposure L2D	−0.1107	**0.7760** ***	−0.7113
ndf 6 D	**−0.4114** ***	**−2.0717** *	**−0.3031** ***
Activity LD	**2.2347** ***	**2.3760** ***	**4.8586** *
dumpub	**0.0165** *	**0.0299** *	−0.0070
dumpupri	**0.0187** **	**0.0360** *	−0.0182
dumfor	**0.0276** **	0.0150	−0.0045
C	−0.0092	0.0099	−0.0235
Sargan Prob>chi²	**1.0000**	**1.0000**	**1.0000**
No 2nd order autocorr. Pr>z	**0.336**	**0.5484**	**0.6931**

Significance levels: * 10%, ** 5%, *** 1%.

For deposits in dollars (Table 3), the general result is that during the first half of the year, there was relatively little differentiation among banks but that during the critical second half of the year, bank fundamentals became much more important.

For the macro variables, *Activity* is never significant but *ndf6* is significant and negative in both the entire sample and during the critical period. This can help explain the system wide decline in dollar deposits during the last few months of the year, as the *ndf6* rose, the probability of a devaluation increased and, remembering earlier experiences with dollar deposits during devaluations, individuals began to move their deposits abroad, home, or into safety deposit boxes.

The autoregressive process for dollar deposits is very similar to that for peso deposits except that now a third lag is significant for both the full period and the critical sample.

Only three of the micro variables are significant during the first half of the year. Higher lagged increases in deposits in pesos, higher interest rates for dollar deposits, and being a foreign bank matter. In the second half of the year, interest rates on dollar deposits and financial income are both significant and positive. Loans in dollars change in the same direction as deposits. Interestingly, dollar deposits in foreign owned banks did not behave significantly differently than deposits in local banks during the critical period.

TABLE 3

PANEL DATA MODELS IN DOLLARS

	a) January-November	b) January-June	c) July-November
Deposit US$ LD	**−0.1584** ***	−0.0612	**−0.4521** ***
Deposit US$ L2D	**−0.2605** ***	**−0.2272** ***	**−0.3883** ***
Deposit US$ L3D	**−0.1402** *	−0.1084	**−0.3076** ***
Deposit $ D	−0.0056	−0.0848	**0.0771** *
Deposit $ LD	**0.0549** **	**0.0599** ***	**0.1126** *
Rate US$ D	0.0070	**0.0221** *	**0.01281** **
Fincome LD	0.1942	0.0513	**2.3747** ***
Loans US$ D	−0.0444	0.0161	0.0430
Loans US$ LD	0.0800	0.0775	**0.2745** *
Problemloan L2D	**−0.0000** ***	−0.1410	0.0000
ndf 6 D	**−0.2107** ***	−0.0409	**−0.1576** ***
Activity LD	−0.1208	0.0990	−0.1140
dumpub	0.0075	0.1105	0.0027
dumpupri	0.0061	0.0138	−0.0106
dumfor	**0.0124** **	**0.0155** **	0.0153
C	−0.0032	−0.0149	0.0010
Sargan Prob>chi²	**1.0000**	**1.0000**	**1.0000**
No 2nd order autocorr. Pr>z	**0.3415**	**0.4320**	**0.4619**

Significance levels: * 10%, ** 5%, *** 1%.

5.2 Cross-section regressions

In this section, we analyze the results from month by month regressions of the bank specific determinants of term deposits held by private sector, separately for peso and dollar denominated deposits. As mentioned above, we consider only the months belonging to the critical period (i.e., July to November). Since these are monthly cross section regressions, there is no sense in including macro variables.

The motivation for this analysis comes from our expectations that the significant cross sectional variables for describing bank deposits will change from month to month. If there is sufficient variation in the results, we can use these to infer which of the two theories mentioned in this paper is best supported.

The results of these cross section regression are in line with those explained above for the panel regressions. The F-tests show that bank fundamentals matter jointly in every month. In each month a substantial number of bank specific variables are individually significant. By considering which variables were significant in each month as the crisis progressed, we hope to better understand the detailed anatomy of bank runs. Table 4 shows the coefficients for the cross section regressions on peso deposits.

TABLE 4

CROSS-SECTION MODELS IN PESOS

	July	August	September	October	November
Deposit $ L1	−0.1448	0.4334	**0.2278** **	−0.1038	0.0507
Deposit $ L2	0.2386	−0.0796	**−0.5952** ***	0.1557	**−0.3925** **
Deposit US$ L1	−0.3222	**0.6930** ***	−0.5918	−0.4794	**0.0803** ***
Deposit US$ L2	−0.2282	**1.3881** *	−0.0137	−0.673	−0.6312
Rate $	**0.0243** *	**0.1999** *	0.0143	0.0199	0.0038
Rate $ L1	**−0.0711** **	−0.0303	**−0.3570** **	**−0.0259** *	**−0.0296** **
Rate $ L2	–0.0003	0.0224	**0.0375** **	0.0009	**0.0276** **
Fincome L1	**15.8956** ***	−12.2938	−16.259	**8.5511** **	3.4202
Fincome L2	**−22.9505** **	10.3233	7.6210	0.2267	**−9.9110** ***
Loans $ L1	**−0.9864** **	−0.0286	**0.8090** ***	0.1207	−0.2817
Loans $ L2	**0.9335** *	0.0973	**−0.6908** ***	−0.1954	0.3909
Problemloan L2	0.2667	0.0000	**−0.6529** **	**−1.5091** **	0.6317
Exposure L2	−0.0023	−0.1007	−0.2467	−0.4173	−0.0582
Rating	0.0022	0.0001	−0.0039	**−0.0066** *	0.0037
dumpub	0.0302	−0.0069	**0.1864** *	0.0746	0.0825
dumpupri	0.0579	0.0814	**0.2149** *	−0.1410	**0.2023** **
dumfor	−0.0625	0.1760	0.0484	−0.0212	**0.0209** ***
C	0.2806	−0.2070	**−0.2305** **	0.1635	**−0.3106** ***
Prob > F	**0.0001**	**0.0000**	**0.0000**	**0.0000**	**0.0000**
R^2	**0.5153**	**0.6702**	**0.8043**	**0.8000**	**0.7201**

Significance levels: * 10%, ** 5%, *** 1%.

During the July bank run, those banks that lost most peso deposits, were those who had most increased the fraction of their loans in pesos, who had experienced greater declines in their financial income, and who had least increased the interest rates they offered on pesos deposits. The positive effect of higher interest rates continues through August, but for the rest of the months, those banks which most raised their interest rates on peso deposits were those which most lost deposits. This suggests that by the end of the crisis, the public began interpreting high interest rates as related to liquidity or solvency problems. In September, banks that were most moving out of dollar loans into pesos loans gained the most peso deposits, but those with increases in problem loans did worse in both September and October. In September, there was a small advantage for public banks but that disappeared. In November it was privatized public banks and foreign banks that least lost deposits. In both September and November, the constant is significant and negative. This suggests a generalized run on banks and might considered as support for the sunspot hypothesis. The financial income results for September are interesting. In October, the coefficient on this variable is positive, so that higher financial income meant higher deposits, while in November the coefficient on exactly the same data (now with two lags) has a significantly negative sign. It could be that increased financial income was first viewed as a positive sign and only later was it viewed as implying that the bank with higher financial income were taking on greater risk.

The results for the monthly cross section results on dollar deposits are shown in Table 5. As with pesos, the bank fundamental variables are jointly significant in every month. In July the autoregressive part of the equation is important and has two interpretations. The fourth lag is positive and corresponds to March, when there was an earlier and smaller bank run. This coefficient explains the similarities between the way banks were run in March and in July. The coefficients on the second and third lags imply that those banks that best recovered from the March run were those least affected in July. The autoregression coefficients for August and September imply that the behavior of deposits of August was similar to that of July but of lesser magnitude and that this behavior was reverted in September. The positive coefficient on the third lag in November measures the similarity with the declines in August.

The relationship between deposits and dollars and lagged deposits in pesos change sign in October. The shift from peso to dollar deposits changed into a general exit from the financial system.

The change in the sign of financial income during the crisis is notable. Higher financial income has a positive sign for the first three months, it becomes insignificant in October and then changes to a negative sign in November. The argument given for this variable in the section on peso deposits above is further strengthened by the results here.

Exposure to government debt seems to matter much less for dollar deposits than for peso deposits. Initially public banks did better but as the crisis progressed, foreign banks gained dollar deposits until October when the lost dollar deposits

TABLE 5

CROSS-SECTION MODELS IN DOLLARS

	July	August	September	October	November
Deposit US$ L1	0.7449	**0.1971** ***	−0.1365	**−0.7712** **	**−0.3211** ***
Deposit US$ L2	**1.3171** ***	0.3058	**0.1925** ***	0.3505	−0.1241
Deposit US$ L3	**−1.4799** ***	0.0430	−0.2425	−0.1953	**0.1726** *
Deposit US$ L4	**0.9804** ***	0.0874	0.1878	−0.2353	0.0632
Deposit $ L1	0.0259	−0.0494	0.0383	**0.4091** ***	**0.0778** ***
Deposit $ L2	**−0.3077** **	−0.0131	**−0.0970** **	**0.2587** *	0.0448
Rate US$ L2	**−0.0445** *	−0.0119	−0.0069	−0.0064	0.0046
Rate US$ L3	0.0229	0.0029	0.0036	0.0064	**−0.0106** ***
Fincome L1	**3.6675** *	**2.6897** **	**2.6669** **	1.8825	**−1.9127** **
Loan US$ L1	0.0910	0.1793	**0.0617** **	**0.3657** ***	**0.3459** **
Loan US$ L3	**−0.2217** **	**−0.2524** ***	−0.0557	−0.1995	**−0.2832** **
Exposure L2	**−0.4655** **	0.2804	−0.0477	−0.0457	−0.0490
dumpub	**0.1077** *	**0.0398** *	0.0150	0.0259	−0.0003
dumfor	−0.0259	**0.0437** **	**0.0395** **	**−0.1174** *	−0.0149
dumpupri	**0.1025** *	0.0628	**0.0496** *	0.0006	−0.0082
C	0.2626	0.0202	0.0179	−0.0114	−0.0004
Prob > F	**0.0204**	**0.0000**	**0.0000**	**0.0000**	**0.0000**
R^2	**0.7876**	**0.5869**	**0.6280**	**0.6770**	**0.5817**

Significance levels: * 10%, ** 5%, *** 1%.

relative to the rest of the system. Different from the case with pesos, the constant is never significant.

VI. Conclusions

In this paper we try to explain the variation in term deposits using different banks characteristics together with general economic variables. We use these results as evidence towards determining if a bank run is best explained by a self-fulfilling prophecy theory or by bank fundamentals.

Working with panel data and cross section regressions for the critical period after the run in July, we found:

a) In panel data, in all cases several bank fundamentals (interest rates, problem loans, loans, exposure to public risk, financial income or dummies differencing banks) have statistically significant coefficients with the sign expected according to solvency theory.

b) In monthly cross section models, included fundamentals are jointly significant in all months. At the same time, variation in coefficients size and in their significant is observed. Variables that were considered positive early in the crisis, such as high financial income, were later viewed as indicating greater risk.

Regarding macro variables, it is interesting to distinguish between the sample in pesos and the sample in dollars. As for *Activity*, note that it is only relevant for peso deposits, and with the expected positive sign. In the case of exchange risk, devaluation expectations are negative and significant both for peso and dollar deposits. This result can be interpreted as saying that the Argentine banking crisis was really an exchange rate crisis.

Notes

[1] Maximum Likelihood estimators do not differ in a significant way from those obtained from lineal regressions when the last come from robust estimation of their standard deviations (STATA 5, Data Management Reference P-Z, p. 155).

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