Capital Restrictions as an Explanation of Stock Price Distortions during Argentine Financial Collapse: December 2001 – March 2002

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I. INTRODUCTION

By the last quarter of 2001, Argentina entered into one of the most important financial and economic crises of its history. The crisis was characterized by huge bank deposit withdrawals, a significant decrease in Central Bank reserves, the abandonment of the Argentine peso peg against the dollar, the country's formal declaration of the largest debt default in history, and a GDP decrease of 4.4% in 2001 and 10.9% in 2002. Paradoxically, in the middle of this financial and economic collapse, the Argentine stock market boomed, shown by an increase in the MERVAL index (local index) of 115% (in Argentine pesos) between the end of November 2001 and the end of March 2002. This was contrary to what happened in other emerging countries' financial crises, such as Mexico, Malaysia or Korea during the 90's, whose stock markets declined by roughly 50%.

At the beginning of December 2001, before the debt default declaration and devaluation, extensive restrictions on bank deposit withdrawals and international transfers were imposed, in order to stop the severe decline in government reserves and local bank deposits, as well as to prevent a speculative attack to the local currency. This group of restrictions was named the Corralito. Under the Corralito's restrictions, it was legal to purchase Argentine stocks using frozen bank deposits, including stocks that were cross-listed in international stock markets.

This paper analyses the impact of the introduction of capital restrictions as an explanation of the stock market boom during this period. In particular, through the stock market, investors were able to evade the capital controls and transfer their wealth out of Argentina. The mechanism worked as follows: Argentine investors purchased stocks in the Buenos Aires Stock Exchange (BCBA – "Bolsa de Comercio de Buenos Aires") using their frozen bank deposits, converted them into American Depositary Receipts (ADRs) in U.S.

stock markets, and finally sold the ADRs and deposited the proceeds in the U.S. banking system. This paper also compares and analyses the differences of the Corralito's impact on cross-listed stocks (ADR stocks) and non cross-listed stocks (non-ADR stocks).

The paper is organized as follows. Section II provides an overview of the Argentine crisis and a detailed description of the capital controls introduced by the Corralito. Section III analyses the price impact of the Corralito on ADR and non-ADR stocks. Section IV qualitatively and quantitatively examines the reasons for the stock price distortions generated by the capital controls by decomposing the premium on ADR and non-ADR stocks. Finally, Section V analyses how local and global factors that have influence in stock pricing changed after the Corralito introduction and during the period in which Argentine stock market was closed.

II. OVERVIEW OF ARGENTINE CRISIS AND CAPITAL CONTROLS

II.1 Brief History of 2001-2002 Argentine Crisis

The 2001-2002 Argentine crisis was among the most severe of its history. The currency-board, under which the Argentine peso had been pegged at parity against the U.S. dollar since 1991, collapsed in January 2002, and by the end of March 2002, the Argentine peso was trading at 3 pesos per U.S. dollar. The crisis came after three years of economic recessions and had a devastating economic and social impact, reflected by the fall in GDP of about 20% over a three year period (2000 - 2002), the default of government debt, the collapse of the banking system, a deep corporate crisis, social unrest, and violent demonstrations against the government. In the following graph, we show the quarterly evolution of Argentine GDP and the peso price of the dollar from 1991 to 2002.

Graph 1: GDP and Exchange Rate Evolution
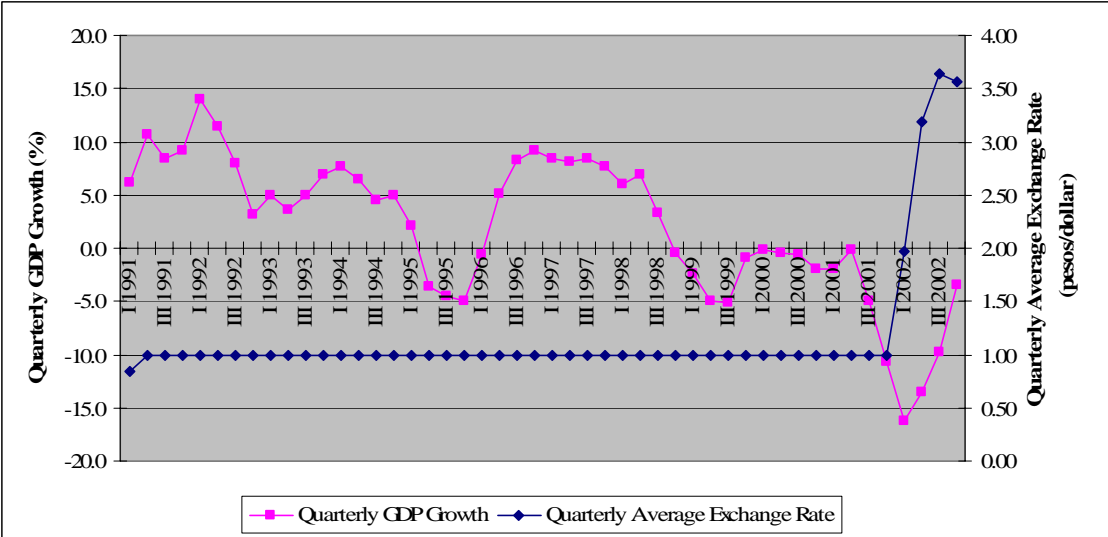
Source: CEI, IMF and The Economist

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II.2 Description of Capital Controls introduced by the Corralito

Through the Corralito, the government imposed several restrictions on bank deposit withdrawals. In particular, only 250 pesos (250 U.S. dollar at the time it was implemented) per week per account could be withdrawn from banks' accounts and only 1,000 pesos were allowed to be taken abroad. An official permit was required to make foreign payments above this amount. In addition, all investors were prohibited from transferring funds outside the Argentine banking system. The Corralito was established on December 3, 2001, and was announced as a temporary measure to stop the significant capital outflows that the country was suffering. From July 2001 to November 2001, more than $15 billion was withdrawn from Argentina's banks. In particular, in the three days from November 28 to November 30, 2001, $3.6 billion, 6% of total deposits, left the banking system.

Under the Corralito, it was allowed to use the frozen bank deposits in excess of the 250 pesos per week to buy stocks that traded in the Argentine stock market. If the purchased stock was also listed in the U.S., it could be converted into an ADR and sold in the U.S., depositing the dollar proceeds in the U.S. banking system.

II.3 Stock Market Boom

As we can see in Graph 2, until the introduction of the Corralito, Argentine local index, the MERVAL, was decreasing at a significant rate, reflecting the economic conditions of the country. From June 1, 2001 to November 30, 2001, the MERVAL dropped by 53.5%. However, after the Corralito's introduction, the Argentine stock market increased significantly, even though the Argentine economy was collapsing. In fact, the MERVAL increased by 69.5% since the Corralito introduction on December 3, 2001 until the beginning of January 2002, just before the currency peg abandonment. In Argentine

pesos terms, the MERVAL increased by 115% from the Corralito imposition to the end of March 2002.

Graph 2: MERVAL Evolution
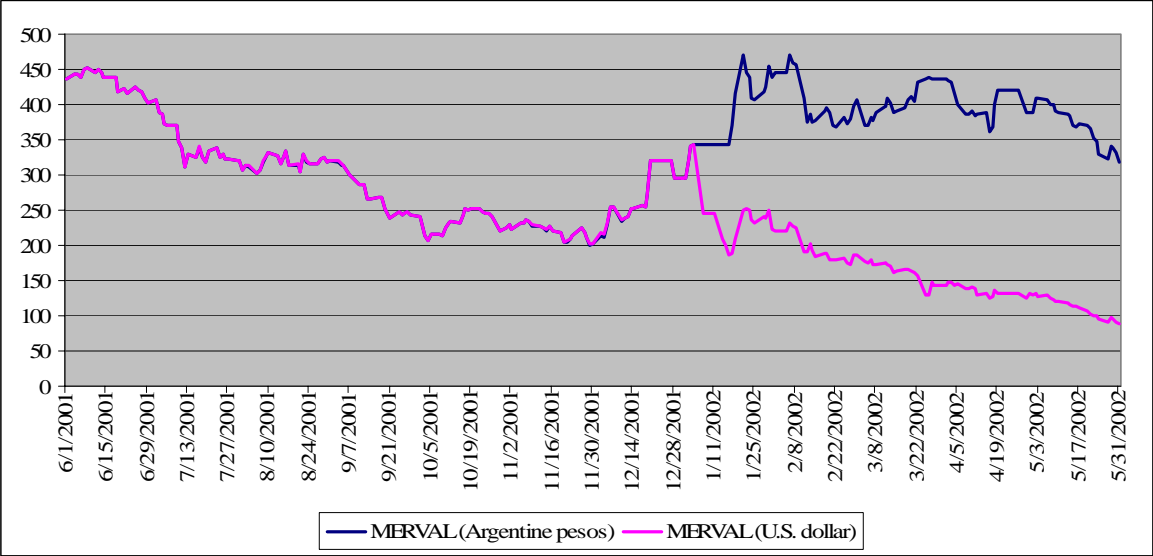
Source: DataStream

II.4 Time Line of Important Economic, Financial and Political Events

In order to analyze the impact of the introduction of capital controls on the local stock market, it is important to know the time line of the main economic, financial and political events during the period December 2001 - March 2002.

Table 1: Main Events in Argentine Crisis

Date	Events
December 3, 2001	The Corralito's restrictions are imposed.
December 19, 2001	Economy Minister Domingo Cavallo resigns.
December 20, 2001	President Fernando De La Rua resigns. President of the Senate Ramon Puerta becomes interim President. Stock market is closed since December 21, 2001.
December 23, 2001	Adolfo Rodríguez Saá is elected President by Legislative Assembly. He announces partial suspension of external debt payments.
December 28, 2001	Stock exchange is re-opened after being closed for 7 days.
December 30, 2001	Rodríguez Saá resigns. Head of Lower House Eduardo Camaño becomes interim President.
January 1, 2002	Eduardo Duhalde is elected President by the Legislative Assembly.
January 4, 2002	Financial press suggests that devaluation is imminent. Devaluation estimate is approximately 40%.
January 6, 2002	The convertibility law (currency board) is abolished by the Congress. A dual exchange rate regime is introduced; one fixed at 1.40 pesos per U.S. dollar for foreign trade operations, and the other freely determined by the market. Financial markets are closed since January 7, 2002.
January 11, 2002	The exchange rate market is re-opened and the new exchange rate regime is implemented.
January 17, 2002	Stock exchange is re-opened after being closed for 10 days.
February 3, 2002	U.S. dollar deposits are "pesoized"[1] at 1.4 pesos per U.S. dollar. The dual exchange regimes established in January 6 are unified in a floating exchange rate regime.
March 25, 2002	ADRs conversion restrictions are announced with the objective of regulating capital outflows through ADRs.

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[1] Mandatory conversion of dollar-denominated deposits to pesos-denominated deposits at 1.4 pesos per dollar rather than at the prevailing market exchange rate.

III. OVERVIEW OF IMPACT OF CAPITAL CONTROLS ON LOCAL STOCK MARKET

III.1 Description of Data

In order to analyze the impact of the introduction of capital controls on stock prices, we separated Argentine stocks in two groups:

- Stocks traded in the local stock market and cross-listed in U.S. stock markets, and

- Stocks only traded in the local stock market.

As at December 2001, 25 Argentine firms were cross-listed in U.S. stock markets: 11 in the New York Stock Exchange (NYSE), 3 in the NASDAQ and 11 were private placements only available to institutional investors.

Based on these groups of stocks, we created three portfolios:

- *ADR Stock Portfolio:* Equally weighted portfolio denominated in U.S. dollar and composed by the following 11 stocks that traded in the BCBA and were cross-listed in the NYSE.

    Table 2: Stocks included in ADR Stock Portfolio

    BBVA Banco Frances
    Cresud
    Grupo Galicia
    IRSA
    Metrogas
    Petrobras
    Siderca
    Telecom Argentina
    Telefonica Argentina
    Transportadora Gas del Sur
    YPF

- *ADR Portfolio:* Equally weighted portfolio denominated in U.S. dollar and composed by ADRs representing the cross-listed stocks included in the ADR stock portfolio. To be comparable with the other portfolios, ADR prices were converted to

a per share basis by dividing the ADR price by the number of Argentine shares that
the ADR represented.

- *Non-ADR Stock Portfolio:* Equally weighted portfolio denominated in U.S. dollar
and composed of the 28 most traded stocks in the BCBA, excluding cross-listed
stocks. The following firms were included in the portfolio.

Table 3: Stocks included in Non-ADR Stock Portfolio

Acindar Industria Argentina de Aceros SA
Agrometal
Aluar
Atanor SA
Banco de Galicia y Buenos Aires
Banco Hipotecario SA
Banco Macro Bansud SA
Boldt
Carlos Casado SA
Celulosa Argentina
Central Puerto SA
Cynba
Dycasa SA
Gas Natural BAN (Argentina)
Grupo Consorcio del Oeste
Hipotecario
Juan Minetti SA
Ledesma SA
Longvie
Molinos Rio de la Plata
Polledo SA
Quickfood SA
Renault Argentina
SA Importadora y Exportadora Patagonia
San Miguel
Sociedad Comercial del Plata SA
Solvay Indupa SAIC
Transener SA
Acindar Industria Argentina de Aceros SA

Local stock prices were converted to U.S. dollars using the dollar/peso spot

exchange rate at the close of each day.

III.2 Evolution of Cross-Listed Stock Prices

In the following graph, we show the price evolution of the ADR stock portfolio and

the ADR portfolio between October 2001 and May 2002. Note that in order to compare

local stock prices with ADR prices, ADRs were converted to the number of underlying

shares using the ADR conversion factor. Transaction costs of ADR conversions were

ignored.

Graph 3: ADR Stock Portfolio and ADR Portfolio
(at the Corralito imposition on 11/30/01 = 100)
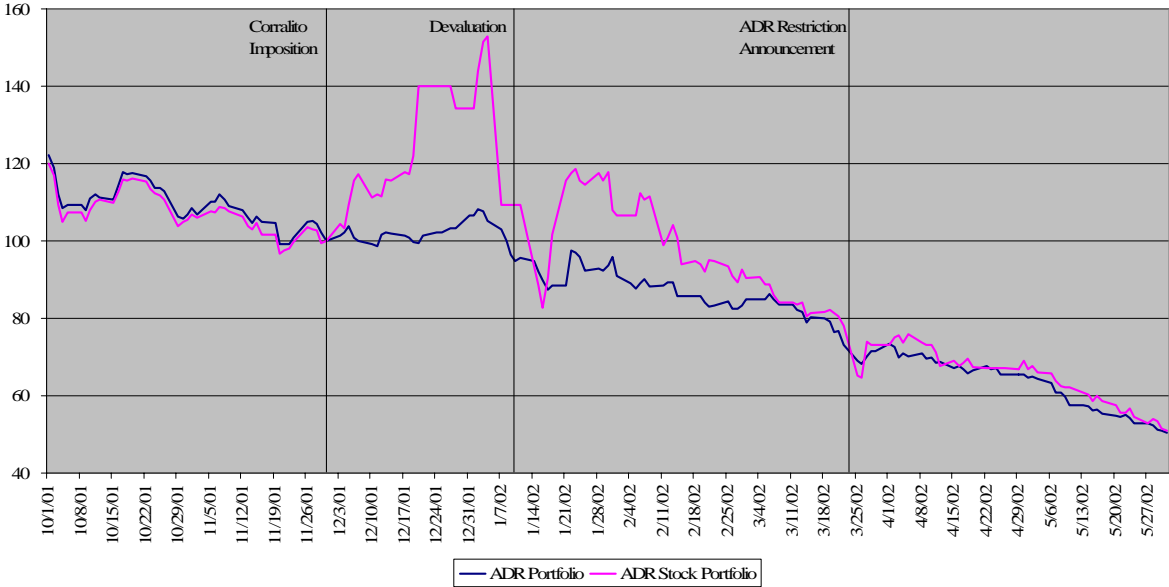
Source: DataStream

As we can see from the graph, before the introduction of the Corralito, the gap

between local share prices and ADR prices was minimal and may be explained by

transaction costs. The weighted average deviation between local share prices and ADR

prices was 0.16% during the period from June 1, 2001 to November 30, 2001 (see Table 4).

The fact that ADRs and their underlying securities moved together is in line with finance

literature that suggests that the law of one price hold for cross-listed stocks after adjusting

for exchange rate differences and transaction costs, leading to no arbitrage opportunities.

However, after the Corralito introduction in December 2001, the deviation between

local share prices and ADR prices increased significantly. While ADR prices were stable,

local share prices were increasing at an astonishing rate. This gap between the local shares

and the ADRs represented the premium that investors were willing to pay to transfer their

wealth from their frozen bank deposits in Argentina into the U.S. financial system, and explained the violation of the law of one price. The premium reached a peak of over 40% just before the peso peg abandonment in January 2002, implying the significant premium that investors were willing to pay to avoid losses in their frozen peso-denominated deposits that a potential devaluation would cause. Table 4 shows that for 7 of the 11 stocks analyzed in this portfolio, their maximum premium was reached on January 3 or January 4, 2002, days before the currency peg collapse, implying that a significant component of the premium was due to investors' expectations of an imminent devaluation. After Argentine's devaluation, the premium, though significant, decreased to lower levels and it tended to disappear, by the end of March 2002, after the announcement of certain restrictions that diminished Argentine investors' incentives to continue using the ADR vehicle.

In Exhibit 1, we show the evolution of the ADR premium for the two most liquid cross-listed stocks: Telecom Argentina and Petrobras.

In the following table, we show the average premium of the local shares over the ADRs for the 11 stocks and ADRs included in the ADR stock portfolio and ADR portfolio. Note that days where the BCBA was closed (December 21 – December 27, 2002 and January 7 – January 16, 2002) were excluded from the calculation.

Table 4: Premium per ADR Stock[23]

	Pre-Corralito 6/1/01 - 11/30/01		Post-Corralito and Pre-Devaluation 12/3/01 - 1/10/02			Post-Devaluation 1/11/02 - 3/25/02		Post-ADR Restriction 3/26/02 - 5/31/02	
	Average	Peak	Average	Peak	Peak Day	Average	Peak	Average	Peak
BBVA Banco Frances	-8.62%	-2.52%	16.03%	48.29%	1/21/2002	6.79%	64.79%	-3.05%	9.95%
Cresud	0.77%	4.44%	8.58%	40.50%	1/4/2002	10.74%	38.98%	3.49%	13.11%
Grupo Galicia	-4.27%	2.60%	24.32%	61.07%	1/21/2002	8.10%	85.37%	-2.43%	11.11%
Irsa	2.13%	5.71%	19.54%	37.99%	1/3/2002	13.37%	28.60%	4.40%	13.34%
Metrogas	-2.67%	4.00%	5.19%	33.33%	12/20/2001	7.62%	28.27%	-1.07%	26.32%
Petrobras	0.14%	5.56%	28.49%	76.68%	1/4/2002	14.25%	39.80%	6.12%	15.87%
Siderca	0.07%	4.12%	30.54%	66.88%	1/3/2002	14.74%	33.81%	5.51%	14.57%
Telecom Argentina	0.19%	7.10%	26.97%	53.38%	1/4/2002	13.27%	36.90%	4.64%	16.67%
Telefonica Argentina	-0.46%	21.11%	17.27%	30.75%	1/29/2002	11.27%	32.71%	-8.24%	14.29%
Transportadora Gas Sur	-0.02%	7.22%	26.88%	57.79%	1/4/2002	12.11%	28.99%	0.88%	12.90%
YPF	1.61%	11.80%	19.16%	46.60%	1/4/2002	17.76%	43.55%	11.48%	33.29%
Average	**-1.01%**		**20.27%**			**11.82%**		**1.98%**	
Weigthed Average	**0.16%**		**21.62%**			**14.39%**		**4.53%**	

Source: DataStream

## III.3 Evolution of Non Cross-Listed Stock Prices

Although local stocks that were not cross-listed in U.S. stock markets did not represent, for Argentine investors, a vehicle to shift their wealth from Argentina to the U.S., they represented a better investment option than investors' current status quo of maintaining their frozen bank deposits. In particular, Argentine stocks were more liquid than Argentine bank deposits and were a better hedge alternative against a potential devaluation or "pesoization" of bank deposits.

In the following graph, we show the price evolution of the non-ADR stock portfolio compared with the price evolution of the ADR stock portfolio between October 2001 and May 2002. Note that a comparison between these two portfolios is meaningful as they are very strongly positive correlated. In particular, before the Corralito the correlation between the non-ADR stock portfolio and the ADR stock portfolio was 0.994, while after the Corralito introduction it slightly declined to 0.947.

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[2] Premium was calculated as (Stock Price – ADR Price) / ADR Price and was not adjusted for transaction costs. ADR Price was calculated on a per share basis using the ADR conversion factor.
[3] Weighted average based on market capitalization.

Graph 4: ADR Stock Portfolio and Non-ADR Stock Portfolio
(at the Corralito imposition on 11/30/01 = 100)
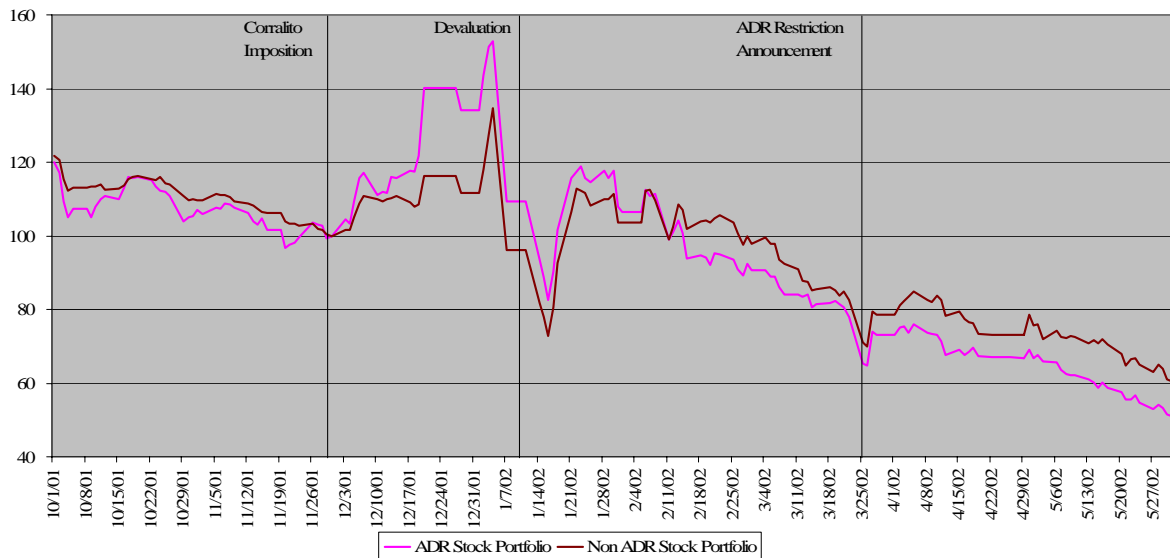
Source: DataStream

As in the case of the ADR stock portfolio, the non-ADR stock portfolio reached a peak during the days before of the currency peg collapse, showing the significant impact of expectations of devaluation on the premium of non-cross listed stocks. However, the increase in stock prices was not as high as in the case of cross-listed stocks.

IV. DECOMPOSITION OF STOCK PREMIUM

IV.1 Estimated Composition of ADR Stock Premium

Under an efficient market, the price of local stocks reflects the fundamental value of the firms, and is the main factor that determines the price of ADRs. However, in the presence of capital controls, such as the Corralito, local stock prices were distorted as local stocks represented a vehicle for Argentine investors to move their deposits out of Argentina. As the Corralito only affected Argentine investors, and not foreign investors, ADR prices were not distorted and, under this scenario, could be considered a close estimate of the fundamental value of the stocks.

Under the hypothesis that ADRs reflected the fundamental price of the stock, the deviation between local share prices and ADR prices should represent the premium that Argentine investors were willing to pay to:

- Convert its frozen deposits, that could be partially or totally lost in value (by a potential reprogramming of deposits or bankruptcy of the financial institution), into liquid stocks (*liquidity premium*),

- Transfer wealth from Argentina to the U.S. (*control capital avoidance premium*), and

- Convert its peso-denominated deposits (or U.S. dollar-denominated deposits), which had a high probability of losing value through the local currency devaluation (or a significant threat of "pesoization"), into U.S. dollar-denominated securities or deposits in the U.S. banking system (*exchange rate hedge premium*).

As analyzed in Section III, the expectation of the abandonment of the currency peg was key in explaining the ADR stock and non-ADR stock price peak by the beginning of

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January 2002, just before the exchange rate collapse. In order to estimate investors'

devaluation expectations, we calculated the daily-expected devaluation rate as the

percentage difference between the spot exchange rate and the one-week non-deliverable

forward (NDF) exchange rate (mid bid-ask).

In order to estimate the average premiums previously described, we regressed the

value of the ADR stock portfolio (S_A) against the value of the ADR portfolio (A), the

expected devaluation rate (D) and two dummy variables (0 or 1) according to whether the

data analyzed was before or after the Corralito imposition (X_1), and before or after the ADR

restriction announcement (X_2):

$$S_A = \beta_0 + \beta_1 A + \beta_2 D + \beta_3 X_1 + \beta_4 X_2 + \varepsilon$$

While β_2 should reflect the impact of a D percent expected devaluation on the

value of the ADR stock portfolio (exchange rate hedge coefficient), β_3 should represent

the liquidity and control capital avoidance premium created by the Corralito, and β_4 the

control capital avoidance premium that should have disappeared when ADR conversions

were restricted. This analysis assumes that the exchange rate hedge coefficient, and the

liquidity and control capital avoidance premium are constant during the period. Under this

assumption, we can estimate the individual premiums:

Exchange Rate Hedge Premium = $\beta_2 D$

Control Capital Avoidance Premium = - β_4

Liquidity Premium = $\beta_3 + \beta_4$

The period regressed was from June 1, 2001 to May 31, 2002, excluding the days in

which the local stock market was closed (13 business days). The following regression was

obtained (see Exhibit 2 for regression details):

$$S_A = -0.49 + 0.98\,A + 0.87\,D + 7.15\,X_1 - 5.68\,X_2 + \varepsilon \quad (R^2 = 99.4\%)$$

Based on the above regression, the control capital avoidance and liquidity premium imbedded in the ADR premium were 5.68% and 1.47% respectively. The estimated exchange rate hedge coefficient was 0.87, which implies that an expected devaluation of the Argentine peso of 1% generated a 0.87% increase in the ADR stock portfolio value. In the following graph, we show the evolution of the ADR premium based on its three components compared with the observed premium caused by the Corralito introduction.

Graph 5: Estimated Premiums for ADR Stock Portfolio
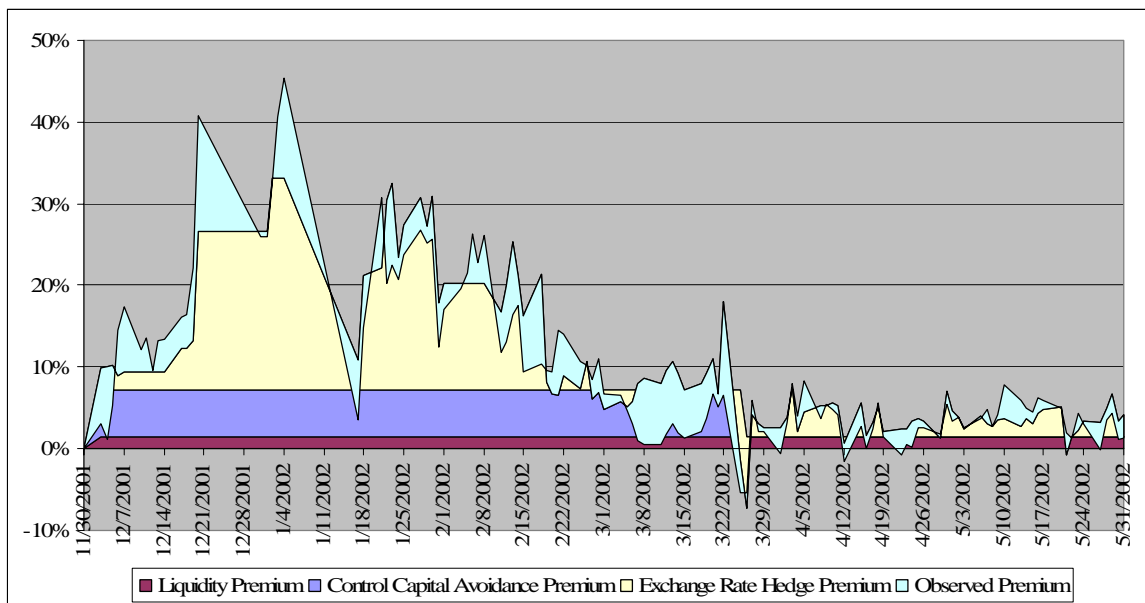
Source: DataStream

Our assumption of constant premiums over the period is an explanatory reason for certain deviations between the sum of our estimated premiums and the observed premium. In particular, the exchange rate hedge coefficient should be higher before the "pesoization" of U.S. dollars bank deposits in February 2002, and in particular previous the currency peg collapse. In fact, the exchange rate coefficient was $\beta_2 = 1.11$ before the peso-peg abandonment and $\beta_2 = 0.64$ after it. Moreover, even though the ADR conversion restrictions were announced by late March 2002, the easing of bank withdrawals

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restrictions in February and March 2002 should have lowered the control capital avoidance

and liquidity premium, partially explaining the gap between the sum of our estimated

premiums and the total observed premium during this period.

IV.2 Estimated Composition of Non-ADR Stock Premium

While by buying non-cross listed stocks, investors were not able to transfer their

wealth from Argentina to the U.S. (control avoidance premium), local shares, in theory,

provided higher liquidity than frozen bank deposits and a partial hedge against the

exchange rate risk. We have to note that even though stock prices in the BCBA are

denominated in Argentine pesos, investors would be willing to pay a partial exchange rate

hedge premium considering that part of the firms' cash flows are in foreign currencies.

In order to estimate the average liquidity and exchange rate hedge premiums, the

value of the non-ADR stock portfolio (S_N) was regressed against the value of the ADR

portfolio (A), the expected devaluation rate (D), and a dummy variable (0 or 1) according to

whether the data analyzed was before or after the Corralito imposition (X_1):

$$S_N = \beta_0 + \beta_1 A + \beta_2 D + \beta_3 X_1 + \varepsilon$$

This analysis also assumes that the exchange rate hedge coefficient and the liquidity

premium are constant during the period, and therefore:

Exchange Rate Hedge Premium $= \beta_2 D$

Liquidity Premium $= \beta_3$

The period regressed was from June 1, 2001 to May 31, 2002, excluding the days in

which the local stock market was closed. The following regression was obtained (see

Exhibit 3 for regression details):

$$S_N = 29.6 + 0.73 A + 0.52 D - 0.19 X_1 + \varepsilon \quad (R^2 = 98.4\%)$$

The exchange rate hedge coefficient obtained for the non-ADR stock portfolio is 0.52, implying a 0.52% increase in the price of non-ADR stocks for every 1% of devaluation expected. This is lower than the coefficient obtained for the ADR stock portfolio, but it is reasonable considering that non-cross listed stocks did not completely eliminated the exchange rate risk, but only partially mitigated it. The results from the regression imply that the capital controls did not introduce a liquidity premium on non-cross listed stocks, as its coefficient (β_3) is close to 0 and is not statistically significant. Cross-listed stocks are naturally more liquid than non-cross listed stocks (one of the main reasons for issuing ADRs in international markets is to increase the stock's liquidity), and investors may have been willing to pay a premium only for the extra liquidity offered by stocks with ADRs traded in the U.S. Therefore, Argentine investors were disposed to purchase non-cross listed stocks only to have a partial hedge against the devaluation, but they were not willing to pay an additional premium for the extra liquidity that these stocks may offer compared to investors' frozen bank deposits.

Selling pressures after the acquisition of non-cross listed stocks may partially explain the lower price increase in this group of shares. Investors that used their frozen bank deposits to purchase these stocks may have sold the shares acquired if they were able to move the peso proceeds out of the financial system and convert them into U.S. dollars in the exchange rate black market. This issue was not quantified in this analysis, and would require further investigation.

V. ADR MARKET PRICING CHANGES INTRODUCED BY CAPITAL CONTROLS

In Section III and Section IV, we showed the pricing distortions in local shares resulting from the introduction of capital controls. In this section we analyze whether or not the Corralito caused significant changes in the pricing of ADRs, particularly during the days in which the underlying securities were not trading, as the local stock market was closed.

We regressed the ADR portfolio returns (R_A) against a local index returns (MERVAL in U.S. dollar - R_M) and an international index returns (S&P500 - $R_{S\&P}$) before and after the Corralito introduction (June 1, 2001 – November 30, 2001 and December 3, 2001 – May 31, 2002, excluding the periods in which BCBA was closed):

$$R_A = \beta_0 + \beta_1 R_{S\&P} + \beta_2 R_M + \varepsilon$$

We also analyzed the ADRs pricing during the two periods in which the underlying local stock market was closed, but the ADRs were trading in the NYSE: December 21 – December 27, 2001, and January 7 - January 16, 2002:

$$R_A = \beta_0 + \beta_1 R_{S\&P} + \varepsilon$$

In the following table we show the results from the regressions (see exhibits 4, 5 and 6 for regression details):

Table 5: ADR Pricing Regression Results

	Pre-Corralito	Post-Corralito	BCBA Closed
β_1	0.230	0.406	0.824
β_2	0.622	0.098	N.A.
SE β_1	0.091	0.246	0.751
SE β_2	0.038	0.043	N.A.
t-stat β_1	2.530	1.650	1.100
t-stat β_2	16.380	2.300	N.A.
R^2	70.60%	10.70%	9.90%

N.A. : Not Applicable

The results suggest that the Corralito introduction made the ADR portfolio more

dependent on the international market than the local market, which reflected a premium

over the fundamental value of the stocks. In fact, the beta on the local market portfolio

decreased from 0.62 before the Corralito to 0.10 during the Corralito. On the other hand,

the ADR portfolio was more affected by international market conditions during the

Corralito, as the beta on the international market portfolio increased from 0.23 before the

Corralito to 0.41 during the Corralito. This is reasonable, as the Corralito's restrictions only

affected Argentine investors, and not investors in the U.S. Argentine investors' incentives

to invest in their local stock market were not in line with the market conditions that foreign

investors were facing in the U.S. stock markets, where the ADRs trade. It is important to

mention that while the local and international indexes explained more than 70% of the

variance of the ADR portfolio returns before the Corralito, they only explained 11% of the

variance of the ADR portfolio returns during the Corralito.

During the period in which the underlying local stock market was closed (13

business days), the ADR portfolio correlation with the international market increased

significantly. In particular, the beta on the international market portfolio increased to 0.82.

It is important to consider that the regression is based on only 13 data points, that the t-statistic of the coefficient was not statistically significant and that the international index explained only roughly 10% of the variance of the ADR portfolio returns.

VI. SUMMARY

The introduction of capital controls in the middle of the Argentine crisis created a significant distortion in both cross-listed and non cross-listed local stock prices. Argentine investors used the local stock market to escape the capital controls imposed by the Corralito. In particular, by purchasing ADR stocks, converting them into ADRs and selling them in U.S. stock markets, Argentine investors were able to transfer their wealth from their frozen bank deposits in Argentina to the U.S. banking system. By doing so they were not only able to avoid the local capital controls, but to completely eliminate the devaluation risk that the Argentine peso was suffering, while increasing the liquidity of their investment. For these reasons, Argentine investors were willing to pay a significant premium for the local stocks, assuming an instant loss when they converted the stocks into ADRs that trade in the U.S. This premium varied during the period December 2001 – March 2002 according to the significance of the control capital, devaluation and liquidity risks, reaching a peak of over 40% just before the currency peg abandonment at the beginning of January 2002.

Even though their increase was lower than the one observed in ADR stock prices, non-ADR stock prices were also significantly impacted by the Corralito. While local stocks that were not cross-listed did not represent a vehicle for Argentine investors to transfer their funds abroad, they represented a partial hedge for a potential devaluation. According to our estimates, Argentine investors were willing to pay an average premium of 0.87% per every 1% expected devaluation for ADR stocks, but only an average premium of 0.52% per every 1% expected devaluation for non-ADR stocks during the analyzed period. Our analysis shows that, even though non cross-listed stocks should have higher liquidity than frozen bank deposits, Argentine investors were not disposed to pay a premium for this concept

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when buying these stocks. However, as stocks that are cross-listed have a significant higher liquidity, an average liquidity premium of approximately 1.50% was attached to these stocks during the analyzed period. Finally, according to our calculations, an average capital control avoidance premium of approximately 5.70% was paid by Argentine investors when buying cross-listed stocks during the analyzed period.

The introduction of the Corralito not only distorted local stock prices, but also produced changes in the pricing of Argentine ADRs traded in the U.S. While before the Corralito, most of the variation on the returns of Argentine ADRs was explained by the Argentine stock market, after the introduction of capital controls, local conditions explained very little the changes in ADR returns. On the contrary, during this period, the correlation of Argentine ADR returns with the international market increased. This trend was even more significant during the period in which the local stock market was closed.

Some of these features result from the specific policies adopted in Argentina, but others may reflect the general distortions that follow from capital controls. In part, they produce sharp differences between local and international prices of capital, and potentially distort the allocation of capital internally. These costs would need to be considered when evaluating the overall impact of capital controls on the economy.

EXHIBIT 1 – PREMIUM FOR TELECOM ARGENTINA AND PETROBRAS[4]

ADR-Stock Premium - Telecom Argentina

Legend: Telecom Argentina

ADR-Stock Premium - Petrobras

Legend: Petrobras
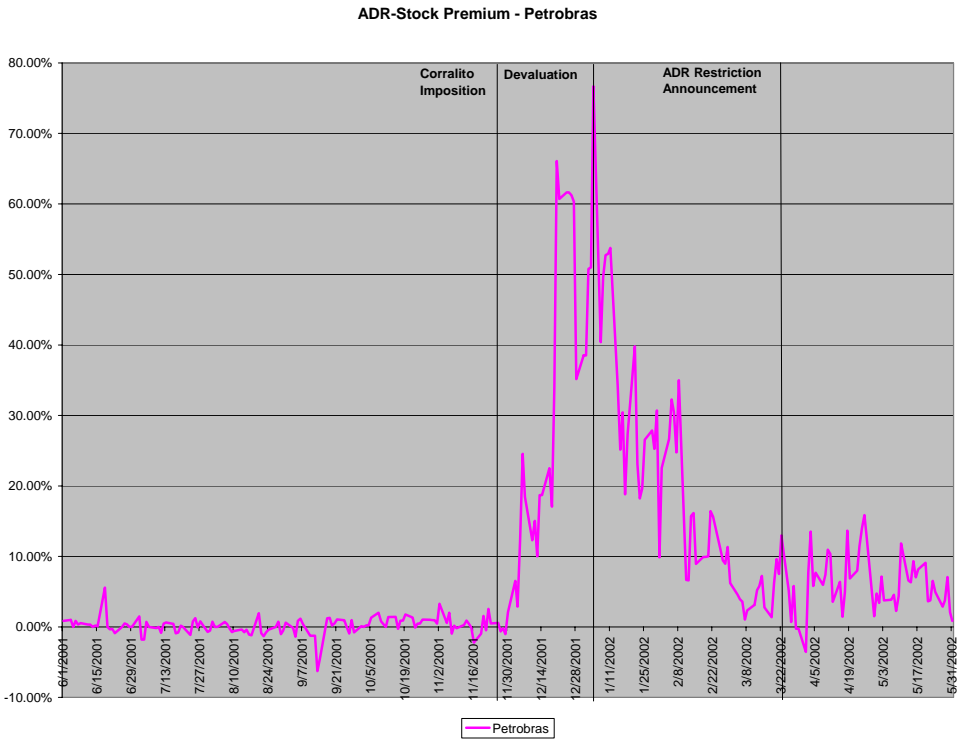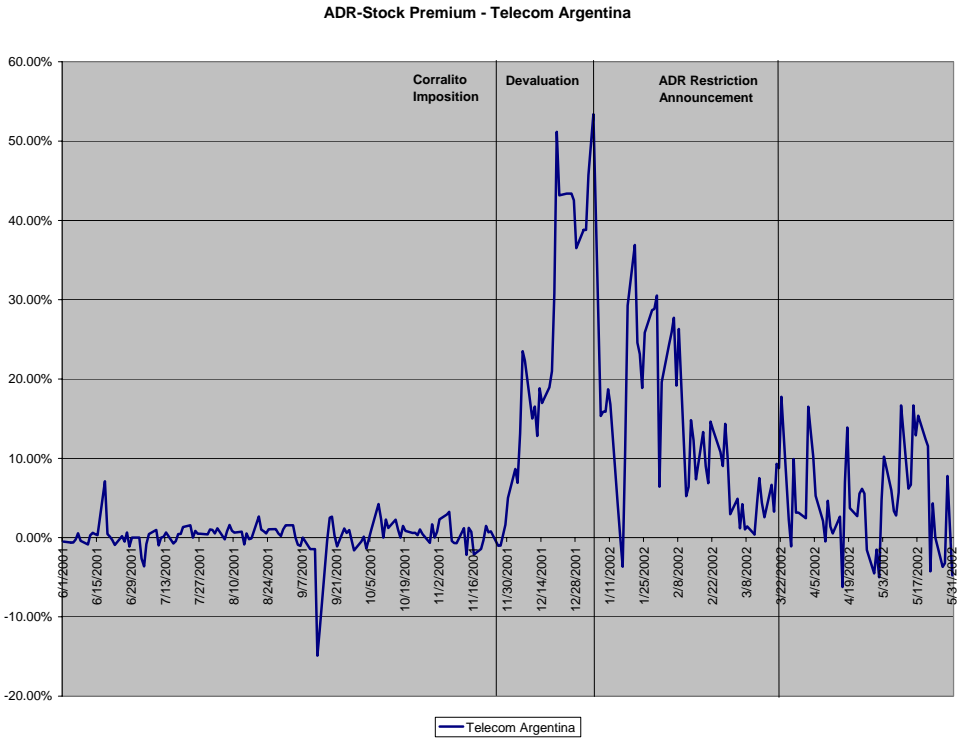
Source: DataStream

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[4] Premium was calculated as (Stock Price - ADR Price) / ADR Price and was not adjusted for transaction costs. ADR Price was calculated on a per share basis using the ADR conversion factor.

EXHIBIT 2 – REGRESSION ADR STOCK PORTFOLIO PREMIUM

```
ADR Stock Portfolio = - 0.49 + 0.985 ADR Portfolio + 7.15 Corralito
                      - 5.68 ADR Restriction Announcement
                      + 0.867 Exp Devaluation (%)


Predictor                        Coef   SE Coef        T      P
Constant                       -0.489     1.231    -0.40  0.692
ADR Portfolio                0.984883  0.007846   125.52  0.000
Corralito                      7.1546    0.8406     8.51  0.000
ADR Restriction Announcement  -5.6794    0.7623    -7.45  0.000
Exp Devaluation (%)           0.86702   0.04183    20.73  0.000


S = 3.57796   R-Sq = 99.4%   R-Sq(adj) = 99.4%


Analysis of Variance

Source            DF      SS      MS        F      P
Regression         4  487994  121999  9529.77  0.000
Residual Error   243    3111      13
Total            247  491105
```

EXHIBIT 3 – REGRESSION NON-ADR STOCK PORTFOLIO PREMIUM

Non-ADR Stock Portfolio = 29.6 + 0.730 ADR Portfolio - 0.193 Corralito
+ 0.523 Exp Devaluation (%)

```
Predictor                Coef    SE Coef       T      P
Constant               29.608      1.476   20.06  0.000
ADR Portfolio        0.730231   0.009388   77.78  0.000
Corralito             -0.1932     0.9804   -0.20  0.844
Exp Devaluation (%)   0.52301    0.04780   10.94  0.000


S = 4.42478   R-Sq = 98.4%   R-Sq(adj) = 98.3%


Analysis of Variance

Source           DF      SS     MS        F      P
Regression        3  285493  95164  4860.61  0.000
Residual Error  244    4777     20
Total           247  290270
```

EXHIBIT 4 – REGRESSION PRE-CORRALITO ADR RETURNS

ADR Portfolio Return = - 0.00212 + 0.230 S&P500 Return + 0.622 MERVAL Return

```
Predictor          Coef    SE Coef       T      P
Constant       -0.002121   0.001100   -1.93  0.056
S&P500 Return    0.22977   0.09087     2.53  0.013
MERVAL Return    0.62169   0.03795    16.38  0.000


S = 0.0123221   R-Sq = 70.6%   R-Sq(adj) = 70.2%

Analysis of Variance

Source           DF        SS        MS       F      P
Regression        2  0.046412  0.023206  152.84  0.000
Residual Error  127  0.019283  0.000152
Total           129  0.065695
```

EXHIBIT 5 – REGRESSION POST-CORRALITO ADR RETURNS

ADR Portfolio Return = - 0.00306 + 0.406 S&P500 Return + 0.0983 MERVAL Return

```
Predictor           Coef    SE Coef      T      P
Constant        -0.003063  0.002582  -1.19  0.240
S&P500 Return      0.4063     0.2461   1.65  0.103
MERVAL Return     0.09832    0.04281   2.30  0.025


S = 0.0216564   R-Sq = 10.7%   R-Sq(adj) = 8.1%


Analysis of Variance

Source          DF         SS          MS      F      P
Regression       2  0.0038367   0.0019184   4.09  0.021
Residual Error  68  0.0318918   0.0004690
Total           70  0.0357286
```

EXHIBIT 6 – REGRESSION ADR RETURNS WHEN UNDERLYING STOCK MARKET WAS CLOSED

ADR Portfolio Return = - 0.00745 + 0.824 S&P500 Return

```
Predictor          Coef    SE Coef      T      P
Constant       -0.007454  0.005102  -1.46  0.172
S&P500 Return     0.8237    0.7505   1.10  0.296


S = 0.0177143   R-Sq = 9.9%   R-Sq(adj) = 1.7%


Analysis of Variance

Source          DF         SS          MS      F      P
Regression       1  0.0003780  0.0003780   1.20  0.296
Residual Error  11  0.0034517  0.0003138
Total           12  0.0038298
```

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