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A COUNTRY-RISK APPROACH TO THE BUSINESS CYCLE. WITH AN APPLICATION TO ARGENTINA

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Abstract

The paper holds that the country risk premium is the triggering factor of the business cycle in a small, financially open and highly volatile economy like that of Argentina. A rise of the premium determines a capital outflow, an aggregate demand contraction and a recession; a fall of the premium determines a capital inflow, an aggregate demand expansion and a boom. We build a model where country risk plays a central role in macroeconomic equilibrium. We evaluate the empirical relationship between country risk and GDP, consumption, investment, and the current account balance. We compare our country-risk model with those of various schools of macroeconomic thought. Main conclusions are: a) Country-risk perceptions of foreign and local investors determine the fraction of world income they like to spend in the small country and the country's GDP adjusts passively to that fraction. b) Country risk causes a sort of labor unemployment that resembles involuntary unemployment. c) Openness softens the impact of a rise in country risk. d) Argentine time series for the period 1985-97 show a strong negative correlation between country risk and those aggregate variables, with causality going from the former to the latter.

JEL: E32, F41

Introduction

I see international finances as a control panel with as many boxes as countries there are in the World. Within each box there are two variables: the rate of return to investment projects in the country and the country risk premium. Each Monday morning, the boards of investment funds and banks meet in New York to balance returns and risks of their portfolios with the assistance of economic and political analysts. The first variable demands little discussion since the rate of return is a long-run phenomenon; in other words, the yield to fixed capital in a country varies slowly according to capital accumulation, progress in education, improvement of institutions and the discovery of natural resources. Board discussions concentrate on the evolution of the second variable. Risk premiums fluctuate largely. Not much in developed and stable countries but certainly a lot in underdeveloped and unstable ones. After scanning the uncertainty horizon of every country the boards take decisions to maximize the value of their world portfolios. In so doing, the macroeconomic fate of most countries is sealed until a new revision takes place. A highly volatile country like Argentina fits properly in this frame.

The country risk premium refers to the cost of macroeconomic or systemic uncertainty. It is the market value of risk associated with a bond that finances capital to be sunk in a country. With perfect foresight or for a perfectly stable country, the premium is null. On the contrary, for a country in the middle of a catastrophe (hyperinflation, banking panic) the premium tends to infinity. The market process determining the premium is complex and changing. We don't know the weight that is attached to every possible source of uncertainty in its formation. To understand what we are saying, compare the Argentine risk premium in the first half of 1982 with that in 1996. In 1982, Argentina was at war with the UK, public spending hovered 50% of GDP, annual inflation amounted to 260%, government was authoritarian, and the economy was largely closed to foreign trade; while in 1996 foreign policy was clearly pro-US, public spending was cut down to 25% of GDP, inflation was negligible, government was democratic, and the economy was relatively open to foreign trade and capital movements. In spite of the great change of scenario, the premium ranged between 1 and 2 percentage points in 1982 and couldn't fall below 7 points in 1996.

The paper holds that fluctuations of the country risk premium trigger the business cycle in a small economy under perfect capital mobility. A premium rise determines a capital outflow, an aggregate demand contraction and a recession, while a premium fall determines a capital inflow, an aggregate demand expansion and a boom. A deeper financial integration in the past two decades may have shortened the lag between the change in the premium and the change in economic activity to a few weeks, intensifying the cycle.

In the first section, we develop a simple model where country risk plays a central role in macroeconomic equilibrium. In the second section, we study the empirical correlation between the Argentine risk premium and GDP, consumption, investment and current account balance. In the third section, we contrast our approach with those of seven schools of macroeconomic thought with an active research agenda. Conclusions follow in the last section.

The main conclusions of the paper are: a) Country risk perceptions determine GDP and the other aggregate variables. Foreign and local investors make up their minds about the fraction of world income they want to spend in the country and the country's GDP adjusts passively to that fraction. b) A jump in country risk premium increases unemployment. The full price flexibility of sunken capital makes it impossible for the unemployed worker to land a job. c) Openness softens the impact of a jump in country risk. d) For the 1985-1997 period Argentine time series show strong negative correlation between country risk and GDP,

consumption, investment and current account balance. The quality of regressions is very good. Though less strong, regressions results for the 1993-2006 period are also good. Country risk seems to be a primary cause of the Argentine business cycle.

Over the last decade, Calvo and various co-authors have written on the business cycle in emerging markets including Argentina. For instance, Calvo, Izquierdo and Talvi (2003) offer an alternative explanation for the fall of Argentina's Convertibility Plan based on the country's vulnerability to sudden stops in capital flows. In our paper, however, we don't try to explain that episode nor the sudden stop phenomenon but the Argentine business cycle since the early 1980's based on the country-risk approach. In a later paper, Calvo, Izquierdo and Talvi (2006) provide an explanation for the Phoenix Miracles they observe in emerging markets (a Phoenix Miracle happens when output recovers with virtually no recovery in either domestic or foreign credit). With this goal they developed a model where firms get liquidity outside formal credit markets. In our paper there is no miracle. Recovery is simply explained by the falling country-risk premium and the resulting decrease of capital outflows that follow the end of the crisis. (A reduction of capital outflows implies an expansion of aggregate demand.)

I. A Simple Model

Figure 1: Country Risk and Long-Run Capital Stock
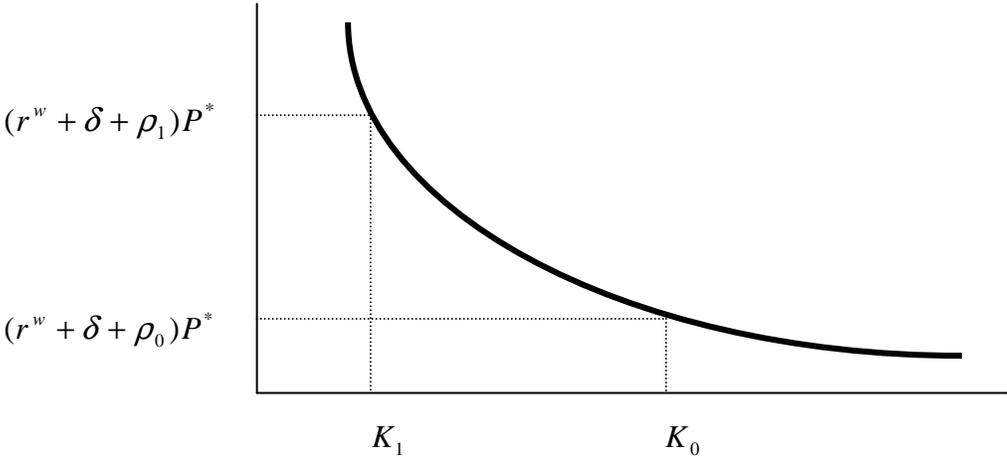
In Appendix I we have developed a dynamic model for a small open economy subject to perfect capital mobility and country risk. An infinite-lived individual produces, consumes, exports and imports one good. Besides, he imports a capital good which once invested can't be re-exported or consumed at home. So we have three nominal prices in the economy: the price of consumption goods (the system numeraire), the price of new capital goods P^*, and the price of sunken capital P. According to domestic demand conditions, P could be higher than, equal to or lower than P^*. When the economy grows and investment is positive and important, $P > P^*$; when the economy reaches its long-run position and investment equals capital depreciation, P tends to P^*; when the economy falls into recession and investment vanishes, $P < P^*$. Figure 1 shows the optimal capital stock for every country risk premium. The schedule measures the marginal product value of capital. In equilibrium, this variable must equal the rental price of capital. An increase in the premium determines a gradual fall

of the optimal capital stock until reaching its lower long-run level by means of technical depreciation.

The domestic interest rate is taken from the world market and equals the interest yield r^w on, say, the US Treasury bond plus the risk premium ρ that Wall Street assigns to the country. The individual allocates his savings to foreign bonds and capital goods invested in the country, thus earning r^w on his financial investments and the country's rental price of capital $w_K = r^w + \rho + \delta$ on his physical investments.

These equations sum up the main conclusions of the model developed in Appendix I.

15) $W = b(t) + \int_t^\infty e^{-r^w(s-t)} \left[f(k) - (r^w + \rho + \delta)k - \gamma(i) \right] ds$

12) $\lambda(t) = \lambda(0)$

13) $c(t) = g[\lambda(0)], \; g' < 0$

18) $\theta(t) = \int_t^\infty e^{-(r^w+\delta)(s-t)} \left[f'(k) - (r^w + \rho + \delta) \right] ds$

They explain the way through which changes in the country risk premium affect wealth, consumption, investment and the price of sunken capital. Equation 15 says that wealth is a negative function of the premium. Equation 12 shows the shadow price of savings, which is a negative function of wealth. Equation 13 says that consumption is a negative function of the shadow price of savings. Equation 18 says that the extra value of invested capital is a negative function of the premium. In short, a rise in the country risk premium determines a fall in consumption, investment and the price of invested capital. The fall in investment is a consequence of the fall in the price of invested capital.

Macroeconomic Equations

The discussion gets a distinct macroeconomic flavor when we define as absorption A the sum of consumption and investment:

i) $A = C(\rho) + I(\rho) = A(\rho), \; \dfrac{\partial A}{\partial \rho} < 0$

Based upon the above referred to behavioral relationships, equation i says that absorption is a negative function of country risk: the individual cuts consumption because the premium rise has erased part of his wealth and reduces investment because the high premium points to a lower optimal capital stock. We assume in equation ii that income is a positive function of absorption, according to Keynesian thought, and also a positive function of the capital stock. This means that income is a negative function of the country risk premium.

ii) $Y = Y[A(\rho), K(\rho)], \; \dfrac{\partial Y}{\partial A} \dfrac{\partial A}{\partial \rho} < 0, \; \dfrac{\partial Y}{\partial K} \dfrac{\partial K}{\partial \rho} < 0$

A rise in the country risk premium causes a short-run fall in income through absorption, a phenomenon we call recession, and also a long-run fall trough capital depreciation, something we call depression. This is the well-known double way through which investment hits upon income.

Empirical observation shows that income (or output) moves along the business cycle hand in hand with absorption yet at lower pace. A rationale for the different sensibility of absorption and (short-run) income with respect to country risk may be this: with perfect access to world capital markets, absorption of the small country is fundamentally driven by perceptions while income is restricted by resources and technology. Therefore, we may say that absorption and income fall in response to a rise in the country risk premium with absorption falling more: $\left| \dfrac{\partial A}{\partial \rho} \right| > \left| \dfrac{\partial Y}{\partial A} \dfrac{\partial A}{\partial \rho} \right|$. The current account (in the short run) is thus a positive function of the country risk premium:

iii) $CA = Y\left[A(\rho), K(\rho)\right] - A(\rho)$

Figure 2: Equilibrium in the Markets for Goods
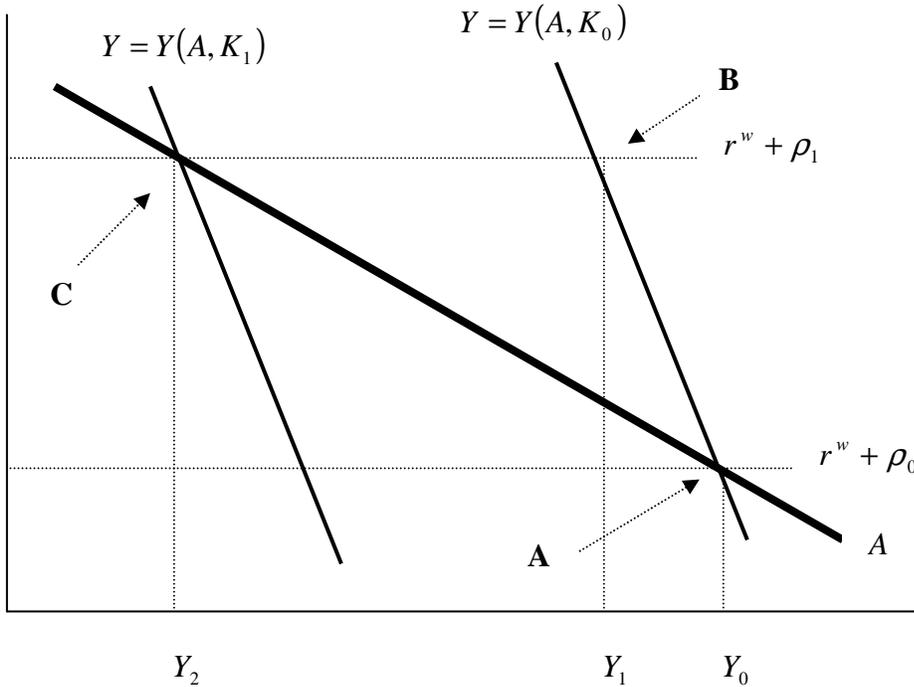
Figure 2 introduces a country-risk vision of macroeconomic equilibrium. Our model does not include a money market. Monetary forces were not an important factor in explaining the Argentine business cycle in the time we study.[1]

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[1] Necessity forced Keynes to include a money market in The General Theory: 1) In his closed-economy model, the liquidity trap played the same role as the capital account in our open-economy model: a hole that

In the figure absorption moves along a fixed absorption curve, and income moves along an income curve that shifts itself to the right when the capital stock increases or to the left when it decreases. The economic logic behind the absorption curve resembles the permanent income hypothesis. The agent forms his expectation of the potential wealth of the country based upon a few facts: size of the country (population), geographical location, endowment of natural resource (climate, coastal extension, water ways), and key forecasts on technical progress and the development of institutions beneficial to economic efficiency (openness to foreign trade, domestic markets competition; we exclude property rights from this list because the country risk premium is nothing but a market price closely related to their stability). For a premium equal to zero, the agent is able to estimate whether the country's potential per capita income corresponds to a rich country, a mid-income country or a poor country. We may question the accuracy of this kind of appraisal but it wouldn't be wise to question the existence of a process of continual revision of the national potential. It seems obvious that the individual as consumer and investor finds himself in need of an opinion in this respect. Assuming that the basic data of the country keeps unchanged, we can define absorption as an inverse function of the country risk premium. A rise in the premium causes a reduction in wealth and a fall in consumption; it also causes a rise in the gross return demanded from investment and a fall in investment.

In the face of a premium rise and a contracting absorption, consider now two scenarios: A) the country is able to export to foreign markets all the excess of production over absorption; B) the country can export only a part of the excess.

Scenario A: In this special case the income curve is a vertical line $\left(\dfrac{\partial Y}{\partial A} \dfrac{\partial A}{\partial \rho} = 0 \right)$. The rise in the premium leads to a fall in absorption with no impact on output since the whole surplus of production over absorption is automatically placed in foreign markets. While absorption goes at once from point A, the initial long-run equilibrium, to point C, the final long-run equilibrium, output stays at point A. The current account balance jumps from zero to a surplus equal to $Y_0 - Y_2$. As time goes by, the lack of investment reduces the capital stock and shifts the income curve to the left. The absorption and income curves cross finally at the higher domestic interest rate, income stops falling and the current account gets balanced again.

Scenario B: This is the general case with a downward sloping income curve. The rise in the premium leads to a fall in absorption, a lesser fall in income, and a current account surplus. Macroeconomic equilibrium goes from point A, where absorption equals income and current account is balanced, to points B and C. Absorption goes right away from point A to point C, income goes from point A to point B, and the current account jumps at once to a surplus equal to $Y_1 - Y_2$. As the capital stock wears away ($K_1 < K_0$), the income curve moves itself towards the left and income goes gradually from point B to point C. Once at point C, absorption and income are equal again though at a higher domestic interest rate, income stops falling, and the current account gets balanced again.

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swallows aggregate demand when "fundamental uncertainty" increases. 2) Also, the money market provided Keynes with an interest rate. In our model, the interest rate is imported from world capital markets. 3) While in the classical model (Marshall-Pigou) the interaction between the savings and investment curves threw the interest rate, for Keynes the mechanism that determines the interest rate became complex because he thought savings are endogenous.

Factor Market Behavior

Figure 3 focus upon the dynamics of factor markets in response to a jump in the country risk premium. Point A stands for the initial long run equilibrium; at this point absorption and income equal output Y_0 and the current account is balanced. Let's analyze scenarios A and B.

Figure 3: Factors Employment and Output Levels
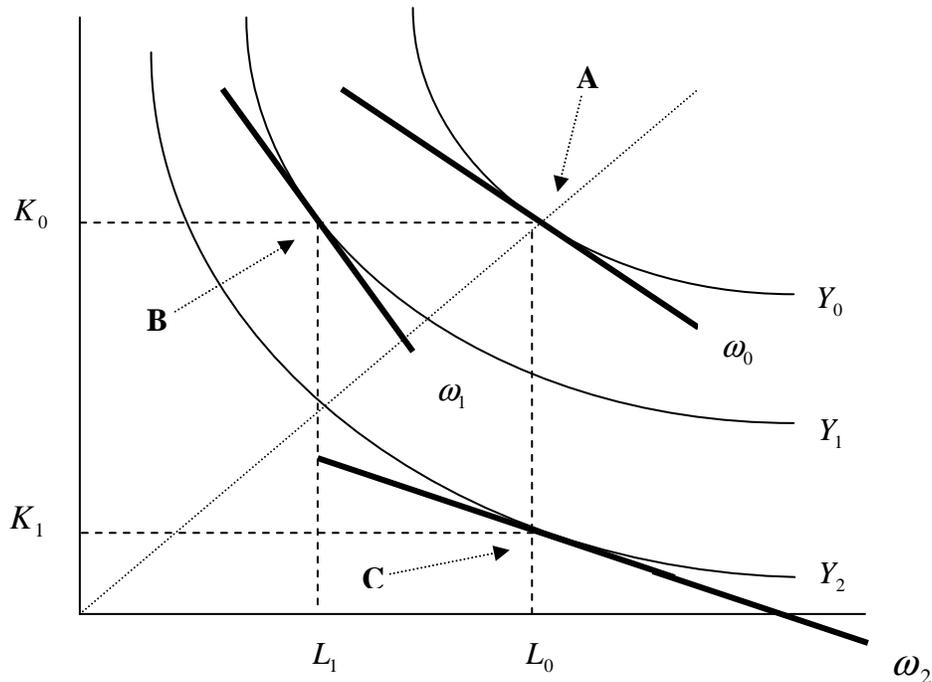
Scenario A: The premium rise determines a fall in absorption to the level of isoquant Y_2 at point C, an unchanged income at the level of isoquant Y_0 at point A, and a current account surplus. The rental price of capital doesn't change since the rise in ρ is compensated by the fall in P (price of sunken capital goods). The factors' relative price doesn't change either so the economy's capital-labor ratio keeps constant. However, since P is below P^* (price of new capital goods) the extra value of invested capital θ is negative and gross investment is zero. The capital stock starts to reduce towards its lower long-run level and output follows a parallel path to the Y_2 level. Regardless of the output contraction, labor keeps always fully employed. Along the adjustment process, the relative scarcity of capital increases, the relative price of capital increases, and the economy becomes less capital intensive. The reduction of the capital-labor ratio increases the gross return on sunken capital thus increasing θ. Once at point C, P gets a little bit higher than P^*, investment just equals capital depreciation, output stops falling and the current account becomes balanced again. As you may notice, the

ability to export most of the surplus of output over absorption sets a relatively shallow floor to the fall of P.

Scenario B: The premium rise determines a fall in absorption to the level of isoquant Y_2 at point C, a fall in income to the level of isoquant Y_1 at point B, and a smaller current account surplus than in the above scenario. Output passes at once from point A to point B. Capital and labor compete for producing the lower production level. Since the supply of invested capital is perfectly inelastic and the supply of labor is rather elastic (workers have a positive reservation wage), invested capital has the ability to drive labor out of production in the needed extent to guarantee full capital employment. The rental price of capital may fall to zero if necessary while the labor wage can't fall below the reservation wage. There is no way for a worker to land a job. If he offered the same effort in exchange for a lower wage or if the government cut the minimum wage, the rental price of capital would fall again to keep unchanged the higher capital-labor ratio at point B. Unemployed labor increases from nothing to $L_0 - L_1$. The full downward flexibility of the price of sunken capital creates a weird situation. The inability of workers to get employment looks very much as involuntary unemployment. Yet it is not because at any time the reservation wage of the unemployed worker is at least equal to the wage earned by the employed worker.

From point B to point C, the price of sunken capital is lower than the price of imported new capital, investment vanishes, and technical depreciation steadily reduces the stock of capital. Through this process, the relative scarcity of capital increases, the relative price of capital increases, the capital-labor ratio decreases, and output steadily falls to a lower long run level. At point C, the price of sunken capital becomes a little bit higher than the price of new capital goods, full employment of labor obtains again, output stabilizes at the level of isoquant Y_2, and the current account surplus disappears.

We have said that at point C the price of sunken capital becomes a little bit higher than the price of new imported capital. This statement looks paradoxical since ρ keeps high and undisturbed. Let's trace once more the path of P during the adjustment process. The jump in the premium reduces P while keeping constant the rental price of capital (the rise in ρ is compensated by the fall of P). To achieve capital full employment a reduction of the rental price of capital is called for. The economy manages to get it by means of an additional fall of P which is the result of an extra fall of θ. The shadow price of invested capital falls because the increase of the capital-labor ratio from point A to point B reduces the marginal product of capital, which is the other determinant of θ (Appendix I, equations 18 and 19). Once at point B, the capital stock starts wearing away, the capital-labor ratio starts going down and the marginal product of capital starts going up. At point C, P is effectively a little bit greater than $P*$ since θ must be a little bit above zero so that investment equals capital depreciation.

Theoretical conclusions

1. With perfect access to world capital markets and the assumptions behind the absorption curve, the country risk premium determines long-run income. Short-run income converges on its long-run level as the capital stock wears away. Being the country just a box in the

control panel of world finances, foreign and local investors make a decision on the fraction of world income they like to spend in the country and the country's GDP adjusts passively to that fraction.

2. A rise in the premium determines a jump in labor unemployment and there is no way for the unemployed workers to get jobs. This weird situation is created by the full flexibility of the price of sunken capital.

3. The greater the ability of the country to place in foreign markets its surplus of production over absorption, the smaller the unemployment of labor, the lesser the fall in the price of sunken capital, and the larger the current account surplus.

In the period 1982-1990 Argentina was a very high risk country, quite unable to export its surplus of production to foreign markets. Its macroeconomic behavior in that time bears resemblance to Scenario B. Output plummeted, the current account surplus soared, wages fell sharply, and the price of sunken capital underwent a great loss. Unemployed workers became public employees, taxi drivers or small shop keepers. As time went on and the economy traveled from point B to point C, factories became rusty and buildings were made their homes by intruders. The ever increasing country risk premium wouldn't let her reach the last point.

II. The Empirical Evidence

Figure 4: Relationship between Argentine Risk and GDP
Argentine risk measured in percentage points per year, vertical axis
GDP measured in constant 1986 pesos, horizontal axis
1985 IV – 1997 IV
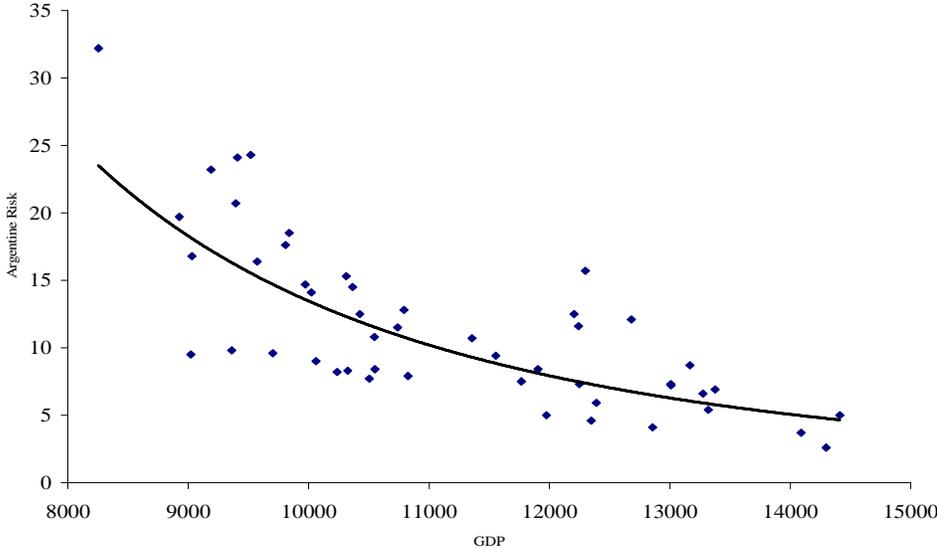
The high-risk Argentina of the 1980s gave birth to a new macroeconomic relationship. Instead of the Phillips curve which points to a negative correlation between the inflation rate and the

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rate of unemployment, the new curve emphasizes a negative correlation between the country risk premium and the economic activity level. The new curve should be named after Keynes since it fits nicely in the relationship between the "state of confidence" and the activity level that Keynes often mentioned in The General Theory. Figure 4 shows this relationship for the period 1985 IV – 1997 IV.

Now we present the estimated equations for the period:

1) $LGDP = 9.49 - 0.09LARP - 0.10LARP(-4) + 0.0056TREND$
   (180)   (-6.5)   (-6.8)   (11.8)

    R2: 93%   Prob. F-stat: 0.0000   D-W: 1.97

2) $LCON = 9.27 - 0.11LARP - 0.09LARP(-4) + 0.0062TREND + 0.32AR(1)$
   (130)   (-6.2)   (-4.8)   (9.2)   (2.3)

    R2: 94%   Prob. F-stat: 0.0000   D-W: 2.01

3) $LINV = 8.37 - 0.22LARP - 0.29LARP(-4) + 0.0100TREND + 0.32AR(1)$
   (49.8)   (-5.4)   (-6.6)   (6.3)   (2.2)

    R2: 93%   Prob. F-stat: 0.0000   D-W: 2.10

4) $SCA = -0.074 + 0.005ARP(-1) + 0.386SCA(-4)$
   (-9.9)   (9.4)   (5.0)

    R2: 86%   Prob. F-stat: 0.0000   D-W: 1.29

LGDP is log of GDP. LARP is log of Argentine risk premium for the current quarter. LARP(-4) is log of Argentine risk premium for the same quarter of the previous year. LCON is log of consumption. LINV is log of investment. TREND represents a trend variable to account for demographic growth and technical progress. SCA represents the current account as a share of GDP while ARP is the Argentine risk premium measured in percentage points.

Argentine risk premium data come from own calculations (1985 IV – 1992 IV) and from J. P. Morgan data bank (1993 I – 1997 IV). National accounts data come from official sources. We have used series at 1986 prices (Appendix II).

Empirical conclusions

1. As an explanatory variable of GDP, consumption or investment, the sign of the coefficient of the country risk premium is negative and statistically significant in all cases, whether the premium is a contemporaneous or a lagged variable.

2. The country-risk elasticity is important. A 20% premium rise (e.g. from 5 to 6 percentage points per year) determines a 1.8% contraction of current quarterly GDP (20% times 0.09), while consumption and investment fall 2.2% and 4.4% each.

3. When the rise in the premium spans for 4 consecutive quarters, quarterly GDP contraction increases to 3.8%, while the fall in consumption and investment increase to 4.0% and 10.2% each.

4. As an explanatory variable of SCA, the sign of the coefficient of the country risk premium is positive and statistically significant. On average, when Argentine risk premium increases by one percentage point SCA rises by half a percentage point of GDP. No serial correlation problems.

5. The quality of regressions is quite good. Basically one variable, the country risk premium, is enough to explain around 90% of the volatility of GDP, consumption, investment and current account balance. We haven't found problems of serial correlation in the estimation of the GDP equation. Regarding the estimations of the consumption and investment equations, we have added an AR(1) variable; the substitution of the dependent variable lagged one quarter for the AR(1) variable yields similar results.

6. Granger's causality tests yield very definite results. The likelihood of country risk premium being the cause of GDP is definitely higher than the likelihood of GDP being the cause of country risk premium, for lags of 1, 2, 3, 4, 5, and 6 quarters. The results of the test are the same for consumption and overwhelmingly so for investment and the current account balance.

7. The responsiveness of aggregate variables to country risk premium fluctuations diminishes when we take into account pre-1985 data. Responsiveness seems to be the highest since the hyperinflation event (1989-1990), moderate during the Plan Austral (1985-1987) and non-existent before the Plan Austral (June 1985). Three reasons may explain this observation: a) before 1985 public spending as percentage of GDP was larger; this fact may have contributed to a more stable aggregate demand; b) international financial arbitrage had not reached the rapidity it would reach later on; this fact may have contributed to a more effective monetary policy; c) the Argentine macroeconomic record was still not as traumatic as it would become after the hyperinflation episode; this fact may have contributed to a less attentive follow up of Argentine financial affairs.

8. Regression results should improve if we correct aggregate variables for seasonality and use the Argentine dollar long-term interest rate instead of the Argentine risk premium. We decided not to do so since correcting for seasonality may yield an unreliable outcome when applied to the highly volatile Argentine macroeconomic time series, and because we wanted to show the raw explanatory power of the country risk premium alone.

9. Regression outputs are based on national accounts computed at 1986 prices. Around 1999 the Government released a set of national accounts computed at 1993 prices. The change in the price structure between 1986 and 1993 was sizable. The drop in the real exchange rate reached 62%! Hence, the weight of the manufacturing and investment sectors in GDP was larger in 1986 than in 1993. Since these sectors are much more responsive to credit conditions than the service sector, it shouldn't be a surprise that regression outputs coming from the old national accounts are more responsive to country risk fluctuations than those coming from the

new national accounts. The next regression outputs correspond to the period 1993 I - 2006 IV and were run on time series at 1993 prices (Appendix III):

1) $LGDP = 2.83 - 0.09LARP + 0.0022TREND + 0.52LGDP(-4)$
$\qquad$ (8.6) $\quad$ (-12.5) $\qquad$ (6.4) $\qquad\qquad$ (8.8)

$\qquad$ R2: 91% $\quad$ Prob. F-stat: 0.0000 $\quad$ D-W: 1.73

2) $LCON = 2.87 - 0.10LARP + 0.0015TREND + 0.48LCON(-4)$
$\qquad$ (11.3) $\quad$ (-16.4) $\qquad$ (5.6) $\qquad\qquad$ (9.9)

$\qquad$ R2: 92% $\quad$ Prob. F-stat: 0.0000 $\quad$ D-W: 1.76

3) $LINV = 1.62 - 0.09LARP - 0.18LARP(-1) + 0.73LINV(-4) + 0.87AR(1)$
$\qquad$ (4.6) $\quad$ (-2.2) $\qquad$ (-4.6) $\qquad\qquad$ (9.0) $\qquad\qquad$ (11.3)

$\qquad$ R2: 93% $\quad$ Prob. F-stat: 0.0000 $\quad$ D-W: 1.73

4) $SCA = -0.0117 + 0.0014ARP + 0.36SCA(-1) + 0.40SCA(-4)$
$\qquad$ (-4.6) $\qquad$ (6.6) $\qquad\qquad$ (3.6) $\qquad\qquad$ (4.8)

$\qquad$ R2: 91% $\quad$ Prob. F-stat: 0.0000 $\quad$ D-W: 1.78

The results of the Granger causality test for this period are not as strong as the results for the period 1985 IV – 1997 IV. In brief, we can say that the Argentine risk premium causes with a delay of one quarter GDP, consumption, investment and the current account balance. For 2, 3, 4, 5 and 6 lags, results are not statistically significant.

III. The Country Risk Approach and the Main Schools of Macroeconomic Thought

According to Phelps (1992), there are seven schools of macroeconomic thought with an active research agenda: Keynes and the Keynesians, Friedman and the Monetarists, Real Business Cycle, Rational Expectations, Supply Side Economics, Neo Keynesians, and Structuralists. He groups them in view of their adherence to a couple of hypotheses: rational expectations and price and wage flexibility. Based on this criterion, Phelps argues that the first two schools are neighbors since the Keynesians and the Monetarists build on the hypotheses of non rational expectations and full price flexibility. The schools of Rational Expectations, Real Cycle and Supply Side share those two fundamental assumptions but stand apart because of differences regarding secondary issues or the types of problems they try to explain. The Neo-Keynesian school accepts the rational expectation hypothesis and rejects the price flexibility assumption; for their members the existence of overlapping contracts, which prevent the price level from adjusting to monetary shocks in the short run, is an important feature of reality consistent with the rationality hypothesis. In turn, the Structural school denies both hypotheses.

As regards style, our model resembles that of the Real Business Cycle. It is not monetary, assumes rational expectations and full wage flexibility. The difference lies in the nature of the shock that triggers the cycle. While for the Rational Expectations school the triggering factor

is a monetary shock and the propagation mechanism, an asymmetry of information, and while for the Real-Cycle school the triggering factor is a technological or labor supply shock and the propagation mechanism lies in the cost of adjustment, in our approach the triggering factor is a change in the country risk premium. In this respect, our approach comes closer to the thought of Keynes and the Keynesians who believe that "fundamental uncertainty" is the key factor in the business cycle. In turn, the Neo-Keynesians are eclectic on the origin of the cycle; in their view the triggering factor could be monetary, non-monetary or fundamental; after all, the Tobin's Q, a variable that captures the state of expectations on the future returns on capital, is one of their main contributions to the study of the cycle.

A rather important difference between our approach and the Keynesian school lies in the way uncertainty hits capital markets. For the Keynesians, and for Keynes himself, uncertainty shifts the investment demand curve towards the origin. While for us the country risk premium works as a tax. On a fixed investment demand curve, the premium opens a wedge between the gross yield on marginal capital and the international interest rate which leads to lower capital accumulation. In brief, while for the Keynesians the economy goes into recession or recovery depending on whether the investment demand curve shifts to the left or to the right, for us recessions and recoveries depend on the country risk premium going up or down.

IV. Concluding Remarks

The bridge between fluctuations in country risk premium and changes in aggregate variables is the flow of financial capital between the country and the rest of the world. Financial flows, in turn, are the result of portfolio reallocations mainly due to country-risk perceptions. In this paper we have tried to prove such proposition theoretically and empirically with Argentine data. The main theoretical conclusions are: 1) Country risk determines income. Foreign and national investors make up their minds about the fraction of world income they want to spend in the country and the country's GDP adjusts passively to that fraction. 2) A jump in the premium increases unemployment and there is no way for the unemployed worker to land a job. Full price flexibility of sunken capital is the reason for this sort of involuntary unemployment. 3) Foreign trade openness softens the impact of a rise in country risk. The greater the ability to export, the smaller the unemployment of labor, the lesser the fall in the price of sunken capital, and the larger the current account surplus.

This is the main empirical conclusion: country risk seems to be a key factor in explaining the Argentine business cycle in the period 1985-1997. The volatility of the premium explains around 90% of the volatility of GDP, consumption, investment and current account balance. The data suggests that causality goes from the premium to aggregate variables. Moreover, the premium-elasticity of these variables is important and statistically significant. For example, a premium rise from 5 percentage points to 6 p.p. lasting four quarters leads on average to a GDP fall of 3.8%, a consumption fall of 4%, an investment fall of 10.2%, and a current account improvement of 0.5% of GDP. Good results also obtain for the period 1993-2006.

Our model shares many features with the Real Business Cycle model. There is full price and wage flexibility, no money, and expectations are rational. Yet our model has in common a key feature with the model of Keynes and the Keynesians: the triggering factor of the cycle is the country risk premium, a very Latin American expression for the Keynesian "fundamental uncertainty".

Appendix I: Dynamic Model with Country Risk

Each member of the family contributes with capital and labor to the firm (the economy). He is paid the country's rental price of capital for capital services, and the wage rate for labor services. The next equation represents the firm's benefits:

1) $\Pi = \pi.L = L.\left[f(k) - \left(r^w + \rho + \delta\right)P^* k - w\right]$

In this equation, L stands for the size of the family, π for per capita benefits, $f(k)$ for per capita output, k for the capital-labor ratio, r^w for the interest rate earned on US Treasury bonds, ρ for the country risk premium, δ for the rate of capital depreciation, P^* for the price of new imported capital goods, and w for the wage rate. First order conditions for maximizing benefits are:

2) $\dfrac{\partial \Pi}{\partial k} = 0 \Rightarrow f'(k) = (r^w + \rho + \delta)P^*$

3) $\dfrac{\partial \Pi}{\partial L} = 0 \Rightarrow w = f(k) - k.f'(k)$

According to equations 2 and 3, benefits are maximized when the marginal product of capital equals the country's rental price of capital and the excess of output over the rental price of capital equals the wage. To investigate the dynamic optimization process we need an equation for the current account or the rate of accumulation of US bonds (Barro and Sala-i-Martin 1995, III).

4) $\dot{b} = w + r^w b - c$

Equation 4 says that the rate of change of the individual's bond stock is equal to his labor income plus his interest earnings on bonds, minus consumption. After plugging equations 2 and 3 in equation 4, we arrive to a new formulation of the country's current account:

5) $\dot{b} = f(k) - \left(r^w + \rho + \delta\right)P^* k + r^w b - c$

For the sake of simplicity, we assume that $P^* = 1$. Remember that the price of new capital goods is a constant taken from the world market.

6) $\dot{b} = f(k) - \left(r^w + \rho + \delta\right)(k - b) - (\rho + \delta)b - c$

Equation 5 says that the (per capita) current account equals the country's (per capita) output plus bond earnings minus payments to capital owners, minus consumption. Equation 6 is no more than a mathematically convenient way of writing equation 5. Given adjustment costs in investing ($\gamma(0) = 0, \gamma' \geq 1, \gamma'' > 0$), the country's capital stock changes gradually according to the difference between gross investment and capital depreciation.

7) $\dot{k} = i - \delta.k$, $k(0) = k_0$

Now we present the current value Hamiltonian for the country's optimization problem:

$$H(c,i;b,k,\lambda,\mu) = U(c) + \lambda\left[f(k) - (r^w + \rho + \delta)(k-b) - (\rho+\delta)b - c - \gamma(i)\right] + \mu(i - \delta.k)$$

Where λ stands for the shadow price of marginal savings, and μ stands for the shadow price of marginal installed capital. These are the first order conditions:

8) $\dfrac{\partial H}{\partial c} = 0 \Rightarrow U' = \lambda$

9) $\dfrac{\partial H}{\partial i} = 0 \Rightarrow \gamma' = \dfrac{\mu}{\lambda} \equiv \theta$

10) $\dot{\lambda} = \beta.\lambda - \dfrac{\partial H}{\partial b} = \lambda.(\beta - r^w)$

11) $\dot{\mu} = \beta.\mu - \dfrac{\partial H}{\partial k} = \beta.\mu - \left[\lambda\left[f'(k) - (r^w + \rho + \delta)\right] - \mu.\delta\right]$

Equation 8 says that the marginal utility of consumption must equal the shadow price of bond savings. Equation 9 says that the marginal cost of setting up capital must equal the relative shadow price of investment. By integrating equation 10 we get this expression for the shadow price of savings:

12) $\lambda(t) = \lambda(0).e^{(\beta - r^w)t} \Rightarrow \lambda(t) = \lambda(0)$, for all time since $\beta = r^w$.

The intertemporal constant $\lambda(0)$ guarantees the continuous equality of the present values of consumption and wealth (net of adjustment costs). After replacing equation 12 in equation 8 and rewriting the latter, we get:

13) $c(t) = g[\lambda(0)]$, $g' < 0$.

Now, by forward integration of the next equation for the current account:

14) $\dot{b} = f(k) - (r^w + \rho + \delta)k + r^w b - c - \gamma(i)$

we end up with this equation for the country's wealth:

15) $W = \displaystyle\int_t^\infty e^{-r^w(s-t)} c(s)ds = b(t) + \int_t^\infty e^{-r^w(s-t)}\left[f(k) - (r^w + \rho + \delta).k - \gamma(i)\right]ds$

Equation 15 states that the present value of consumption must equal wealth W, which, in turn, is equal to the present value of the country's product minus the rental price of installed capital, minus the cost of installing new capital. Notice the negative sign of the relationship between the country risk premium and wealth. If the country risk premium goes up the country's wealth goes down, $\lambda(t)$ rises and then consumption falls once-and-for-all (Figure 1).

Figure 1: Dynamics of Consumption

$c(t)$

t_0
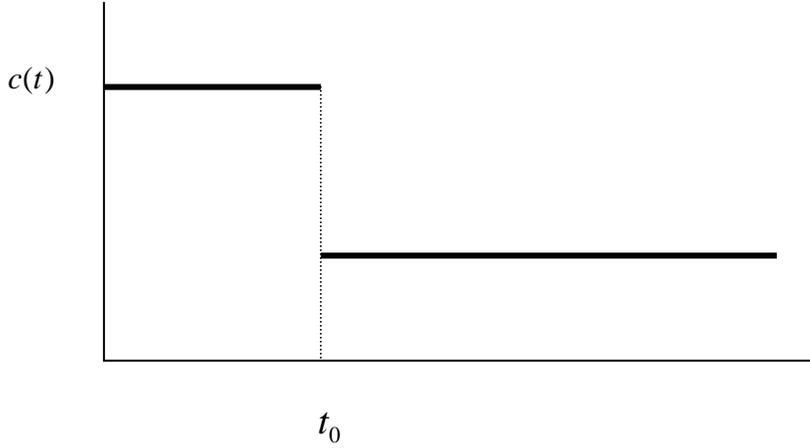
The sign of the relationship between the country risk premium and investment is given by equation 2. If the premium goes up, the marginal yield on capital must also go up. This implies a lower optimal capital stock and, of course, a lower investment. By considering the relative shadow price of investment we reach the same conclusion.

16) $\dot{\theta} = \dfrac{\dot{\mu}.\lambda - \mu.\dot{\lambda}}{\lambda^2}$

After replacing equations 10 and 11 in equation 16 and considering that optimal investment requires that $\theta = \gamma'$ at any time, we arrive at the following expression:

17) $\dfrac{f'(k) - (r^w + \rho + \delta)}{\gamma'} = r^w + \delta - \dfrac{\dot{\theta}}{\theta}$

Equation 17 says that the quotient between the net return to capital and the cost of installing capital must equal the user's cost corrected for capital gains at every moment.

18) $\theta(t) = \int_t^\infty e^{-(r^w + \delta).(s-t)}\left[f'(k) - (r^w + \rho + \delta)\right]ds$

19) $P = P^* + \theta, \; -P^* \leq \theta$ since $P \geq 0$.

Equation 18 says that the extra value of installed capital must equal the present value of the difference between the marginal return to capital and the rental price of the factor. θ stands for the valuation of the service of installing capital. Every time this relative shadow price is positive, the price of sunken capital P is greater than the price of new capital P^* (equation 19), and the country invests; every time the relative shadow price is negative, P is smaller than P^*, gross investment vanishes and the capital stock starts to decrease at the δ rate. In the long run, for any level of the country risk premium, θ remains positive and P is a little bit above P^* so that investment equals capital depreciation, and the country's capital stock keeps constant. (In order to stress our point, this model doesn't allow for technical progress and population growth.)

Moreover, notice that θ also depends on the marginal product of capital $f'(k)$. Then, as the economy's capital-labor ratio rises and $f'(k)$ falls (we have assumed a constant returns to scale production function), θ must also fall or become negative.

Figure 2: Capital Stock Adjustment
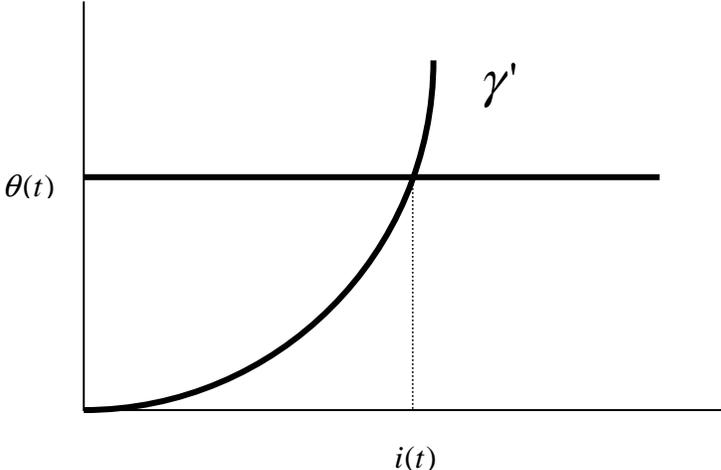
In Figure 2, γ' is the marginal cost of setting up capital and i is the investment rate. A sharp rise in the premium reduces θ more or less in the same proportion. The extra value of installed capital becomes zero or negative, investment vanishes, net investment becomes negative, and the capital stock gradually shrinks until reaching its new long-run (private) optimum. Once the economy arrives at the long-run position, the price of invested capital is a little bit above the price of new capital (this means that θ is a little bit above zero), so that investment equals capital depreciation and the capital stock remains constant.

Appendix II: Time Series

Gross Domestic Product, Consumption, Gross Investment, Current Account and Argentine-Risk Premium, period: 1981 III – 1997 IV.

	GDP	Consumption	Investment	A-Risk Premium	Current Acc.
81 III	9749,4	7555,9	2317,6	0,9	-124,2
81 IV	9677,0	7742,9	2186,8	0,5	-252,7
82 I	8929,0	7067,6	1841,6	1,7	19,8
82 II	9191,2	7282,9	1673,2	0,8	235,1
82 III	9717,1	7576,4	1950,0	10,0	190,7
82 IV	9903,6	7837,3	1945,5	10,0	120,8
83 I	9170,9	7187,4	1730,5	6,2	253,0
83 II	9901,7	7740,1	1912,4	5,6	249,2
83 III	10167,7	8032,5	1967,4	12,7	167,8
83 IV	10052,6	8065,6	1829,5	12,2	157,6
84 I	9175,3	7334,3	1551,7	11,0	289,3
84 II	10199,7	8098,7	1845,6	18,9	255,4
84 III	10315,4	8386,2	1837,2	10,8	92,0
84 IV	10388,4	8497,1	1897,8	8,7	-6,5
85 I	8954,2	7350,2	1416,1	9,2	187,8
85 II	9381,9	7381,0	1481,2	12,2	519,7
85 III	9255,6	7222,5	1579,0	10,1	454,1
85 IV	9701,1	7761,6	1650,2	9,6	289,3
86 I	9021,8	7454,1	1428,1	9,5	142,7
86 II	10060,6	8104,9	1630,4	9,0	324,2
86 III	10550,2	8498,9	1885,6	8,4	167,6
86 IV	10324,8	8417,0	1858,8	8,3	48,7
87 I	9362,1	7641,2	1661,2	9,8	63,1
87 II	10503,1	8351,4	1960,7	7,7	190,5
87 III	10791,2	8706,7	2088,5	12,8	-1,3
87 IV	10311,4	8318,9	1972,6	15,3	19,2
88 I	9808,6	7793,1	1850,2	17,6	168,5
88 II	10365,4	8130,5	1907,9	14,5	326,1
88 III	10021,5	7791,3	1884,4	14,1	347,5
88 IV	9970,8	7911,8	1769,8	14,7	287,4
89 I	9394,0	7661,5	1558,6	20,7	177,1
89 II	9409,2	7292,3	1465,7	24,1	647,2
89 III	9030,4	7126,2	1274,7	16,8	630,1
89 IV	9518,5	7619,8	1512,3	24,3	386,8
90 I	8253,5	6650,0	1033,5	32,2	569,6
90 II	9188,3	7161,7	1219,2	23,2	830,9
90 III	9572,6	7547,6	1293,6	16,4	786,0
90 IV	9837,8	8027,2	1382,3	18,5	422,3
91 I	8924,9	7511,7	1208,9	19,7	218,2
91 II	10425,5	8357,1	1624,2	12,5	463,2
91 III	10545,8	8602,2	1735,9	10,8	248,4

91 IV	10825,1	9124,3	1914,3	7,9	-212,9
92 I	10237,1	8865,2	1758,7	8,2	-390,5
92 II	11766,6	9791,6	2244,5	7,5	-266,0
92 III	11554,4	9826,8	2302,0	9,4	-583,8
92 IV	11356,9	9591,5	2351,3	10,7	-630,6
93 I	10739,1	9234,8	2010,6	11,5	-512,8
93 II	12248,0	10151,0	2456,1	7,3	-366,2
93 III	12389,0	10503,5	2638,7	5,9	-766,3
93 IV	12346,6	10356,8	2936,7	4,6	-964,6
94 I	11974,8	10272,8	2771,9	5,0	-1088,1
94 II	13375,1	10987,7	3087,5	6,9	-715,7
94 III	13274,2	11001,4	3110,4	6,6	-854,1
94 IV	13166,9	10753,6	3257,9	8,7	-862,3
95 I	12297,7	10147,5	2803,0	15,7	-675,4
95 II	12679,7	10011,0	2543,5	12,1	124,5
95 III	12203,3	10075,5	2354,8	12,5	-228,7
95 IV	12240,9	10137,9	2538,3	11,6	-461,9
96 I	11904,2	10056,2	2362,9	8,4	-540,8
96 II	13009,4	10731,8	2823,3	7,2	-298,8
96 III	13008,7	10841,2	2790,4	7,3	-654,8
96 IV	13318,1	10898,2	3109,4	5,4	-741,3
97 I	12856,5	10780,2	2970,2	4,1	-1046,2
97 II	14089,2	11579,6	3546,0	3,7	-148,8
97 III	14296,6	11784,4	3633,2	2,6	-1336,3
97 IV	14410,2	11857,3	3871,2	5,0	-1468,7

Sources: 1) National accounts, official quarterly data at 1986 prices. 2) Argentine-risk premium, monthly data from Ávila (2000, Statistical Appendix) and the JPMorgan series. The premium is expressed in percentage points (one percentage point = 100 basic points). 3) In the 4th quarter of 1995, the current account series based on 1986 prices was spliced with the series based on 1993 prices.

Appendix III: Time Series

Gross Domestic Product, Consumption, Gross Investment, Current Account and Argentine-Risk Premium, period: 1993 I – 2006 IV.

	GDP	Consumption	Investment	A-Risk Premium	Current Account
93 I	216.370.111	152.148.446	37.324.889	11,5	-4.693.138
93 II	241.871.858	166.025.867	43.955.971	7,3	-2.474.859
93 III	242.645.522	166.667.550	48.221.121	5,9	-6.688.974
93 IV	245.132.429	169.860.311	50.775.676	4,6	-8.889.589
94 I	232.945.326	164.965.420	45.580.104	5,0	-10.844.259
94 II	257.476.895	177.234.828	51.527.053	6,9	-5.857.803
94 III	253.467.778	174.510.154	53.181.918	6,6	-7.284.837
94 IV	257.341.544	177.721.808	54.636.626	8,7	-7.380.528
95 I	237.968.103	164.321.480	46.128.891	15,7	-5.501.338
95 II	248.093.639	166.567.449	43.399.785	12,1	4.295.594
95 III	242.214.699	164.276.737	44.019.700	12,5	-171.984
95 IV	244.467.965	168.866.520	44.564.733	11,6	-2.545.605
96 I	236.566.037	164.311.572	41.460.149	8,4	-3.592.701
96 II	260.751.925	175.591.878	47.590.750	7,2	-511.084
96 III	262.166.964	177.726.972	51.557.602	7,3	-4.589.021
96 IV	267.020.047	183.153.037	53.326.944	5,4	-5.043.481
97 I	256.387.857	177.490.019	48.510.922	4,1	-7.536.295
97 II	281.769.801	191.310.690	56.800.223	3,7	-4.792.024
97 III	284.092.267	195.505.523	60.488.603	2,6	-9.499.090
97 IV	287.515.346	199.383.506	62.390.250	5,0	-10.206.007
98 I	271.702.368	187.196.678	57.077.179	4,4	-10.352.579
98 II	301.207.598	202.675.183	62.699.419	4,5	-4.981.668
98 III	293.315.404	200.922.426	62.903.411	7,7	-8.756.073
98 IV	286.267.849	199.434.263	60.442.669	7,5	-8.174.710
99 I	265.024.636	185.463.056	48.383.924	7,7	-5.830.224
99 II	286.412.327	195.463.399	53.304.486	6,8	964.594
99 III	278.472.693	194.457.732	54.757.574	8,1	-5.596.333
99 IV	283.566.399	199.054.269	56.019.277	6,2	-5.824.819
00 I	264.555.918	186.315.129	45.938.124	5,5	-5.215.313
00 II	285.275.176	195.338.736	49.232.441	6,5	756.274
00 III	276.767.971	193.972.609	50.994.548	6,7	-4.323.711
00 IV	278.091.676	193.703.380	51.843.460	8,1	-3.995.065
01 I	259.199.874	182.900.187	41.580.294	7,5	-5.276.271
01 II	284.795.763	191.297.580	46.196.310	9,8	3.704.848
01 III	263.126.505	181.090.983	42.220.209	14,9	3.843.697
01 IV	248.864.555	169.871.185	37.001.538	29,9	7.605.960
02 I	216.849.495	148.507.392	22.718.815	44,7	16.145.462
02 II	246.314.633	158.475.554	26.310.998	55,2	21.007.805
02 III	237.416.867	156.093.858	26.713.598	42,8	19.477.350
02 IV	240.361.392	157.992.266	30.388.086	19,7	16.611.882

03 I	228.595.882	153.188.337	27.659.223	19,5	15.504.704
03 II	265.402.478	169.567.358	35.023.838	14,3	18.677.942
03 III	261.534.523	172.253.988	38.706.853	13,7	14.493.170
03 IV	268.560.967	176.794.330	45.247.923	14,0	10.253.237
04 I	254.330.423	171.056.272	41.571.380	9,4	8.578.241
04 II	284.375.611	183.635.133	47.908.306	10,2	10.500.566
04 III	284.392.060	187.557.703	51.702.472	9,5	9.557.271
04 IV	293.467.061	193.373.719	55.936.051	7,5	8.986.832
05 I	274.594.503	184.976.301	47.158.783	5,5	10.238.425
05 II	313.927.290	203.728.817	59.862.847	6,6	8.623.326
05 III	310.593.080	203.814.850	63.851.487	4,1	9.536.958
05 IV	319.939.241	208.747.142	70.960.654	4,2	6.728.117
06 I	298.695.562	200.565.514	57.963.266	4,0	7.444.596
06 II	338.243.728	219.462.442	71.049.562	3,5	7.994.620
06 III	337.741.885	218.509.900	77.256.326	3,4	5.198.360
06 IV	347.578.707	224.988.561	79.483.535	2,7	6.027.551

Sources: 1) National accounts, official quarterly data at 1993 prices. 2) Argentine-risk premium, monthly data from the JPMorgan series. The premium is expressed in percentage points (one percentage point = 100 basic points).

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