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**FISCAL DEFICIT, MACRO-UNCERTAINTY,
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FISCAL DEFICIT, MACRO-UNCERTAINTY, AND GROWTH IN ARGENTINA
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Abstract

We analyze the relationship between fiscal deficit, macroeconomic uncertainty and growth for the period 1915-2006, and conclude that the deficit, possibly through the volatility in relative prices it generates, is a significant restriction on per-capita income growth in Argentina.

¹ The ideas explored in this paper go back to Avila (1999). I am grateful for comments made by J. Streb and other members of the Economics Seminar at UCEMA. These views are personal and do not necessarily represent the position of the University.

Introduction

The cause of Argentina's economic decline, according to a commonly-held view, has been a blend of excesses: industrial protectionism, state-run monopolies, public spending, rapid monetary growth. In our view, however, the Argentine disease consists of an exceptional dose of uncertainty, in particular since the 70s. More specifically, our thesis says that the persistence of high fiscal deficits, financed by turns through inflation tax and foreign debt, generated a sequence of relative-price adjustments that made it impossible to make reliable evaluations of investment projects. This fact led to a fall in the stock of per worker capital, hindered technical progress and lowered per capita income. We advance three hypotheses: a) the fiscal deficit is an important source of macroeconomic uncertainty; b) uncertainty is an important cause of the Argentine economic decline, and c) causality runs from deficit to growth, and not the other way around.

Several works provide rather traditional explanations for the Argentine decline in the 20th century. Cortés Conde (1997, I) heads in the right direction in trying to explain the 19th century miracle, but goes astray in trying to explain the decline since 1930. Regarding the miracle, he argues that the end of the civil wars provided the political and legal stability the country badly needed to assert property rights and cut transaction costs, concluding that this achievement was the key factor behind the huge inflows of capital and labor resources that built modern Argentina. Yet in explaining the decline he points to mistakes in the import substitution policy and shortages of foreign exchange and domestic savings. Sturzenegger (1984) and Cavallo (1984) provide a suggestive explanation for the 20th century decline but they do not provide one for the 19th century miracle. Since the Argentine economy has been a mixed economy for most of the last century, Sturzenegger argues that its capitalist sector did not have real markets while the socialist sector did not have central planning; policy-induced distortions worsened conditions such as competition, appropriability and certainty that markets require to work, while political instability worsened conditions for planning where markets fail. Cavallo stresses the impact upon the rate of economic growth of some static distortions (taxes, regulations, and trade barriers). He may be right in some sense: if a static distortion yields a once-and-for-all fall in the level of national income, a crescendo of static distortions may yield a long-run sequence of national income falls that looks like a reduction in the rate of economic growth. Sturzenegger's work broadens this thesis until explicitly including the impact of dynamic distortions.

According to the growth literature, a long-run increase in per capita income comes from investment in physical and human capital and basic research, from improved organization of production and trade, from quick and precise information. Most investments involves taking low-risk liquid funds, sinking them within a country's borders, and betting that they will be recovered with at least some profit above their opportunity cost. So the depth of the horizon is critical. The collapse of fiscal accounts and the consequent uncertainty on the path of key relative prices distorts the intertemporal margins that govern investment. On the contrary, restrictions to international trade, lack of competition in large markets, and public spending beyond the social optimum do not have a direct impact upon the rate of growth of per capita income; they affect only static margins and provoke one-time falls in national income.

Section I presents the empirical evidence. Historical and international comparisons let's identify two correlations: 1) a positive correlation between the fiscal deficit and volatility in relative prices; 2) a negative correlation between volatility in relative prices and per capita

income growth. Section II develops a rationale for these correlations. The change in fiscal deficit financing from inflation tax to foreign debt, and from the latter back to the former, boosts changes mainly in the real exchange rate and the real interest rate; the relative price changes are needed for the country's economy to adjust to budget innovations. Since risk aversion is a predominant trait in capital markets, such volatility creates a wedge in the capital market that hinders the process of accumulation. In the last section we summarize our findings.

I. Empirical Evidence

The purpose of this section is to explore statistically the thesis of the paper. To that end, we have to define uncertainty and measure it. We will link uncertainty to the volatility of two important prices in real terms: the exchange rate and the interest rate. We will then measure volatility using simple statistics (the variance or the standard deviation) for the respective time series. We will finally claim that a country undergoes a period of uncertainty when the relative price variance is high as compared to other periods in its history or other countries in the same period. So a relative price variance approaching zero will tell them that the flow of future income generated by an investment project could be valued at relative prices very similar to those prevailing at the time the decision is taken; on the other hand, a high variance will make present relative prices useless as a reference point. Thus we will say that a country is economically "predictable" or "safe" when its volatility index is low in a relative sense.

	Fiscal Deficit % of GDP	Volatility Real Rate of Exchange	Income per Capita Cumul. annual %
1915-28	1.4	0.4	1.5
1933-45	3.3	2.0	0.5
1946-58	8.7	8.1	1.4
1959-72	3.0	1.8	2.3
1973-90	13.3	13.1	-0.8
1991-01	2.0	0.3	1.3
2002-06	-1.3	0.6	6.0

Notes

a) Fiscal deficit: simple annual average of the imbalance in the consolidated public sector.

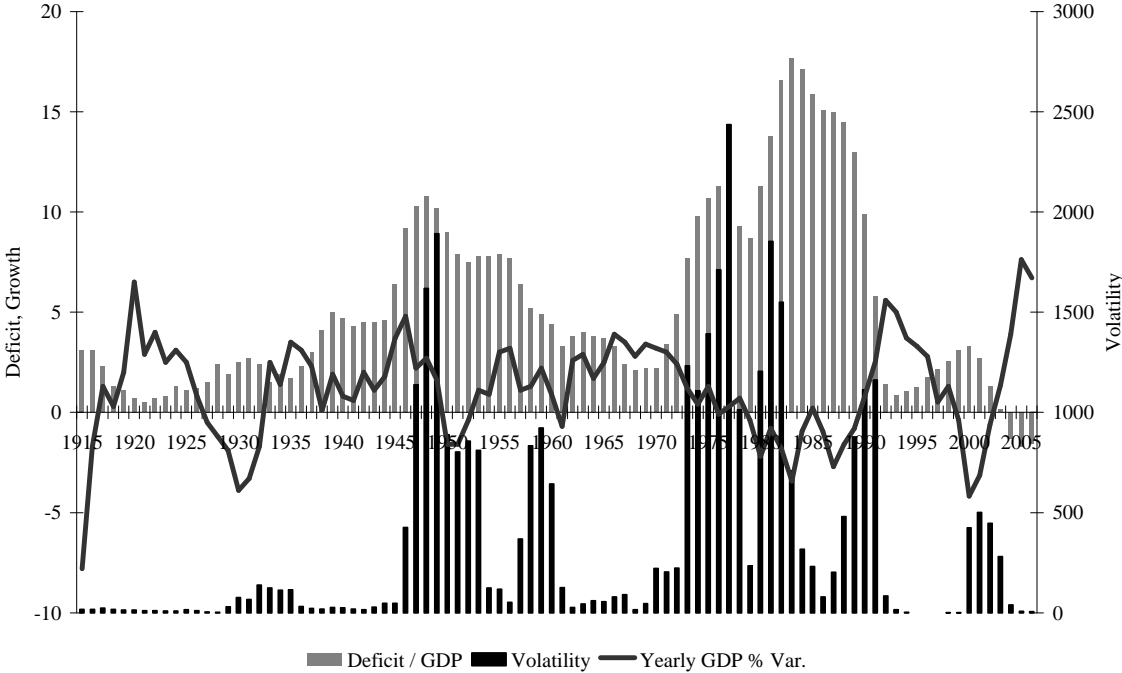
b) Volatility: The volatility coefficient is equal to the variance in the series for the real rate of exchange divided by the statistical mean for the period. The real rate of exchange is equal to the US wholesale price index times the free rate of exchange (pesos per dollar) divided by the Argentine consumer price index.

c) Growth in per capita income: to moderate the impact of the peaks and troughs of the economic cycle, we have calculated the cumulative growth rate between triennial per capita income averages which correspond to the initial and end year in each period.

Source: Calculations based until 1979 on data from IEERAL (1986); from then on calculations are based on Argentina's national income accounts. Fiscal deficits for the periods 1991-2001 and 2002-06 were taken from Espert & Associates. Per capita income data up to 1990 was taken from Avila (1998) and since then from recent calculations based on national income accounts.

Our thesis highlights correlations between fiscal deficit, volatility in relative prices and long-term growth of per capita income. As a first step to assess such correlations, Table 1 shows Argentine macroeconomic performance in seven periods covering the last 90 years, and Figure 1 shows the paths of the fiscal deficit, the real-exchange rate volatility index and the growth rate as five-year moving averages for the period 1915-2006.

Figure 1: Argentina: Fiscal Deficit, Volatility and Growth, 1915-2006



On the base of such annual data (Appendix) we have run three regressions to study in greater depth the type of relation and the existing causality between the fiscal deficit, volatility and per capita income growth. Results are summarized in Table 2:

Table 2: Results of the regressions

$$1) VOL = -32.36 + 72.95DEF + 0.31VOL(-1) - 0.23VOL(-2) + 0.63AR(1)$$

(-0.3) (3.6) (2.0) (-2.2) (4.2)

R2: 71% Prob. F-stat: 0.0000 D-W: 1.96

$$2) GRO = 1.06 - 0.0005VOL(-3) + 0.0007VOL(-4) + 0.74AR(1)$$

(1.5) (-1.0) (1.3) (9.8)

R2: 54% Prob. F-stat: 0.0000 D-W: 1.72

$$3) \text{ GRO} = 2.44 - 0.24\text{DEF} + 0.69\text{AR}(1)$$

(3.5) (-2.7) (8.6)

R2: 56% Prob. F-stat: 0.0000 D-W: 1.86

VOL is the five-year moving variance of the real exchange rate. GRO is the five-year moving average of the rate of growth of per capita income. DEF is the five-year moving average of the fiscal deficit as a percentage of GDP.

Regression 1 says the fiscal deficit is an important variable in explaining volatility. An increase in the mean deficit by one point of GDP increases mean volatility by 73 points or 18%. The good correlation found by Nogués and Grande (2001) between the deficit and the Argentine-risk premium in the 90s supports this result.

Regression 2 says the volatility index has little or no influence on per-capita income growth. The strong correlation found by Avila (2010) between the Argentine-risk premium and GDP since the late 80s up until 2006 does not support this result.

Regression 3 says the fiscal deficit certainly does have an impact on growth. When the mean deficit increases by one point of GDP, the mean rate of annual growth falls by 0.24 percentage point. Thus the fiscal deficit would explain growth better than volatility.

The results of regressions 2 and 3 don't square with the strong correlation found by Avila (2010) between country risk and growth. A possible clue to the puzzle might be the narrow scope of the index of volatility as compared to the wide scope of the country risk premium. Investors may take the fiscal-deficit figures as forecasts of crisis or violations of property rights (sovereign defaults, confiscations, devaluations, inflations, bank runs). That is, they may take the deficit as a proxy of the risks involved in sinking capital within the borders of the unstable country. So the fiscal deficit would have a significant impact upon growth because it is a better proxy to country-risk premium than the volatility of relative prices.

As regards the causality between the fiscal deficit and growth, the results of the Granger test support the hypothesis that the deficit is the cause of growth and not the other way around, for lags of 1, 2, 3, 4, 5 and 6 periods.

As a last step in the analyses of data, Table 3 provides a comparison of the Argentine performance with that of a group of countries for the period 1974-85 (see next page).

From the empirical evidence we conclude that:

- There is a seemingly positive correlation between the fiscal deficit and the volatility of key macroeconomic prices, such as the real exchange rate and the real interest rate. The correlation appears closer in the historical series for Argentina than in the international comparison; the difference may be due to the fact that in Table 1 we use a more uniform measurement of the public sector deficit than in Table 3.
- There is a negative correlation between volatility and economic growth. An exception to the rule is the 1946-58 period in Argentina, when in spite of large increases in the fiscal deficit and volatility, growth rose instead of falling. The cause of this unexpected performance was probably the sharp improvement in the terms of trade in 1948 and the world-wide post-war boom.

	Fiscal Deficit % of GDP	Volatility		Income per Capita Cumul. annual %
		Real Rate of Exchange	Real Rate of Interest	
Argentina	6.5 (3.2)	19.9	23.3	-1.3
Chile	0.1 (3.2)	5.1	11.3	0.6
Uruguay	2.9 (2.6)	7.6	10.3	0.6
USA	3.4 (1.6)	0.1	3.4	1.5
West Germany	2.0 (0.7)	3.6	2.2	2.1
Japan	6.1 (1.7)	1.0	3.6	3.2
Paraguay	0.1 (1.0)	2.4	7.6	2.9
Singapore	-1.4 (1.3)	0.3	2.9	5.9
South Korea	1.9 (0.8)	0.5	4.2	6.2

Notes

a) Fiscal deficit: simple annual average at Central Administration level. Respective standard deviation is shown in brackets.

b) Volatility: measured in the same way as for Table 1.

c) Growth in income per capita: idem.

Source: Calculations based on IMF data (1987).

- Countries or historical periods with good public finances are noted for low volatility in relative prices and high growth in per capita income. This is the case for Argentina in periods of relative stability (1915-28; 1933-45; 1959-72; 1991-2001; 2002-06), and for countries such as USA, West Germany and Japan, and even more clearly for Paraguay, Singapore and South Korea, in the period 1974-85. Countries or historical periods that show high (or unstable) deficit are noted for a significantly greater volatility. Argentina falls into this category in the period 1946-58 and especially that of 1973-90: unusually high volatility and a fall in per capita income without precedent. This context repeated itself, with less intensity, in Chile and Uruguay; both countries experienced a higher volatility than that observed in the other countries in the sample and very low growth.
- The fiscal deficit measure used in Table 3 is the only one available for international comparisons, though it is not the most appropriate since it only covers the imbalance of the Central Administration. The problem becomes evident when comparing Argentina with Japan. While in Argentina the Central Administration deficit in the period 1974-85 was approximately half the consolidated total, in Japan the strong deficit of the Central Administration was neutralized by the surplus in the provinces and the social security system, so that the consolidated deficit became insignificant. The Chilean case is interesting: budget equilibrium coexists with high volatility; this observation contradicts our thesis. In this case, however, volatility is a consequence of an unstable deficit; the standard deviation of the Chilean deficit is similar to that for Argentina; in the period analyzed Chile frequently swung from large deficits to surpluses and vice-versa, forcing adjustments in relative prices that shortened the investor's horizon. The Uruguayan case is similar to that of Chile, although more moderate.
- In short, to extend the investor's horizon and foster growth both variables are important: the mean size of the fiscal deficit and its degree of stability. This assertion carries with it

an implicit causality judgement: fiscal deficit causes volatility, and volatility causes low growth. Though it is possible to speculate on the existence of a hidden variable the fluctuations of which dominate the relationship between deficit and growth (such as the terms of trade), we should remember that the deficit seems to be the cause of growth in the Argentine time series.

II. A Rationale

The Australian model, quite popular in the literature on open-economy macroeconomics in the 70s and 80s, represents fairly well the setting we have in mind. According to the model, the country's economy is a) small and open, so it takes as given the prices of exportable and importable goods, and the risk-free interest rate; b) the country is populated by individuals who produce and consume traded goods (exportable and importable) and non-traded goods (services); c) individuals hold their wealth in local currency, foreign bonds, and fixed local capital; d) risk aversion explains why individuals spread wealth among those assets; e) the fiscal deficit is financed by means of foreign borrowing or inflation tax; f) individuals have rational expectations and incomplete information on the future course of economic policy (deficit size and way of financing it).

Deficit and Volatility

Assume the fiscal deficit starts to be financed by foreign debt. How does the economy adjust to such innovation? Foreign debt leads to an increase in aggregate demand and a rise in the price of the domestic good to ration its supply. The budget innovation leads in this way to a fall in the real-exchange rate.² As the horizon for foreign borrowing gets short and agents forecast the return of the inflation tax, the country bears a higher real-interest rate, besides currency overvaluation. The jump in the interest rate can be attributed to a change in expectations on the rate of currency devaluation. Agents expect that the substitution of the inflation tax for foreign borrowing will make the nominal-exchange rate rise faster than the price level, so that the real-exchange rate recovers the level it had before the first budget innovation. The opposite scenario (higher real-exchange rate or currency undervaluation, and lower real-interest rate) prevails when the deficit is financed by the inflation tax. This budget cycle helps to explain the history of inflation and current-account adjustments that Argentina underwent in the second half of the 20th century. The bulk of financing swung from one source to another. In the 70s and 80s this phenomenon got stronger as the deficit literally exploded.³ We think this may be the origin of the volatility in relative prices. The index of volatility reached high levels in the 1946-58 period and very high levels in the 1974-85 period.

Volatility and Investment

² Argentine evidence since the 70s seems to indicate that the private sector behaves as if it does not discount future tax liabilities.

³ On the relative importance of each source (money creation, domestic debt bonds and foreign loans) see Cavallo and Peña (1983). A budget vision of the Argentine-economy progress and reversals can be found in FIEL (1989).

Risk aversion is a key factor in capital markets. It is a consequence of the hypothesis of decreasing marginal utility of income. According to this hypothesis, the expected value of a lottery with 50% chance of winning \$100 and 50% chance of losing \$100 is zero, while its expected utility is negative because the disutility of losing \$100 is greater than the utility of winning \$100. The difference between the utility of not intervening in the lottery and the expected utility of intervening is the welfare loss borne by the investor who leaves a safe position to embark on a project with an uncertain outcome. It accounts for the maximum premium he would pay to keep his wealth unchanged.

The peculiar way through which the volatility in relative prices filters into the process of capital accumulation should be now evident. A project for sinking capital into Argentina would bear a turbulence of relative prices thirty times greater than that for the same project in South Korea. Therefore, the risk premium for investing in Argentina will have to be several times higher than the South Korean risk-premium. In weighing the possibility of investing physically in Argentina, investors who live in New York or Buenos Aires will behave in identical fashion. Given a 10 year-US Treasury bond that yields 4% per year, a project with a return of 12%, excellent in the environment of security and predictability of the European Union or Canada, in Argentina would be quickly discarded as loss. Think of the fate of a project for industrial exports during the great revaluation in real terms of the peso in 1979-80, or the fate of a non-tradable project during the great depreciation in real terms of the 80s. Consider further the fortune of any such firms when they have to go month after month through an anti-inflation program with real rates of interest at 4% per month. The instability of important relative prices is too high in Argentina for the average investor to be attracted by an annual 12% return. During the 80s investors required a 22% average return per year on projects to be carried out in Argentina under Argentine law, or a quick recovery of the capital invested. Without an insurance against macroeconomic instability, investors self-insure demanding from their projects the opportunity cost of the funds to be sunk (the interest yield on a long US Treasury bond) plus a risk premium which for Argentina at that time was about 15% per year. Thus lots of projects that would have contributed greatly to the national wealth were discarded until the horizon improves.

III. Concluding Remarks

The fiscal deficit seems to be an important restriction to economic growth in Argentina. Yet macroeconomic uncertainty, a concept we identify with the volatility of key relative prices, doesn't show up as a significant link between the deficit and growth. The narrow scope of the volatility index we have used in the paper, as opposed to the wide scope of the modern index for the Argentine-risk premium, may be a possible explanation of such a result. Think that the country-risk premium captures not only the above mentioned volatility but also the likelihood of a long list of events that certainly hinder capital accumulation in the country: sovereign default, confiscation, nationalization, bank run, bank lock-out, big devaluation, big inflation, prohibitions to export and the like.

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Appendix

Argentina: Per capita GDP Growth Rate, Real Exchange Rate, and Fiscal Deficit (1913-2008)

	Growth Rate	Real Exchange Rate	Fiscal Deficit
1913	-6,2	42,8	0,6
1914	-15,5	42,9	4,3
1915	5,1	39,7	3,5
1916	-7,2	45,0	2,4
1917	-15,2	51,0	4,6
1918	24,4	44,4	0,7
1919	-0,4	51,2	0,1
1920	0,1	53,9	-1,3
1921	0,9	47,2	1,3
1922	7,5	49,2	2,5
1923	6,2	54,6	0,0
1924	5,1	52,3	0,9
1925	-7,0	48,4	-0,5
1926	3,5	47,9	3,4
1927	4,9	44,2	1,8
1928	-2,3	44,3	0,3
1929	-1,7	44,6	2,7
1930	-10,5	45,9	3,7
1931	0,3	56,8	0,8
1932	-5,3	63,6	4,9
1933	0,6	47,5	1,3
1934	6,6	74,3	1,4
1935	10,6	72,3	-1,0
1936	-5,6	63,6	3,0
1937	5,4	61,2	4,0
1938	-1,4	66,0	4,2
1939	2,2	70,5	5,0
1940	0,0	70,8	4,4
1941	3,5	74,5	7,6
1942	-0,5	79,4	2,4
1943	-2,3	79,3	1,9
1944	9,4	78,8	6,0
1945	-4,8	67,2	4,4
1946	7,1	66,2	8,2
1947	9,2	79,2	11,6
1948	3,3	116,9	15,6
1949	-3,7	142,2	11,7
1950	-2,4	160,7	6,8
1951	1,7	194,0	5,2
1952	-6,9	131,4	5,8
1953	3,3	122,6	10,0

1954	2,2	132,8	9,5
1955	5,1	142,4	8,3
1956	0,9	151,6	5,2
1957	3,4	139,4	6,3
1958	4,3	135,9	9,3
1959	-8,0	101,5	2,7
1960	6,1	82,8	2,7
1961	5,4	72,5	3,6
1962	-3,1	80,7	3,6
1963	-3,9	76,3	4,1
1964	8,6	71,1	5,0
1965	7,5	87,4	3,5
1966	-0,8	68,0	2,7
1967	1,2	73,8	3,4
1968	2,8	64,4	1,7
1969	7,0	65,1	0,9
1970	3,8	65,4	1,8
1971	2,1	79,6	3,1
1972	0,4	98,7	3,7
1973	2,0	68,2	7,6
1974	3,6	93,9	8,1
1975	-2,2	158,8	16,1
1976	-1,6	109,1	13,6
1977	4,7	68,8	8,3
1978	-4,8	51,4	10,3
1979	5,2	36,8	8,3
1980	0,0	29,0	6,2
1981	-6,9	51,2	10,4
1982	-4,7	116,7	21,4
1983	2,5	115,8	22,9
1984	0,4	92,2	22,0
1985	-8,4	96,3	11,6
1986	5,5	74,1	7,8
1987	1,0	86,8	15,3
1988	-3,4	80,6	19,0
1989	-8,3	110,4	21,2
1990	-2,8	49,7	9,0
1991	9,4	36,7	1,4
1992	9,2	30,9	0,5
1993	5,2	28,5	-0,4
1994	7,0	27,5	0,9
1995	-5,8	27,2	1,8
1996	3,0	27,8	2,5
1997	7,1	27,8	1,5
1998	2,7	27,3	2,0
1999	-4,5	28,1	3,1
2000	-1,8	29,5	3,6

2001	-5,4	30,4	5,4
2002	-11,9	74,8	2,3
2003	7,8	64,4	-0,9
2004	8,2	63,6	-3,8
2005	8,1	60,3	-2,3
2006	7,3	58,7	-2,0
2007	6,7	-	0,3
2008	3,2	-	-0,2

Sources: 1) Up to 1979, calculations are based on data from IEERAL (1986); from then on, based on Argentina's national income accounts. 2) Fiscal deficit data for periods 1991-2001 and 2002-06 taken from Espert & Associates. 3) Data on per capita income taken from Avila (1998) up to 1997; from then on, estimated according to national income accounts.

Notes: 1) Observations are not averages. They are simply the fiscal deficit, the growth rate or the real exchange rate that correspond to each year. 2) For fiscal deficit we mean global or financial Public Sector deficit. 3) The real exchange rate is equal to the nominal exchange rate times the US WPI divided by the Argentine CPI. 4) There is no real exchange rate data for years 2007 and 2008 due to lack of reliable official data for consumer inflation.