

Testing the Sustainability of Argentine Fiscal Policy: 1865-2002

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Abstract

This paper contributes to the study of the economic history of Argentine crises by analyzing the fiscal sustainability for the period 1865-2002. Fiscal deficits are sustainable if the current market value of debt equals to the discounted sum of expected future surpluses. Following a large literature started by Hamilton and Flavin (1986) sustainability is empirically tested by finding out if revenues and expenditures (including interest payments) are cointegrated along a given period.

It is found that Argentina was fiscally sustainable for the whole period 1865-2002. However, when sustainability is analyzed by sub periods, Argentina, at most, reached weak sustainability for some sub periods and no sustainability at all for 1950-1989. Interestingly, sustainability gets worse as the economy went from mostly open to relatively close.

Keywords: fiscal sustainability, currency crises, cointegration, unit roots.

JEL Classification Codes: E32, N26

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“... Only I have no luck anymore. But who knows? May be today. Every day is a new day. It is better to be lucky. But I would rather be exact. Then when luck comes you are ready”

Ernest Hemingway
The old man and the sea

I. Introduction

Blaming unfavorable external conditions for their persistent currency crises is a deeply rooted tradition in Argentina. From incumbent politicians to academics, several arguments have been put forth to present the country as a “victim” of international agencies, core countries policies or contagion from diseases generated elsewhere. Recent developments in the field of international economics seem to give some support to the “unfavorable external conditions hypothesis”. The sudden stops theory of currency crises emphasizes the liquidity problem in emerging economies due to a sudden and massive reversal in capital inflows. The reversions generally happen in countries that have experienced heavy capital inflows and consequently important current account deficits. Sudden Stops has to be met by reserve losses or lower current account deficits. In fact, both take place. Losses of international reserves increase the country’s vulnerability, and are frequently the prelude of the currency devaluation. The resulting reverse in current account deficit impacts on economic activity and employment. This line of research is associated to the works of Calvo (1998), Calvo and Reinhart (2000) and Calvo, Izquierdo and Talvi (2002).

The literature on contagion also seems to endorse the proposition that emergent economies are mainly victims of a chain reaction triggered by external financial events, like devaluations. For instance, Kaminsky, Reinhart and Vegh (2003) sustain that most of the fast and furious

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contagion episodes are characterized by a large surge in capital flows that come as a surprise, and involve a leveraged common creditor¹.

Although both, sudden stops as well as contagion literature, stress external conditions, they recognize that the magnitude of the impact on a given country depends on domestic variables such as the degree of openness, the extent to which a country has diversified production, the degree of liability dollarization and the monetary and fiscal policies followed². As posit by Calvo, Izquierdo and Talvi (2003), the share of the tradable goods relative to domestic absorption of tradable goods magnify the effect of a sudden stop in capital flows, as well as high initial public debt, denominated in foreign currency and the liability dollarization mainly in the non-tradable sector. Likewise, Vegh and Talvi (2000) and Tornell and Lane (1998) stress the role of procyclical fiscal policy in emergent economies that discourage both public saving and reserve accumulation during good times, exposing the country to exchange rate instability and disruptive currency drops.

On the other hand, comprehensive studies of the history of Argentine currency crises like Cerro (2006) and Cerro and Meloni (2003) find that the “unfavorable external conditions” have some responsibility in explaining crises but, in most of them, “domestic fundamentals” played the main role. Interestingly, these findings match with results obtained from political economy models applied to Argentina³. This line of research accentuates deleterious incentives faced by federal and provincial governments that lead the latter ones to overspend and overborrow in the expansionary phase of the business cycle and the first one to rescue them. Rather than a “victim of unfavorable external conditions”, it seems that Argentina was hit by perverse fiscal incentives that made it prone to twin deficits and hence extremely vulnerable to contagion and capital flow reversals. As shown by Calvo, Izquierdo, and Talvi (2003) the sudden stop reversal that began with the Russian Crises in 1998, had different impact on Argentina and Chile, which calls for further research in domestic conditions.

This paper contributes to the study of the economic history of Argentine crises by analyzing fiscal sustainability of Argentina for the period 1865-2002. Fiscal deficits are sustainable if the current market value of debt equals to the discounted sum of expected future surpluses. Following a large literature started by Hamilton and Flavin (1986) sustainability is empirically tested by finding out if revenues and expenditures (including interest payments) are cointegrated along a given period. Since the extended period considered (138 years) may include several breaks that might bias the results, we study various sub periods taking the breakpoints from the regression tree results obtained by Amado, Cerro and Meloni (2005).

¹ The authors christen these factors as the “the unholy trinity”.

² See Bordo (2006)

³ See Nicolini, Posadas, Sanguinetti, Sanguinetti and Tommasi (2002) and Jones, Sanguinetti and Tommasi (1997, 1999)

We also carry out the Bai-Perron test to determine endogenous structural break. As in Quintos (1995) and Martin (2000) we also evaluate strong and weak sustainability for each sub period. We conjecture that Argentina's fiscal stance was either unsustainable or weakly sustainable for most of the sub periods under investigation.

The remainder of the paper is organized as follows. Section II motivates the paper by analyzing some salient features of the Argentine crises throughout its history and their relation with international crises. Section III discusses the characteristics and the limits of the sustainability tests proposed to explore the strength of the "domestic fundamentals". Section IV gives details on the data sets used and the empirical strategy of the paper while section V explains the empirical results obtained from standard unit root and cointegration tests. Finally, section VI elaborates the conclusions.

II. Crises in Argentina: capital flows reversals and Contagion

One of the most striking observations for those who study the economic history of Argentina is its record of currency crises. From 1823 to 2002, Argentina experienced 26 crises, which implied 43 *crisis years*, that is, on average, one crisis every 4 years. Moreover, six of these episodes can be termed as crashes. It is also surprising that despite the differences in historical periods and protagonists, in economic structure and arrangements, in international and domestic conditions, in the eves and the outbreaks of the crises, there are some common factors that repeat throughout history⁴. Cerro and Meloni (2003), relying on parametric and non-parametric tests show that Argentina's crises, taken as a set, are mainly explained by domestic variables behavior like fiscal deficit, public revenues and expenditures and RER overvaluation, although exogenous variables like the Terms of Trade and LIBOR also play a role in some crises. Likewise, Amado, Cerro and Meloni (2005) applying the Regression Tree technique, classify the argentine currency crises into groups or varieties. They found that crises respond to four "recipes", having fiscal deficit as the common factor in all mixes. The first variety includes only extremely high fiscal deficits (greater than 4.4% of GDP), which predict a crisis with 54% of probability. This is the most frequent type of crisis in Argentina and, as will be evident later, is related to the closed economy period, from the 50's to the 80's. The relationship between fiscal deficit and crises is evident from simple inspection of figure 1: crises became more frequent since 1950's which is coincident with the increases in fiscal deficit. However, during open economy years the fiscal deficit remained in the neighborhood of the 1% of the GDP, while in the closed economy period not only surpassed that mark, but also was more volatile. Notice also that crises become more

⁴ Notable analysts of the economic history of Argentina like Alberdi (1994) in the XIX century and Prebisch (1921) in the XX century, made similar conjectures.

frequent and longer (the wider the grey lines) as the fiscal deficit exceeded the 2% of GDP threshold.

Another mix that leads to a currency crisis occurs when combining “moderate” fiscal deficits (less than 4.4% of GDP) with real exchange rate overvaluation. The probability that this type of mix provokes a crisis remains around 53%. On the other hand, the concurrence of moderate fiscal deficit with huge declines in the rate of growth of real deposits produces a crisis with a probability of 75%. Finally, there are few cases where the main ingredients for a crisis are moderate fiscal deficits and high external debt to ratio exports. The probability of crisis when this combination is present is 100%.

Figure 1. **Fiscal Surplus (as % of GDP) and Crises in Argentina: 1867- 2002.**

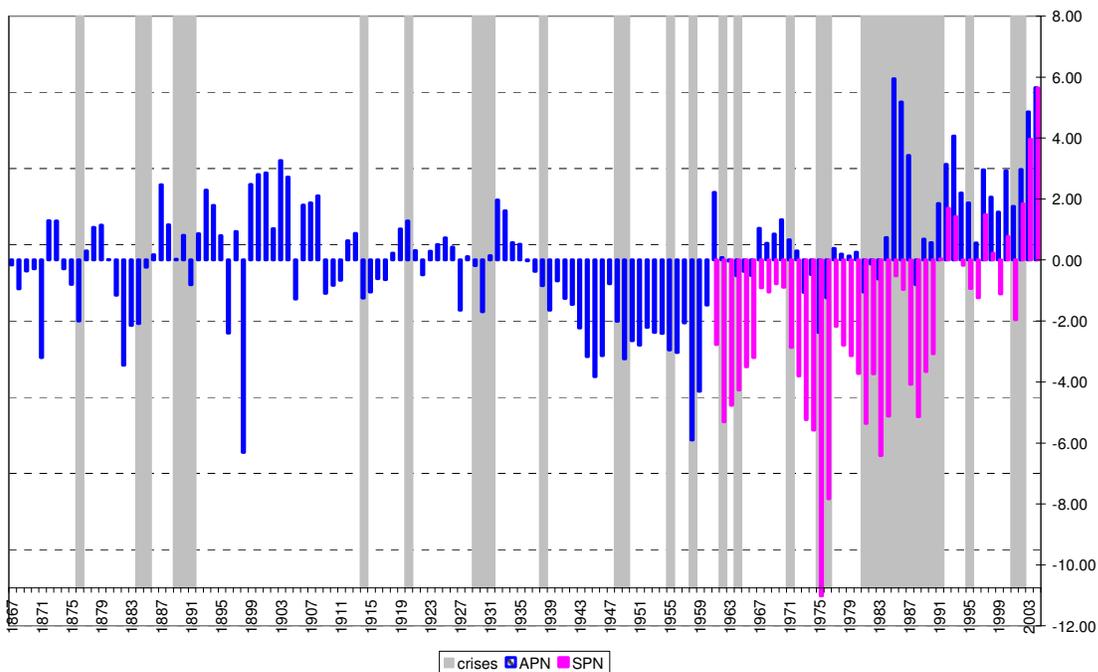


Table 1 shows the results of the Regression Tree technique. It is easily seen that crises were explained mainly by the high fiscal deficit during closed economy decades (from the 30's to the 80's in the XX century), that is, domestic conditions were dominant. While for periods of relatively open economy, (from 1870 to 1930 and 1991 to 2001) crises occurred when mixing moderate fiscal deficit with other ingredients, like real exchange rate overvaluation, decline in real deposits and high debt to exports ratio: Precisely, if “unfavorable external conditions” were to play a central role in the explanation of argentine crises, it has to be during the years were the economy remained open.

How can “unfavorable international conditions” cause recessions or various types of crises in a given country? “Bad news” spread out through changes in relative prices. There are two main channels. One is the interest rate and the other is the price of exports relative to the price of imports, the so-called terms of trade. When the international rate of interest goes up, the government not only suffers due to increases in the debt payments services which affects the composition of public expenditures, but also because investors redirect funds from emerging markets to the developed ones, causing exchange rate drops and downturn in economic activity.

Table 1. Crises Ingredients (from the Regression Tree classification technique)

Crisis	Ingredients	Crisis Type	Openness	
1876	High Fiscal Deficit/GDP ratio (>4.4%)	Mild	Open	
1885		Deep		
1889/91	Moderate Fiscal Deficit, no RER Overvaluation plus strong decline in Real Bank Deposits	Very Deep		
1914		Deep		
1918/19	Moderate Fiscal Deficit and Real Exchange Rate Overvaluation	Mild		
1920/21		Mild		
1929/31		Very Deep		
1937/38		Mild		
1948/49		Deep		
1950/51	High Fiscal Deficit/GDP ratio (>4.4%)	Mild	Closed	
1955		Mild		
1958		Deep		
1962	Moderate Fiscal Deficit and Real Exchange Rate Overvaluation	Deep		
1964/65	High Fiscal Deficit/GDP ratio (>4.4%)	Mild		
1971	Moderate Fiscal Deficit and Real Exchange Rate Overvaluation	Deep		
1975/76	High Fiscal Deficit/GDP ratio (>4.4%)	Very Deep		
1981/82		Deep		
1983/84/85		Mild		
1986/87/88		Deep		
1989/90/91		Very Deep		
1995		Moderate Fiscal Deficit, mild Real Deposits decline and high External Debt to Export ratio		Mild
2001/02	Moderate Fiscal Deficit and Real Exchange Rate Overvaluation	Very Deep		

Source: Amado, Cerro and Meloni (2005)

On the other hand, an impairing in the terms of trade, i.e. a declining price of exports or an increasing price of imports, may provoke severe balance-of-payments problems, leading to

reserves drainage and ultimately to a currency devaluation to regain competitiveness. During the XIX century and the first quarter of the XX century, the worsening in terms of trade also brought about severe fiscal problems in Argentina⁵, given the particular structure of public revenues that relied heavily in trade taxes.

The literature on contagion provides several explanations for the propagation of diseases across borders. The most popular is based on trade linkages. The typical case is the competitive devaluation in one country, which puts pressure on other countries to take a similar measure to avoid losing competitiveness. Another plausible explanation for the contagion is the existence of financial linkages and a common leveraged creditor that, given a collapse in one of the assets in her portfolio, sells other assets causing prices to fall and spreading the original disturbance across markets. Closed related to this explanation is the *herding behavior* which emphasizes the impact of informational asymmetries on decision-making.

Table 2. **International Crises and their impact on Argentina**

Year	Epicenter of the Crisis	Growth Recession	Crisis		
			Mild	Deep	Very Deep
1826	Crisis in London, 1825-26				
1873	World Recession				
1890	Baring Crisis				
1907	Crisis in USA				
1914	World War I				
1929	Wall Street Crash				
1982	Mexican Default				
1992	European Crisis				
1994	Mexican Crisis (tequila)				
1997	South East Asian Crisis				
1998	Russian Crisis				
1999	Brazilian Crisis				

Source: authors' calculations based on Cerro (1999) and Reinhart y Kaminsky (2002)

Table 2 presents the mayor international crises in the XIX and XX centuries, and their impact on the Argentine economy⁶. Given the “clinical record” of Argentina, it does not surprise that only the European and the South East Asian crises had no impact on Argentina. These episodes were regional, circumscribed to a few countries in the neighborhood of the epicenter. All other international episodes left some trace in the Argentine economy. The

⁵ Officially, the name *República Argentina* was established in 1860.

⁶ The Turkish crisis is not included since Argentina started its recession at the end of 1998, more than 30 months before the devaluation in Turkey.

World recession in 1873, the US crisis in 1907, the Russian crisis in 1998 and the Brazilian devaluation in 1999 only provoke a *growth* recession (or a slowdown in the growth rate) in Argentina⁷ while the beginning of the World War I and the Mexican Crisis of 1982 caused mild crises. It is interesting to notice that in 1914 Argentina was an open economy, apparently vulnerable to international episodes, while in 1982, was pretty much closed, which explains why the impact of the Mexican crisis was rather mild. Table 2 also poses a central question: why some crises end up in crashes and some other in deep and mild crises, or just a growth recession? We argue that fiscal sustainability helps to answer the question⁸.

III. Testing for Fiscal Sustainability

The standard framework for modeling fiscal sustainability departs from the well-known federal government budget constraint:

$$G_t - T_t = B_t - (1 + r_{t-1})B_{t-1} \quad [1]$$

Where G_t is the real government expenditures at t, T_t is real tax collection net of transfers (except for interest payments on the government debt), and B_t is the real market value at t of one period bonds issued at t, to be paid off at t+1 and to bear interest at net real rate r_t (assumed to be stationarity around the mean r). Note that we do not allow the government to finance its expenditures by printing money⁹.

Setting $\gamma = (1 + r)^{-1}$ and substituting forward equation [1], we obtain:

$$B_t = \sum \gamma^{j+1} (T_{t+j} - G_{t+j}) + \lim_{j \rightarrow \infty} \gamma^{j+1} B_{t+j} \quad [2]$$

The intertemporal budget is sustainable if and only if the current value of outstanding government debt is equal to the present value of future budget surpluses¹⁰. That is, the following condition must hold:

$$E_t \lim_{j \rightarrow \infty} \gamma^{j+1} B_{t+j} = 0 \quad [3]$$

Where $E_t(\cdot)$ is the expectation conditional on information at time t

⁷ The Russian crisis and Brazilian devaluation can be considered as the factors that triggered the 2002 Argentinean crisis, however, in the very short-run they only provoked a growth recession in Argentina.

⁸ The analysis of current account sustainability is left for further research.

⁹ See Sargent (1986)

¹⁰ We can also interpret equations (2) and (3) as the stock of debt held by the public is expected to grow, on average, no faster than the mean real rate of interest.

Taking first differences in [2] gives an empirical testable representation of the federal government budget constraint:

$$\Delta B_t = \sum \left(\frac{1}{1+r}\right)^{j+1} (\Delta T_{t+j+1} - \Delta G_{t+j+1}^*) + \lim \left(\frac{1}{1+r}\right)^{j+1} \Delta B_{t+j+1} \quad [4]$$

Analogously, sustainability implies:

$$\lim E_t \left(\frac{1}{1+r}\right)^{j+1} \Delta B_{t+j+1} = 0 \quad [5]$$

Following Martin (2000), testing for fiscal sustainability involves two steps: first, we test whether G_t and T_t are I(1). If the null hypothesis is confirmed, we proceed to the second step: testing for cointegration by means of the following regression model

$$T_t = a + bG_t' + \varepsilon_t \quad [6]$$

Where G_t' denotes real government expenditures plus the interest payments on the government debt. That is, $G_t' = [G_t + r_t B_{t-1}]$

If T_t and G_t are cointegrated, the deficit is strongly or weakly sustainable depending on the value of the b coefficient in the regression [6]. If $b=1$, the fiscal deficit is **strongly** sustainable, but if $0 < b < 1$ the deficit is weakly sustainable. On the other hand, if $b \leq 0$ the deficit is unsustainable. In contrast, if the Johansen test rejects cointegration, we considered that the deficit is unsustainable too¹¹. Table 3 summarizes the criteria for sustainability.

Table 3. **Criteria for Sustainability**

Cointegration	Value of b	Sustainability
Yes	b=1	Strong
Yes	0 < b < 1	Weak
Yes	b=0	Non-sustainable
No	irrelevant	Non-sustainable

Conclusions about cointegration and the values of the parameters may change in the presence of structural breaks in the series. For example, early findings about the fiscal sustainability of the U.S. economy by Hamilton and Flavin (1986) were overturned when structural breaks were taken into consideration. By imposing exogenous breakpoints, Hakkio

¹¹ Quintos (1995) claims that cointegration is not a necessary condition for weak sustainability. Nonetheless, as pointed out by Martin (2000) the interpretation of the coefficient b is unclear in this case.

and Rush (1991) found that Hamilton and Flavin results were supported by one sub period but not for the other. The latest developments follow the trace started by Haug (1992) that picked the breaks endogenously. Haug relied on the parameter stability tests by Hansen (1992) to obtain the breakpoints and consequently determine the sub periods, while Quintos (1995) uses a sequential Chow test with I(1) process. Recently, Martin (2000) developed a cointegration model with multiple endogenous breaks. This methodology produces simultaneous inferences about the presence of cointegration, the value of the cointegrating parameters and the size and timing of shifts.

IV. Data Specification and Empirical Strategy

We worked with three homogeneous data sets compiled from official sources. The first one comprises annual revenues and expenditures of the *Federal Government Administration* (henceforth, APN), excluding state-owned firms, from 1865 to 2002. The second series, which goes from 1961 to 2002, includes state-owned firms, configuring the so-called *Public Sector Series* (henceforth, SPN). This is the most appropriate series to study the fiscal sustainability of the country but unfortunately official data starts in 1961. Nonetheless, the available *federal government administration* series is a very good proxy for the period 1865-1960. Before the *great depression* state-owned firms were rare in Argentina. They become increasingly important after the upper forties but their deficits played a minor role in the total budget up to the mid 60s.(see figure 1)

The third data set contains quarterly data of the *Public Sector* for the period 1990-2002. The *Federal Government Administration* and *Public Sector* annual series were compiled by Ferreres (2006) from official sources, while the *Public Sector* quarterly data was obtained from the *Ministerio de Economía de la Nación* web site (www.mecon.gov.ar)

We test for fiscal sustainability for the entire period 1865- 2002 and also in various sub periods whose beginning and ending dates were chosen by two alternative methods:

(a) *Exogenously*, using the regression tree results obtained by Amado, Cerro and Meloni (2005) in their study of the argentine currency crises. They distinguish four sub periods: 1865-1914 (mostly an open economy), 1915-1950 (transition from open to close economy), 1951-1989 (closed economy), and 1990-2002 (relatively open economy). This series breakup is also supported on economic and political events¹².

(b) *Endogenously*, identifying structural breaks by means of the Bai-Perron stability test.

¹² For more details, see Cerro and Meloni (2003)

The empirical strategy to test for fiscal sustainability is very simple. Firstly, we check for the order of integration by the customary Phillips-Perron (henceforth, PP) and Augmented Dickey-Fuller (ADF) tests. We also performed the Zivot and Andrews test (ZA) to control for a structural break to avoid biasing the results towards non stationarity. Secondly we verify cointegration by the usual Johansen test as well as the Gregory-Hansen test that allows one structural break.

Figures 1A, 2A, 3A, 4A, and 5A in Appendix, portray the behavior of the target variables, Total Revenues and Total Expenditure in real terms, for different sub periods.

V. Empirical Results

Table 4 contains the outcomes of the PP and ADF tests for the whole period, 1865 - 2002, and for the four sub periods chosen exogenously¹³. It is worth remarking that we use a quarterly data set for the years 1990 – 2002. We tested different models (with or without intercept and with or without trend) and most of them sustain the non stationarity of the series.

Table 4. **Unit-Root Tests. PP and ADF**

Period	Data	Variables	PP(*)	ADF(*)
1865- 2002	APN	Revenues	-0.58	-0.82
		Expenditures	-0.72	-0.70
1865- 1914	APN	Revenues	-0.52	-0.71
		Expenditures	-0.48	-0.30
1915-1950	APN	Revenues	-0.61	0.82
		Expenditures	0.33	1.70
1951- 1989	APN	Revenues	-1.43	-1.55
		Expenditures	-1.35	-1.36
1961- 1989(**)	SPN	Revenues	-2.49	-2.48
		Expenditures	-2.31	-2.31
1990-2002(***)	SPN	Revenues	0,54	0.08
		Expenditures	0,20	0.11

(*) Critical Values: -3.47, -2.88 and -2.57 for the 1%, 5% and 10% level of significance respectively. Model with intercept for all tests, except for the period 1990-2002 without intercept and trend.

(**) SPN series not available for the period 1951-1960

(***) Quarterly data.

¹³ We also included estimations for the subperiod 1961-1989, with SPN series, since we could not carry out estimations with this series for the period 1951-1989 due to data availability as explained before.

We also performed the Zivot-Andrews unit-root test (Z-A), which allows for a single break in intercept, trend or both. The null hypothesis is unit-root versus the alternative of stationarity with a break. Table 5 exhibits the Z-A results. For the variable *Real Revenues* we accepted the null of unit root with breaks in 1903, 1945, 1961, 1985 and 2000.IV, while for *Real Expenditure* we also accepted the null with breaks in 1944, 1961, 1974 and 2000.IV but rejected the null for the periods 1865-1914

Table 5. **Unit Root Test. Zivot- Andrews**

Period	Data	Variables	Allowing for Break in Intercept	Break (year)
			Minimum T-Statistic	
1865-2002	APN	Revenues	-4.858*	1961
		Expenditures	-3.627	1958
1865-1914	APN	Revenues	-4.162	1903
		Expenditures	-5.666**	1905
1915-1950	APN	Revenues	-3.704	1945
		Expenditures	-4.753	1944
1951-1989	APN	Revenues	-4.748	1961
		Expenditures	-1.660	1973
1961-1989(***)	SPN	Revenues	-4.622	1985
		Expenditures	-3.875	1974
1990-2002	SPN	Revenues	-4.670	2000. IV
		Expenditures	-2.657	2000.IV

Note: Critical Values: -5.43 and -4.80 for the 1% and 5% level of significance respectively.

* Reject the null at 1%

** Reject the null at 5%.

(***) SPN series not available for the period 1951-1960

Once we find the cointegrating equation by means of the Johansen and Gregory–Hansen tests, we use the normalized cointegrating coefficients, and test the null of $b=0$ versus the alternative, $b>0$. If we accept the null, we conclude that the fiscal policy is unsustainable in that period. If we do not accept the null, we perform a new test but this time the null is $b=1$ against the alternative $0<b<1$. If we accept the null, we infer that there exists strong sustainability; otherwise we conclude that sustainability is weak.

A summary of the Johansen and Gregory-Hansen cointegration tests for Real Public Revenues and Real Public Expenditures (including debt services) are presented in Table 6. We estimated \mathbf{b} by the Johansen normalized cointegration vector and also by the Philips and Hansen fully modified estimator intended to solve estimation bias due to endogeneity. The

results of both tests are very similar, so we refer to the Fully Modified estimated **b** coefficient in our analysis.

Table 6. **Johansen and Gregory-Hansen Cointegration Tests**

Periods	Data	Cointegration		Cointegration Coefficient b		Conclusions From b test	Sustainability (·)
		Johansen	G-H	Johansen	Fully Modified (·)		
1865-2002	APN	Yes**	Yes	-0.98 (0.0313)	0.96 (0.0222)	b=1	Strong
1865-1914	APN	Yes**	Yes	-0.84 (0.0388)	0.83 (0.0337)	0 < b < 1	Weak
1915-1950	APN	Yes*	Yes	-0.71 (0.0428)	0.66 (0.0359)	0 < b < 1	Weak
1951-1989	APN	Yes*	No	-1.01 (0.0951)	0.98 (0.0903)	No interpretation	No sustainability
1961-1989 (•)	SPN	No	No	-0.76 (0.0759)	0.76 (0.0827)	No interpretation	No sustainability
1990-2002(••)	SPN	Yes**	No	-0.61 (0.1016)	0.61 (0.0862)	0 < b < 1	Weak

Note: standard errors in parenthesis below coefficient

(·) Under Quintos, weak sustainability.

(·) By Phillips and Hansen (1990). All coefficients statistically significant at 1% level.

(**) and (*) At the 1% and 5% level of significance respectively.

(•) SPN series not available for the 1951-1960 period

(••) Quarterly data.

According to Johansen and Gregory-Hansen tests (see Tables 1A and 2A in Appendix), the Argentine fiscal policy for the entire period 1865-2002 was sustainable. Nonetheless, as soon as we explore the sub periods we find weak sustainability. Interestingly, the sustainability of fiscal gets worse as the economy went from mostly open to relatively close. That is, the cointegrating coefficient **b** passes from 0.83 in the first period (1865-1914) to 0.66 in the years 1915-1950. In the period 1951-1989 we mostly reject cointegration. We may reject or accept cointegration depending on the method, the model and the significance level we use. Results are highly unstable, and these are also consistent with the high macroeconomic instability that the Argentinean economy was going through in those years. This period was characterized by huge average fiscal deficit (as % of GDP), volatility in public accounts and

high inflation rate ensuing from money printing to finance fiscal disequilibria¹⁴. These results are in line with the ones obtained by the Regression Tree Analysis, in which fiscal deficit was the first variable to split the sample in this period.

The results for the last period (1990 – 2002) present a disagreement between the Johnsen and the Gregory-Hansen tests. While the former finds a cointegrating equation with a \mathbf{b} coefficient equals to 0.61; the latter's verdict is no cointegration. In other words, if we take Johansen test, the fiscal policy was weakly sustainable in those years, but if we believe that Gregory-Hansen is the right test; there is no long term relationship between revenues and expenditures.

Endogenous sub periods

Emergent countries' economic time series covering extended periods usually present structural breaks and Argentina is not an exception. The Bai-Perron stability test finds the best 1 breakpoint of the real revenue-real expenditures relationship in 1984 and the best 2 breakpoints in 1984 and 1959 (see Table 3A in Appendix). Given that the 1984 breakpoint would have left us with few observations when applying the unit roots and cointegration tests for the period 1960-1984 and 1984-2002, we then split the whole sample into two sub periods only: 1865-1960 and 1961-2002.¹⁵ For the first sub period we worked with APN, while for the second one with SPN, according to the availability of the series, as we explained at the beginning in the previous section.

As with the exogenous breaks case, we first check for the order of integration of the series and second we test for cointegration. Table 7 contains the outcomes of the Zivot-Andrews test for unit root with one break for the whole period, 1865 - 2002, and for the sub periods: 1865 -1960 with the APN series, and 1961 – 2002 with the SPN series. Clearly, we cannot reject the null (unit root) at 1% in all cases except for Real Expenditures in the period 1961-2001 models (1) and (3), however with ADF and PP we accept the null for every model and significance level.

¹⁴ Inflation was the main source to finance public deficits during the four decades, although external funds were available for shorter periods, like 1978-1980.

¹⁵ However, results with the 1984 breakpoint are presented in Tables 4A and 5A in Appendix and are in line with the ones obtained for the period 1960-1998.

Table 7. Zivot and Andrews Unit Root Test

Zivot-Andrews Unit Root Test				
Period	Variable	Intercept (1)	Trend (2)	Both (3)
1865-2002	Real Revenues	-4.858* at 1961	-3.954 at 1931	-4.552 at 1959
	Real Expenditures	-3.627 at 1958	-2.422 at 1914	-3.085 at 1973
1865-1960	Real Revenues	-4.455 at 1946	-4.351 at 1931	-4.552 at 1946
	Real Expenditures	-2.954 at 1944	-3.865 at 1932	-3.846 at 1932
1961-2002	Real Revenues	-4.232 at 1990	-3.857 at 1986	-4.919 at 1990
	Real Expenditures	-5.834** at 1990	-3.157 at 1982	-5.349* at 1990
Critical Values 1%		-5.43	-4.93	-5.57
Critical Values 5%		-4.80	-4.42	-5.08

Note: * reject the null at 5% ** reject the null at 1%

The Johansen and Gregory-Hansen cointegration tests are quite conclusive for the period 1865-1960: we accept cointegration for whatever model or method we use (see Table 8)¹⁶. But for the 1961-2002 period results are ambiguous: we may accept or reject cointegration, depending on the model, the level of significance or the test we use. These results are similar to the ones we obtain for the exogenous periods analysis (Table 6).

Table 8. Johansen and Gregory Hansen Cointegration Tests

Periods	Cointegration		Cointegration Coefficient b		Conclusions From b test	Sustainability*
	Johansen	G&H	Johansen	Fully Modified**		
1865-2002	Yes	Yes	-0.98	0.96 (0.0222)	$0 < b < 1$	Weak
1865-1960	Yes	Yes	-0.68	0.67 (0.0147)	$0 < b < 1$	Weak
1960-2002	Yes/No	No	-0.71	0.68 (0.065)	No interpretation	No sustainability*

Note: standard errors in parenthesis below coefficient

* Under Quintos, weak sustainability.

** By Phillips and Hansen (1990). All coefficients statistically significant at 1% level.

¹⁶ The Johansen and Gregory-Hansen cointegration tests for Real Public Revenues and Real Public Expenditures (including debt services) are presented in Tables 4A and 5A in the Appendix.

Concluding Remarks

This study accounts for the sustainability of fiscal policy in Argentina. Surprisingly, we find that Argentina was sustainable for the whole period 1865-2002. That is, just like developed countries, Argentina reached fiscal sustainability. However, on second thoughts, this is an obvious conclusion rather than a surprising one: by any means, sooner or later, a country must be fiscally sustainable. The difference is the way emergent and developed countries attain sustainability.

Results change substantially as we look into sub periods: Argentina's fiscal performance was either weakly sustainable or not sustainable at all, depending on the sub period analyzed. This is in line with Hakkio and Rush (1991) findings for the US, in the sense that Hamilton and Flavin (1986) results of sustainability for the whole period were overturned when structural breaks were taken into consideration.

Argentina was weakly sustainable from 1865 to 1914 and also from 1915 to 1950, with a high but decreasing value of β as we pass from the first to the second sub period. From the 50s to the 80s when the economy remained mostly closed, conclusions about cointegration between real public revenues and expenditures were not robust: results are highly unstable and accepting or rejecting cointegration depends on the method, the model and the significance level we use. These results are robust to the way we define sub periods, whether exogenously, i.e., obtained from regression tree results by Amado, Cerro and Meloni (2005) or endogenously, i.e., finding the breakpoints by the Bai-Perron stability test.

The sub period 1950-1989 was characterized by an outrageous number of crises with almost no intervention of "unfavorable international conditions". On the other hand, the other sub periods in which the economy was relatively open, sustainability was weak, which made the country more vulnerable to international shocks, sometimes transmitted by the interest rate and some other by the terms of trade, or both. Clearly, fiscal sustainability matters and the evidence presented here exclude any explanation of crisis in Argentina based only on *bad international conditions*. In other words, in order to have a crisis, to the unholy trinity we must add up the unholy fiscal unsustainable policies. An episode of unfavorable condition may end up in a recession, a mild or a deep crisis depending on the intensity of the shock but also on the fiscal stance of the country. However, from the policy implication point of view, deactivating sudden stops or impeding terms of trade impairing are out of the reach of a small country, while fiscal prudence should be a more attainable objective.

Our findings supports the results of previous comprehensive studies of the history of Argentine crises, like Cerro and Meloni (2003) and Amado, Cerro and Meloni (2005) and

Cerro (2006) that showed that external factors only played a decisive role in few episodes and a secondary part in most of the crises, even though Argentina was involved in most of the international crises accounted for by Bordo (2006) and Eichengreen and Adalet (2006). Our evidence also fits very well the political economy studies on Argentina (see Jones, Sanguinetti and Tommasi, 1997 and Nicolini, Posadas, Sanguinetti, Sanguinetti and Tommasi, 2002) that stress the failure of some key institutions as the tax-sharing system, that provides incentives to overspend and overborrow in the Argentine provinces and to rescue them by the federal government.

It remains an open question why if crises are so costly, authorities do not adjust smoothly, in order to get a soft landing instead of painful crises. The answer seems to point out at the institutions (see Cerro, 2006)

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Appendix

Figure 1A.. Real Public Revenues and Real Public Expenditures: 1865- 1914

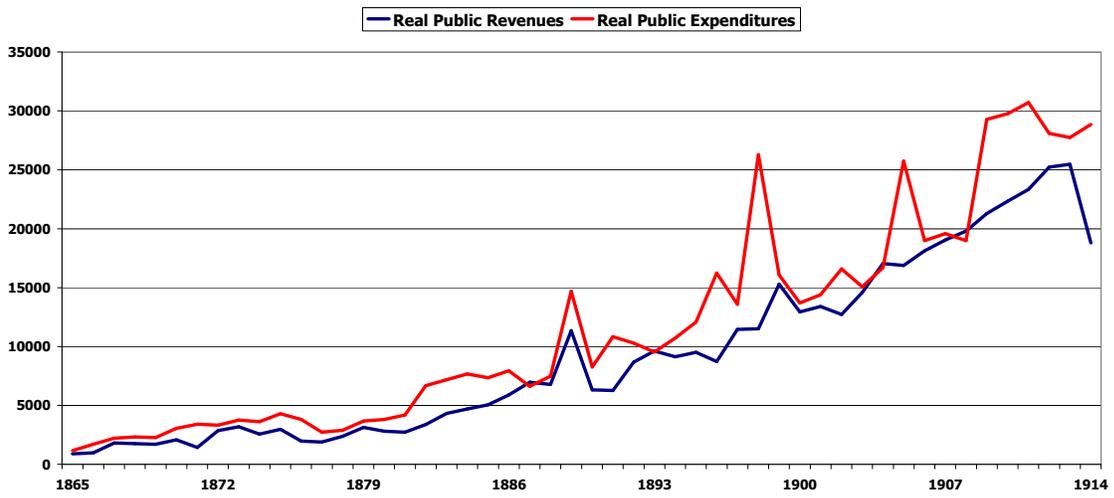


Figure 2A.. Real Public Revenues and Real Public Expenditures: 1915- 1950

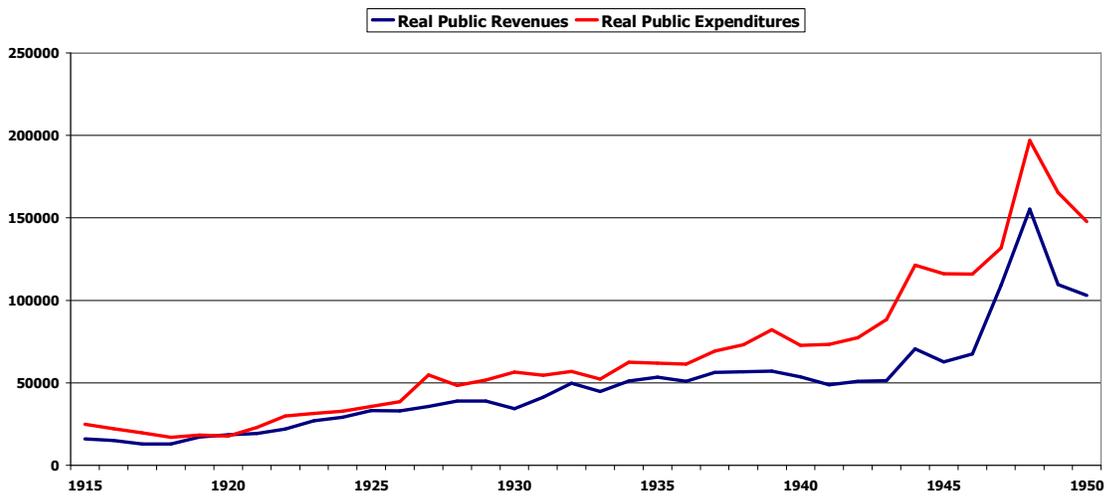


Figure 3A.. Real Public Revenues and Real Public Expenditures (APN): 1951- 1989

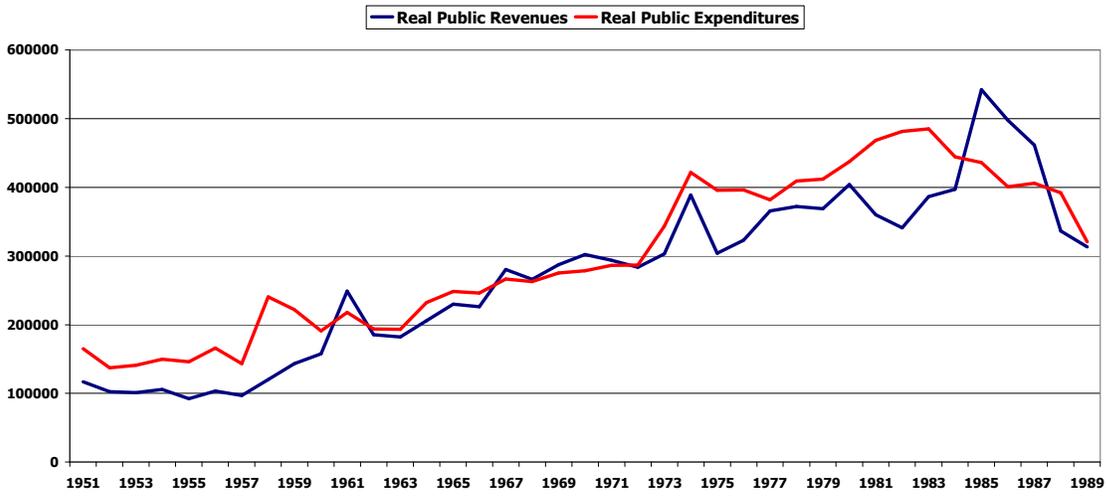


Figure 4A.. Real Public Revenues and Real Public Expenditures (SPN): 1961- 1989

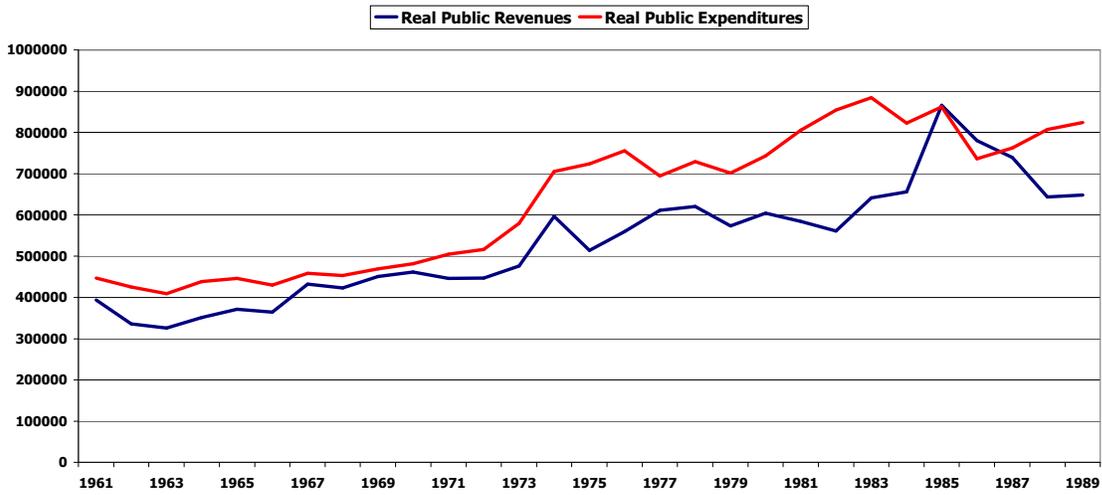


Figure 5 A. Real Public Revenues and Real Public Expenditures: 1990:1- 2002:4

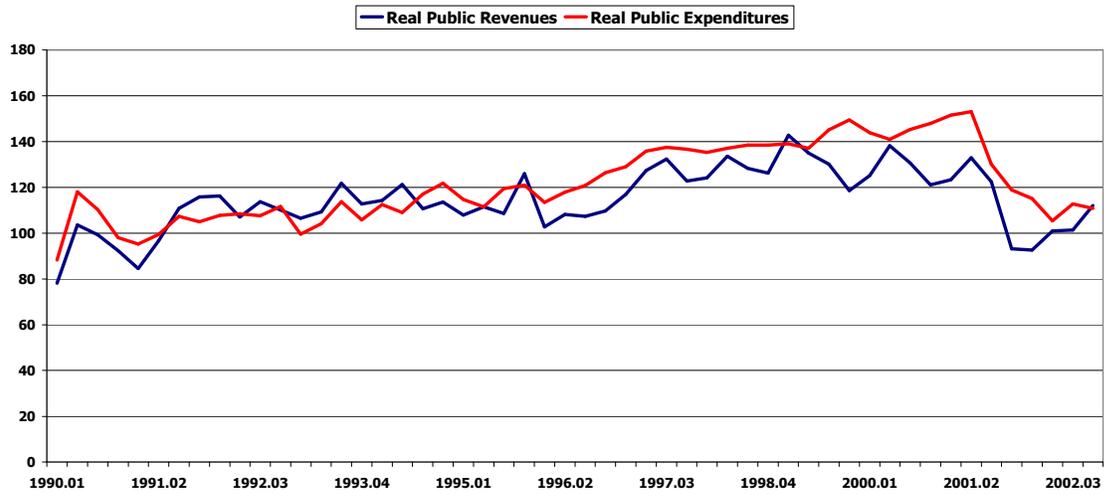


Table 1A. Johansen Cointegration Test

Johansen Cointegration test						
Period	Data	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Max-Eigen Statistic	Beta
1865-2002	APN	None	0.221	34.616**	34.07**	-0.98
		At most 1	0.004	0.538	0.538	
1865-1914	APN	None	0.367	21.983**	21.982**	-0.84
		At most 1	1.025	0.0004	0.0004	
1915-1950	APN	None	0.349	15.704*	15.466*	-0.71
		At most 1	0.006	0.237	0.237	
1951-1989	APN	None	0.340	18.01*	16.21*	-1.01
		At most 1	0.045	1.79	1.79	
1961-1989	SPN	None	0.345	12.707	11.040	-0.76
		At most 1	0.062	1.667	1.667	
1990-2002	SPN	None	0.310	21.41**	18.599*	-0.61
		At most 1	0.054	2.811	2.811	

Note: *(**) denotes rejection of the null hypothesis (no cointegration) at the 5% (1%) level of significance respectively

Table 2A. **Gregory-Hansen Cointegration Test**

Gregory-Hansen Cointegration Test		
Period	Break in Intercept No Trend	Verdict
1865-2002	-6.31	Cointegrated
	1965	
1865-1914	-7.83	Cointegrated
	1900	
1915-1950	-5.90	Cointegrated
	1941	
1951-1989	-4.12**	No Cointegrated
	1963	
1961-1989	-4.47**	No Cointegrated
	1983	
1990-2002	-5.07*	No Cointegrated at 1%
	1999:03	

Note: Critical Values: 1% -5.13 and 5% -4.61; * (**) Accept at 1% (5%) the null.

Table 3A. **Bai-Perron Stability Test**

Dependent Variable	Data	Coefficient of Real Expenditure	Best 1 breakpoint	Best 2 breakpoints
Real Revenues	APN	0.93 (70.67)	1984	1959 1984

* t statistics in parenthesis.

Table 4A. **Gregory-Hansen Cointegration Test**

Gregory-Hansen Cointegration Test		
Period	Break in Intercept No Trend	Verdict
1865-2002	-6.31	Cointegrated
	1965	
1865-1960	-7.42	Cointegrated
	1941	
1961-2002	-5.02*	No Cointegrated at 1%
	1983	
1865-1984	-8.17	Cointegrated
	1960	
1961-1984	-3.95**	No Cointegrated
	1966	
1984-2002	-4.91*	No Cointegrated at 1%
	1998	

Critical Values: 1% -5.13 and 5% -4.61

* (**) accept at 1% (5%) the null (no cointegration)

Table 5A. **Johansen Cointegration test**

Johansen Cointegration test					
Periods	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Max-Eigen Statistic	Beta
1865-2002	None	0.22	34.616**	34.07**	-0.98
	At most 1	0.004	0.538	0.538	
1865-1960	None	0.39	48.43**	47.94**	-0.68
	At most 1	0.00	0.49	0.49	
1961-2002	None	0.37	19.75*	18.53*	-0.71
	At most 1	0.03	1.22	1.22	
1865-1984	None	0.11	19.37*	13.51	-0.72
	At most 1	0.05	5.86*	5.86*	
1961-1984	None	0.42	12.31	12.19	-0.66
	At most 1	0.005	0.11	0.11	
1984-2002	None	0.58	17.59*	16.73*	-0.78
	At most 1	0.04	0.86	0.86	

Note: *(**) denotes rejection of the null hypothesis (no cointegration) at the 5% (1%) level of significance respectively.