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## Explaining the Argentine growth paradox: new evidence applying cointegration techniques

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# Kieler Arbeitspapiere Kiel Working Papers

Kiel Working Paper No. 506

EXPLAINING THE ARGENTINE GROWTH PARADOX:  
NEW EVIDENCE APPLYING COINTEGRATION TECHNIQUES

by

Federico Foders and Hans H. Glismann

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## Abstract

In this paper we revisit three hypotheses, which we had proposed before, in an attempt to explain the long-run pattern of Argentine real GDP growth: (i) distributional conflicts (between the government and the private sector, and between entrepreneurs and trade unions), (ii) a permissive monetary policy, and (iii) the delinking of the Argentine economy from the world markets. Applying unit root econometrics we determine that the model is not cointegrated and that it should be estimated with conventional methods in difference form. Alternative estimates indicate that the best fit is achieved by a model representing hypotheses (i) and (ii) but not (iii). Thus, foreign trade seems not to have had any impact on Argentine GDP during the period studied. Also, the conflict between entrepreneurs and trade unions does not seem to have had an important influence on Argentine growth, at least in the period 1915 - 1978. However, the results for the extended period 1915 - 1988 indicate that our model representing hypotheses (i) and (ii) does not perform well in explaining the 1980s, when substantial changes in economic policy took place in Argentina.

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## I. Introduction

Some years ago, in an enquiry into the long-run pattern of Argentine growth we put forward some hypotheses and empirically assessed their relative explanatory power [Foders, Glismann 1985, 1987]. An important part of that evidence was based on the assumption that our key variables could be statistically described as following a linear deterministic trend, and that the impact of economic policies on aggregate macroeconomic variables could be studied by analysing the cycles presented by the deviations of the series about their long-run trend. Regressing the level of real GDP on the levels of the proxies for our hypotheses and applying standard econometric wisdom we found support for the picture derived from closely scrutinising the cycles shown by the detrended series. However, since the multiple regression showed a rather high  $\bar{R}^2$  and significant t-values but a low Durbin-Watson statistic, the suspicion arises that our results might have been of the "spurious" kind [Granger, Newbold 1974]. Recent advances in econometric theory and in the empirical analysis of time series have established that spurious regressions may occur if the time series involved are non stationary, i. e. if they have stochastic components or unit roots [Granger 1986; Hendry 1986; Stock, Watson 1988]. In the presence of unit roots standard asymptotic theory does not apply and regression analysis involving the levels of variables can be highly misleading.<sup>1</sup> In this paper we address long-run Argentine economic growth drawing heavily on these new developments in econometric theory and time series analysis.

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<sup>1</sup> The appropriate procedure under the unit root assumption is to determine whether the series are cointegrated. A model consisting of cointegrated variables can be best estimated using a dynamic specification approach (for example, an error correction model). Not cointegrated variables call instead for an estimation in difference form applying traditional methods.



In spite of the fact that the short-run analysis of Argentina's economic performance dominates the literature<sup>1</sup>, Argentina's economic decline seems to be the outcome of a rather chronic disease. According to Table 1, real GDP growth has been slowing down over a period of 75 years; the same applies to total productivity growth (or to the growth of real GDP per capita). The average ratio of investment to GDP was 50 per cent lower in 1951 - 1989 than in the period 1900 - 1913; the openness of the country (as measured by the ratio of imports plus exports to GDP) fell dramatically from 1864 - 1913 to 1951 - 1989. Argentina's growth pattern differs from the one experienced by comparable countries in that the growth rates it achieved this century were not only much lower than the ones achieved in the second half of the 19th century, but also lower than the rates experienced by other Latin American countries (Brazil, Mexico) [Díaz-Alejandro 1982].

What is Argentina's growth paradox all about? It is widely acknowledged that Argentina's endowment with factors of production has more similarities with industrial countries than with most developing countries. This applies particularly to the supply of qualified labour, as can be inferred, for instance, from the national enrollment share in higher education, which comes near to the level of Southern Europe [World Bank]. Since Argentina is well-endowed with traditional energy resources (oil, gas, coal, uranium), the country was not severely hit during the oil price hikes of the 1970s. Also, population growth never was a problem. Moreover, the inflow of human and financial capital remained important until well into the 1960s. Argentina's comparative advantage in the production of agricultural products, de-

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<sup>1</sup> See, for instance, the attention given to the "Tablita" and to other short-run stabilisation plans ("Plan Austral") by World Development [1985] and Blejer, Cheasty [1988].

Table 1 - Argentina: Real Growth, Investment, Productivity and Foreign Trade, 1864 - 1989

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Indicator	1864- 1913	1914- 1950	1951- 1989
Growth <sup>a</sup>	3.94	3.22	2.26
Productivity <sup>b</sup>	1.28	1.11	0.62
Investment <sup>c</sup>	42.06	24.03	21.05
Foreign Trade <sup>d</sup>	46.24	29.63	18.73

---

<sup>a</sup> Exponential annual average rate of growth of real GDP (prices of 1960) in per cent;

<sup>b</sup> exponential annual average rate of growth of real GDP per capita (prices of 1960) in per cent (1869 - 1913);

<sup>c</sup> ratio of gross real investment to real GDP (prices of 1960) in per cent (1900 - 1913);

<sup>d</sup> ratio of (real) imports plus (real) exports to real GDP (prices of 1960) in per cent.

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Source: Own calculations with data from sources listed under "References".

rived from the availability of fertile land and a beneficial climate, was, for many years, a reliable source of foreign exchange, at least until mounting protectionism in foreign markets (United States, European Community) reduced the demand for Argentine agricultural products. With these assets in mind, one would have expected high growth rates of output. In view of the Argentine growth puzzle it is surprising to find that the profession appears to have lost its interest in comprehensive studies of long-run relationships in the vein of the ones published by Laura Randall [1978] and Carlos F. Díaz-Alejandro [1970, 1982].

The purpose of this paper is to contribute to the empirical analysis of the long-term economic growth of Argentina. In Section II some of the hypotheses already put forward elsewhere [Foders, Glismann 1985, 1987] are reviewed and in Section III they are tested applying unit root methods. In the last section we contrast our findings and policy conclusions with the economic reforms currently underway in Argentina.

## II. Hypotheses Explaining the Long-Run Pattern of Argentine Development

### 1. Distributional Conflicts

The distributional conflicts hypothesis refers to the outcome of the struggle of different social groups to secure an increasing share of national income for themselves. The key players are the government bureaucracy, the trade unions and the entrepreneurs. The theory of public choice offers several (positive) approaches to the role of such social groups in the economic process [Olson 1982]. The essence of this theory is that rent seeking by these groups leads to a reallocation of productive factors away from profitable investment and towards private consumption and government expenditure. The hypothesis that variations in long-term growth observed in industrial countries could be associated with variations in the intensity of distributional conflicts has been invoked to explain the growth pattern of Germany [Glismann, Rodemer, Wolter 1978].

In the case of Argentina, two different conflicts can be distinguished: the one arising between unions and entrepreneurs, and the one arising between the government and the private productive sector. *Ceteris paribus*, every distributional conflict can be considered to be a zero-sum game, with improvements in the position of one side costing the

other side a loss. For example, wage hikes which are out of line with productivity growth are likely to lower the profitability of capital investment. Lower profits affect investment, and this, in turn, might affect employment; in the end GDP increases could be smaller, thereby offering new incentives for the next round of distributional conflicts. Similarly, a substantial expansion of government activity in the economy, for instance, by nationalising private firms, could lead to a monopoly position of government-owned firms in the corresponding domestic markets and thus to lower growth rates of the affected industries. This would ultimately reduce the overall rate of economic growth, particularly if private industry is crowded out by government-owned firms in the market for private goods.

The first class of distributional conflicts, the one between trade unions and entrepreneurs, has a prominent place in Argentine history. Together with immigration from Europe the idea of unionisation reached the country already in the first half of the 19th. century. Industrialisation and the increasing concentration of workers in the main cities particularly after World War I favoured the development of unions. Since the 1940s worker's organisations began to increase their power, when the establishment of a virtually closed shop system lead to a growing membership. Accumulating membership fees, which were centrally administered, Argentine unions turned first into an economic and then into a political factor. Their power matched quite well the economic and political power accruing to entrepreneurs.

The second type of conflict also occurred repeatedly in Argentina, both before and after the rise to power of Peronism in the 1940s. The ownership structure of Argentine industry was clearly biased towards foreign capital, because most capital and entrepreneurial talent had come from abroad. Foreign companies had contributed to the very dynamic eco-

conomic development of the country after the independence from Spain in 1810 and were engaged in international trade and banking but also in the local production of both public and private goods and services. In the 1930s and 1940s nationalism, the dominant political movement in continental Europe at that time, also governed Argentine politics. This led to the nationalisation of many British and American firms holding monopoly interests in the key sectors of the Argentine economy [Randall 1978] and, thus, to a dominant position of state firms.

Peronism also changed labour relations. Being the party of "Social Justice", the Peronist party used income distribution as an instrument to enhance its popularity and, hence, increase the number of votes. The Peronist government on the one hand directly influenced wage negotiations in favour of the unions and on the other offered entrepreneurs (private and state firms) a "safe" domestic market by introducing tariff and non-tariff barriers to international trade and maintaining an overvalued exchange rate for "cheap" imports of capital goods and intermediate products. Price controls for agricultural commodities and foodstuffs (= wage goods) artificially maintained a high purchasing power of money income; real wages increased.

The pattern of investment (Table 1) could be interpreted as revealing that at least from the World War I to the late 1950s (not less than 40 years of Argentine economic history) an increasing share of real income was used for other purposes, notably for consumption. At its lower average level (21 - 24 per cent from 1914 to 1989) investment never led to a recovery of GDP. This seems to indicate that the natural conflict between savings and consumption, which can be related to the time preference of the leading social groups, was decided in favour of the latter, a fact that is supported by the downturn in productivity experienced during the period under study.

## 2. A Permissive Monetary Policy

This hypothesis deals with the transmission mechanism from monetary policy to the real sector of the economy via the impact of monetary policy on prices [von Mises 1953, Friedman 1977]. It particularly highlights the effects of monetary policy on the relative prices of goods, services and factors of production. Since under high and variable rates of inflation the informational content of (relative) prices is lost, entrepreneurs find it increasingly difficult to allocate their capital to the most profitable uses.

Argentina's monetary history can be divided into two periods according to the prevailing standard, gold and the US dollar. Until 1875 there was no monopoly for the emission of money; several private banks had the right to mint gold and silver coins. In 1875 the (spontaneous) system of parallel currencies came to an end, when the government set a fixed ratio between both metals. Eight years later, the gold standard was introduced, hoping that it would help to control the money supply. This did not happen, however, and only two years later the external convertibility of the domestic currency had to be temporarily suspended for most international transactions. Convertibility was again restricted during the so-called Baring crisis in 1890/91 [Bernholz 1984] and again from 1914 to 1927. Finally, in 1931 the US dollar was chosen as the new standard for the local currency and in 1935 the Argentine central bank was founded, at first as a private bank. These developments did not help to control the money supply either. Instead, they paved the way for an expansion of government expenditure at exorbitant rates.

Several monetary measures contributed to a policy of soft budget restriction. From 1946 to 1957 and later from 1973 to 1976 the government nationalised bank deposits. This is tantamount to having a 100 per cent reserve requirement in a

fractional reserve system. Monetary expansion at first was limited to 25 per cent of gold and foreign currency reserves. From 1949 onwards this ceiling was relaxed until a fractional reserve system was formally introduced in 1957. But this system with its much better means to control at least a part of the money supply also failed. The central bank became an instrument of fiscal and income policies. The first major increase in the supply of money happened during the 1930s; the 1940s and 1950s saw a virtual explosion of the money supply. Inflation became a problem: annual changes in the consumer price index in the order of 20 per cent were common in the 1950s; the 1970s and 1980s saw three to four-digit rates per annum.

### 3. Disintegration

The disintegration hypothesis is the reverse of the well-known gains-from-trade hypothesis derived from classical and neoclassical international trade theory [Haberler 1936; Heller 1968]: to close the economy to international trade is to give away the potential gains from foreign trade. If the gains from no trade exceed the gains from trade, the closed economy will experience higher rates of growth of real income than the open economy. Foreign trade constituted the single major sector of the Argentine economy in the 19th century. Exports alone reached a level of about 40 per cent of GDP in 1870; imports amounted to some 30 per cent. A high degree of foreign trade dependence is not only obvious in the light of the relatively small domestic market existing at that time. It also shows that Argentina adhered to the law of one price in the sense that the country was fully integrated into the world economy. However, the strengths of integration have to be contrasted with the risks implied by the high commodity and regional concentration of trade flows and the high regional concentration of capital flows: from independence (1810) to World War II Britain was the single

most important customer for Argentine (mainly agricultural) products. In the interwar years the US began to absorb an increasing share of Argentine exports; in the past 40 years the US became the most important market for Argentine products. The same regions were also the most important sources of Argentine commodity (mainly manufactures), financial capital and technology imports.

Since foreign economic relations appear to have been central to Argentine economic development, it is plausible to assume that external shocks in form of wars and other (unexpected) interruptions of world trade and capital flows should have had an impact on the economic performance of this country. Even if the empirical evidence showing potential welfare losses for Argentina derived from the extreme dependence on international trade and capital flows is missing, what ultimately counts is the policy reaction to this perceived exposure. The expectations of Argentine policymakers in this century can be safely said to have been deeply influenced by the alleged weakness of being dependent on foreign trade. It is thus not surprising that already in the 1930s import substitution turned into a "leitmotiv" of Argentine economic policy. By closing the economy policymakers traded the risk of being severely hit by uncontrollable events originating in the world market for another risk, the risk of implementing a development strategy against the country's static comparative advantage. Since the latter determined the country's traditional role in the international division of labour, the strategy of import substitution involved a radical departure from this role and hence from Argentina's integration into the world market.

It can be inferred from Table 1 that Argentina's path went from integration to disintegration. As shown in our 1985 paper, the period of integration was very short: it lasted from 1864 to 1890, when disintegration began. In 1870 im-



ports and exports together amounted to about 70 per cent of GDP; this ratio fell to 40 per cent in 1891 and remained under 30 per cent from 1930 to 1970; in the 1970s and 1980s this indicator hardly ever rose over 20 per cent. Interestingly, both World Wars seem to have been periods of increasing integration, in contrast to the interwar years (Great Depression). This obviously weakens the hypothesis of external vulnerability in the face of events with a potential impact on global trade.

If the openness of the country was a factor in Argentine economic history, slow growth may have been the price for delinking the Argentine economy from the world market. While the country might have deliberately pursued autarky policies after 1930, when excessive import substitution policies were introduced, why did the country begin to retire from world markets as early as 1890?. Trade problems with the UK could have been one motive, although most of the problems came much later, in the wake of the consolidation of the British Commonwealth in the 1920s. The Roca-Runciman-Treaty (1933 and again 1936) kept Argentine exports flowing into the British market for a while, in spite of the fact that Argentina was not accepted as a Commonwealth member.

### III. The Model, Data Pre-Analysis and Empirical Results

#### 1. The Model

The basic empirical model incorporating proxies for the hypotheses presented in the last section can be written as

$$(1) \quad \text{GDP} = \text{GDP} \quad (\text{INV}, \text{AST}, \text{MX}/\text{GDP}, \text{CPI}, \text{RWP})$$

+       -       +       -       -

where

GDP = real gross domestic product (in prices of 1960)  
INV = real gross investment (in prices of 1960)  
AST = real government expenditure (in prices of 1960)  
MX/GDP = imports plus exports (as a per cent of GDP; in prices of 1960)  
CPI = consumer price index (1960 = 100)  
RWP = real wage position (wage: productivity ratio; in prices of 1960).

INV, AST and RWP represent the distributional conflicts hypothesis, CPI the monetary policy hypothesis, and MX/GDP the disintegration hypothesis. AST addresses the conflict between the government and the private sector and RWP the one between entrepreneurs and trade unions. In a society engaged in distributional conflicts, i. e. showing a time preference between consumption and savings favouring the former, the potential level of savings decreases and, in the absence of foreign savings, investment too (INV). The signs found under the independent variables in (1) follow from the discussion in the last section: an increase in investment (INV) and trade (MX/GDP) is assumed to have a positive impact on output, whereas increases in government spending, the level of prices, and the wage: productivity ratio can be expected to have a negative impact.

Hoping to benefit from new developments in econometrics, in this paper we first set out to subject our time series to a pre-analysis in order to try to identify (or at least to better approximate) the underlying data-generating process. We scrutinise the sample autocorrelation estimates of the relevant variables and subsequently embark on a formal unit root test. We then perform a multivariate cointegration test in order to derive the appropriate estimation procedure.

## 2. Data Pre-Analysis

### a. Autocorrelation Estimates

A pre-analysis of our time series based on the Chi-square distributed Box-Pierce Q-statistic (at lag 20) and the standard error of the sample autocorrelation function (at lag 20) yields the characteristics summarised in the second column of Table 2. This exercise includes the ratios used in our 1985 and 1987 papers (INV/GDP, AST/GDP), and the series present in RWP (REL and PROD). According to the Q statistic alone, AST, INV/GDP, AST/GDP, and CPI seem to be borderline cases. While INV/GDP is found to be stationary in the first and second differences, CPI appears to be stationary in any of the three forms studied (the original time series, and first and second differences). AST and AST/GDP, both present a non-stationary structure. These results clearly point toward the limited applicability of the Q-statistic, probably due to the fact, that its assumed distribution as Chi-square is only an approximation for large samples. Since it is also known that stationary series are defined as featuring a particular sample autocorrelation function which falls off rather quickly as the number of lags increases, casual observation of these functions can be used as a further criterion to determine whether a particular time series was generated by a white noise process. We conclude from Table A1 that AST, INV/GDP and AST/GDP are stationary in first differences, and that CPI is stationary in second differences.

### b. Unit Root Test

Performing a unit root test<sup>1</sup> on the same data yields the re-

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<sup>1</sup> We regressed the first difference of the natural log of each series on the lagged value of the undifferenced log and alternatively included deterministic components and lagged values of the dependent variable (Tables A2 - A11).

Table 2 - Identification of the Data Generating Process  
Underlying the Data Set

Original Series	Autocorrelation Analysis of Raw Data	Unit Root Test
GDP	FD	I(1)
INV	FD	I(1)
AST	FD	I(1)
INV/GDP	FD	I(1)
AST/GDP	FD	I(1)
CPI	SD	I(2)
REL	FD	I(1)
PROD	FD	I(1)
RWP	FD	I(1)
MX/GDP	FD	I(1)

## Notes:

GDP: real gross domestic product; INV: real gross investment; AST: real government expenditure; INV/GDP: investment ratio; AST/GDP: government expenditure ratio; CPI: consumer price index; REL: real wage index; PROD: real GDP per capita; RWP: real wage as per cent of PROD; MX/GDP: exports and imports as per cent of GDP; FD: first differenced series is stationary; SD: second differenced series is stationary; I(1): difference stationary (first order); I(2): difference stationary (second order).

Source: Own calculations.

sults also summarised in Table 2, column three. The formal test generally confirms the autocorrelation analysis for the whole set of variables. As usual, though, in some cases the test is ambiguous, a fact that is no surprise, for, as recently noted by Cochrane [1991], and also by Campbell and Perron [1991], tests for unit roots have low power in the sample sizes typically available for economic time series. It consequently turns out to be virtually impossible to clearly distinguish whether a series is difference-stationary or trend-stationary. This can be readily seen from Table A3, for example. While the results for INV indicate

that the hypothesis that this time series is integrated of second order ( $I(2)$ ) can be rejected for every subcase at the 10 per cent significance level, the rejection of the hypothesis that  $INV$  is  $I(1)$  depends on the specification of the regression: it cannot be rejected in the subcases 1a, b, c; 2a, c; 3a, b, c and 4a, b, c. In the subcase 2b it can be rejected in favour of  $I(0)$ . Similarly,  $AST$  (Table A4) appears to be  $I(0)$  in the subcase 2a; the ratios in Tables A5 and A11 also alternate between  $I(0)$  and  $I(1)$ . These results underline the importance of both (i) correctly modeling the deterministic components of a time series and (ii) including or not a lagged dependent variable on the right hand side of the estimated equation. For "any trend-stationary process can be approximated arbitrarily well by a unit root process" and vice versa [Campbell, Perron 1991, pp. 18 - 19]. Tables A2 - A11 reveal that by specifying a fairly wide array of deterministic components, the series can vary substantially in their demeaned and detrended behaviour as well as in their reaction to lagged dependent variables.<sup>1</sup>

As far as  $GDP$  is concerned, the Dickey-Fuller test cannot reject the null hypothesis over most of the specification scenarios chosen, as long as the order of the trend polynomial remains under four. Thus, in this case, the well-known phenomenon of "near observational equivalence" between trend stationary and difference stationary series shows up only from trend polynomials of order four onwards, where the null must be rejected. In deciding whether a series is  $I(0)$ ,  $I(1)$  or  $I(2)$  we assumed the specification featuring a constant and a linear trend to be the crucial one, because it nests both the null hypothesis of a unit root and the alternative hypothesis that the series is trend stationary.

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<sup>1</sup> This method has been called "identifying the breaking point of deterministic complexity" (Paqué 1991, pp. 22-27). In contrast to Paqué's findings for German wage data, we do not detect a common breaking point.

In sum, the unit root test yields that our real variables (GDP, INV, AST, REL) and ratios (AST/GDP, INV/GDP, MX/GDP, RWP, PROD) all appear to be  $I(1)$  and that our only "nominal" series, CPI, is  $I(2)$ . This means that in nominal terms GDP, INV, AST, MX, and REL should also be  $I(2)$ . If these assumptions hold, our findings for Argentine time series are in line with the findings of other authors for other countries, particularly in the case of GDP and CPI [Campbell, Perron 1991, p. 56].

### 3. Cointegration Test

We now embark on a cointegration test, i. e. on finding out empirically whether a linear combination of the time series in our data set exists, which (i) is stationary ( $I(0)$ ), (ii) eliminates the unit roots, and (iii) might have a linear trend. The aim is to test for stochastic integration, a somewhat weaker form of cointegration which is compatible with the existence of deterministic components in the data [Campbell, Perron 1991, p. 25]. For this we use a residual-based test which amounts to a unit root test on the errors of a static equation including a constant and a linear trend. The null hypothesis is the one of no cointegration, the alternative hypothesis the one of stochastic cointegration.

In the last section, a univariate unit root test revealed that with only one exception (CPI) we were not able to reject the hypothesis that the time series in our data set are  $I(1)$ . Since CPI appears to be  $I(2)$ , this variable should enter the cointegrating regression in first differences, due to the requirement that all specified variables be integrated of the same order.<sup>1</sup> In fact, here the unit root test matches the prior given by economic theory, that the change

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<sup>1</sup> In fact, series with a lower order of integration (i. e.  $I(0)$ ) could be present [Campbell, Perron 1991, p. 25].

in the price, i. e. the rate of inflation, is the correct specification.

As can be seen from Table 3 we estimated the static equation for two periods: 1915 - 1978 and 1915 - 1988. The first period coincides with the period for which we presented the results in our 1985 paper. A Chow test for splitting the sample into the subperiods 1915 - 1978 and 1979 - 1988 indicates that the coefficients are unstable over the longer period. This could point towards a change in the policy regime. In the 1980s Argentina experienced important shocks and deep institutional changes with an impact on the economic regime: the war in the South Atlantic, the return to democracy and civilian government, heterodox stabilisation plans etc.

The static regression reveals that in both periods the expectations pertaining to the signs of the variables were not met. A higher DW statistic in the shorter period is not an encouraging indicator of superiority. Invoking further test statistics, as the Breusch/Godfrey Lagrange Multiplier test in its both forms AR/MA(1) and AR/MA(2), and the Ljung/Box statistic (1 and 2 lags), as reported in Table 3, the picture remains, that our model appears to perform slightly better in the shorter period.

Turning now to the actual test for cointegration by scrutinising the results of the residuals regression leads to the conclusion that according to the Dickey-Fuller test (Table 3) the null of no cointegration can be rejected at the 10 per cent level in favour of the hypothesis of stochastic cointegration for the 1915 - 1978 estimate but not for the 1915 - 1988 estimate. Although we seem to meet again the problem of "near observational equivalence" between cointegration and no cointegration, which we already met in the section on the unit root test, the wrong signs detected in the static regression constitute strong evidence in favour

Table 3 - Residuals-Based Test for Cointegration

	Static Regression <sup>a</sup> (OLS)	
	1915-1978 <sup>c</sup>	1915-1988 <sup>d</sup>
	Coefficients	
Constant	6.4550	6.4294
Linear Trend	0.0277	0.0269
ln INV	0.1834	0.2315
ln AST	-0.0008	-0.0315
ln MX/GDP	0.0246	-0.0349
dln CPI	-0.0057	-0.0393
ln RWP	0.0056	0.0353
	Statistics	
D <sub>2</sub> W. <sup>f</sup>	1.1388	0.6542
R <sup>2</sup>	0.9971	0.9955
S.E.	0.0340	0.0460
Chow (1979)	-	9.7667**
Breusch/Godfrey LM		
AR/MA(1)	1.8782	7.2995**
AR/MA(2)	3.3429	12.3026**
Ljung-Box Q-statistic		
1 lag	10.5985**	29.5980**
2 lags	10.7843**	40.6628**
	Residuals Regression <sup>b</sup> (OLS)	
	1916-1978 <sup>c</sup>	1916-1988 <sup>d</sup>
Coefficient <sup>e</sup>	-0.5821	-0.3239
t-ratio <sup>e</sup>	-4.9472	-3.5228

<sup>a</sup> dependent variable: ln GDP;

<sup>b</sup> dependent variable: first difference of residuals from the static regression; independent variable: lagged residuals; no deterministic terms are included in the residuals regression;

<sup>c</sup> static regression: T = 64; residuals regression: T = 63;

<sup>d</sup> static regression: T = 74; residuals regression: T = 73;

<sup>e</sup> critical values for the Dickey-Fuller statistic: -5.0282 (5 per cent) and -4.7311 (10 per cent) [Phillips, Ouliaris 1990];

<sup>f</sup> approximate range of indifference for the DW statistic: R<sub>L</sub> = 0.397 (0.347), R<sub>U</sub> = 1.352 (1.187) for T = 64 (74) (interpolated) at the 5 per cent significance level [Sargan, Bhargava 1983].

\*\*significant at the 1 per cent level; \* significant at the 5 per cent level

Source: Own calculations.



of the null hypothesis. We base our discrimination between cointegration and no cointegration on traditional time series analysis by inspecting the sample autocorrelation function of the residuals from the static regression as shown in Table 4. Following the Box-Pierce Q statistic, the standard error (both at lag 20) and casual observation of the estimated function we conclude that the residuals are I(1). Since stationarity of the residuals can be achieved only by first differencing them, we cannot reject the null of no cointegration.

#### 4. Model Estimation

Having gathered evidence that our model consists of difference-stationary time series which are not cointegrated, estimation should be done with differenced variables; CPI, the only I(2) series in our model, should be differenced twice, the others only once. The results from a simple OLS regression (Table 5) indicate that the model performs best in the period 1915 - 1978 (all signs are correct, the coefficients are highly significant, and the null of serial correlation of residuals can be rejected). A specification including lags for AST and CPI achieves the best fit. However, neither RWP, the variable representing the conflict between entrepreneurs and trade unions, nor MX/GDP, the trade variable, are significant. Dropping both leads to a marginally higher  $\bar{R}^2$  as well as to marginally higher t-ratios. We conclude that the distributional conflicts hypothesis and the inflation hypothesis contribute to explain Argentine growth in the period 1915 - 1978. A regime change in the 1980s leading to coefficient instability indicates that our specification is incorrect for the period 1915 - 1988.

Table 4 - Autocorrelation Estimates for the Residuals of the Cointegrating Regression

Lag	1915 - 1978			1915 - 1988		
	$u_t$	$du_t$	$d^2u_t$	$u_t$	$du_t$	$d^2u_t$
1	0.46	-0.13	-0.53	0.55	-0.10	-0.56
2	0.18	-0.04	0.09	0.30	-0.02	0.12
3	-0.03	-0.10	-0.04	0.17	-0.07	-0.04
4	-0.13	-0.07	0.00	0.10	-0.04	-0.01
5	-0.16	-0.04	0.10	0.05	0.05	0.11
6	-0.24	-0.25	-0.29	-0.08	-0.21	-0.25
7	-0.07	0.19	0.36	-0.01	0.15	0.24
8	-0.11	-0.15	-0.31	-0.06	0.00	-0.15
9	-0.04	0.15	0.20	-0.13	0.11	0.13
10	-0.01	0.22	-0.26	-0.20	-0.04	-0.10
11	-0.22	-0.11	-0.06	-0.25	-0.02	0.07
12	-0.19	-0.07	0.02	-0.24	-0.07	-0.02
13	-0.06	-0.06	-0.04	-0.18	-0.07	-0.08
14	0.13	0.07	0.09	-0.11	0.05	0.06
15	0.20	-0.13	-0.12	-0.07	0.02	0.05
16	0.26	0.17	0.08	-0.02	-0.04	-0.12
17	0.15	0.11	0.00	-0.01	0.09	0.06
18	-0.02	0.06	0.09	-0.04	0.09	0.09
19	-0.22	0.21	-0.18	-0.11	-0.18	-0.15
20	-0.16	0.20	0.18	-0.11	0.02	0.17
Q (20)	50.30	21.50	51.40	53.50	13.50	46.30
S. E.	0.20	0.16	0.21	0.18	0.14	0.18

Notes:

$u_t$ : original time series;  $du_t$ : once differenced series;  $d^2u_t$ : twice differenced series;  $Q$ -Statistic (Box-Pierce) at lag 20; S. E.: standard error of autocorrelation estimate at lag 20; critical values for the Chi-square distributed  $Q$ -Statistic at the 5 and 10 per cent significance level: 31.41 and 28.41 [Pindyck, Rubinfeld 1991].

Source: Own calculations.

Table 5 - OLS Estimate of the Model in Differences

	5 Variable Model				3 Variable Model			
	1915-1988		1915-1978		1915-1988		1915-1978	
	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio
Constant	0.0242	6.3900**	0.0289	7.2768**	0.0244	6.5014	0.0288	7.4383
dln INV	0.1989	9.6589**	0.1762	8.0411**	0.1944	9.8311	0.1787	8.8993
dln AST(-1)	-0.0294	-1.5624	-0.0411	-2.1981*	-0.0277	-1.5586	-0.0414	-2.3822
dln MX/GDP	-0.0183	-0.8381	0.0069	0.3064	-	-	-	-
d <sub>2</sub> ln CPI(-1)	-0.0106	-0.7711	-0.0398	-2.0903*	-0.0115	-0.8707	-0.0391	-2.2099
d <sub>2</sub> ln CPI(-3)	-0.0128	-0.7253	-0.0479	-2.1873*	-0.0116	-0.7005	-0.0484	-2.3031
dln RWP	0.0055	0.1858	-0.0020	-0.0633	-	-	-	-
Other Statistics								
T	70		60		70		60	
R <sup>2</sup>	0.5797		0.5937		0.5876		0.6078	
D.W.	2.0773		2.0683		2.0496		2.0704	
Chow (1979)	2.5217*		-		3.8563*		-	
S.E.	0.0295		0.0279		0.0292		0.0274	
Breusch/Godfrey LM								
AR/MA(1)	0.0311		0.0456		0.0291		0.0184	
AR/MA(2)	0.6795		1.3839		1.8604		0.7885	
Ljung-Box Q-statistic								
1 lag	0.1701		0.1589		0.1603		0.0962	
2 lags	0.6291		2.1866		2.4342		0.3467	

\*\* significant at the 1 per cent level; \* significant at the 5 per cent level; calculated using TSP.386 version 4.2 A.

Source: Own calculations.

#### IV. Final Remarks

In this paper we revisited three hypotheses, which we had proposed before, in an attempt to explain the long-run pattern of Argentine real GDP growth: (i) distributional conflicts, (ii) a permissive monetary policy, and (iii) the delinking of the Argentine economy from the world markets. Applying unit root econometrics we find evidence that our series are difference-stationary but not cointegrated. We thus estimate a model in differences and conclude that hypotheses (i) and (ii) contribute to explain the Argentine growth pattern in the period 1915 - 1978. However, the results for the extended period 1915 - 1988 indicate that our model does not perform well in explaining the 1980s, when substantial changes in economic policy took place in Argentina.

Argentina's poor economic performance appears to be related to economic policies aiming at boosting domestic demand with expansionary fiscal policies, accommodated by a loose monetary policy. Foreign trade does not seem to have had any impact on GDP in the period studied. Moreover, the private sector seems to have been crowded out, with the government becoming the main player in the economy. This policy and institutional mix can be associated with the stagnation-cum-inflation experienced by this country over many decades. To the extent that our results qualify as a basis for policy conclusions, a recovery programme for Argentina seems to call for a privatisation of state enterprises and a restrictive monetary policy. The long-run decline of the economy in the framework of an excessive import-substitution strategy could indicate that a reintegration into the international division of labour could constitute an additional source of growth by expanding the level of demand faced by Argentine firms.

By selling off state firms, the government could reduce its role in the production of private goods and services and focus on the production of genuine public goods. By stabilising the economy the government could create the basic incentives needed for the private sector to increase investment. Argentine capital transitorily parked abroad and new foreign capital (and technology) could flow in if Argentina would again become an attractive location for economic activity. Accumulated foreign debt could then be easily paid off.

If these elements of a growth-enhancing strategy are contrasted with the economic programme currently (1991/92) implemented by the Argentine government, consisting of privatisation, fiscal discipline and lower tariff and non-tariff barriers, we agree with "The Economist" [19 October 1991] that Argentina seems to have rejected at least some of its "old ways". However, current economic policy is not only too vague on fiscal and monetary policy but also includes a fixed exchange rate of the Argentine currency vis-a-vis the US dollar (fixed by public law). The outcome is that inflation, although receding, is still high and that the domestic currency remains overvalued, as it has been during most of this century. This means that import demand for tradables is bound to stay high, that the competitiveness of Argentine exports could decrease further, and that Argentina could remain a bad choice for local and foreign investors. An effective stabilisation programme would demand further cuts in public spending, a much slower monetary expansion and, most importantly for foreign trade and voluntary capital inflows to resume, a freely floating exchange rate; convertibility of the domestic currency should eventually follow.

Are there any lessons from the Argentine case study that could be useful for the former COMECON countries? In spite of the major ideological and institutional differences ex-

isting between Argentina and the formerly communist countries, it is certainly not surprising to find that the latter have to cope, in part, with very similar problems. Privatisation is a need for Argentina as it also is for the countries of Central and Eastern Europe including the former USSR. The same applies to price stabilisation and convertibility of the domestic currency. One lesson that could be derived from the Argentine experience is that the former COMECON countries should be very careful with distributional conflicts: the transformation of a socialist economy into a market economy is a savings-intensive process with little room for prodigality. It will only be possible to close the probable savings-gap resorting to the international capital market if attractive conditions are established, i. e. if distributional conflicts are solved by negotiating shares in the achieved income, instead of distributing unearned wealth by artificially expanding the money supply and fuelling inflation.

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Appendix

Table A1 - Autocorrelation Estimates for Key Variables, 1914 - 1988 (Raw Data)

Lag	Variables								
	$y_t$	GDP $dy_t$	$d^2y_t$	$y_t$	INV $dy_t$	$d^2y_t$	$y_t$	AST $dy_t$	$d^2y_t$
1	0.97	0.02	-0.39	0.96	0.10	-0.28	0.96	-0.28	-0.74
2	0.93	-0.17	-0.27	0.90	-0.26	-0.47	0.91	0.36	0.56
3	0.90	0.19	0.15	0.87	0.20	0.30	0.84	-0.34	-0.44
4	0.87	0.18	0.14	0.82	0.08	0.12	0.78	0.27	0.23
5	0.83	-0.04	-0.15	0.75	-0.21	-0.22	0.73	-0.02	-0.15
6	0.79	0.04	-0.09	0.70	-0.08	-0.03	0.66	0.28	0.21
7	0.76	0.23	0.29	0.66	0.04	0.08	0.59	-0.11	-0.18
8	0.72	-0.14	-0.25	0.61	-0.01	0.02	0.51	0.06	0.20
9	0.67	0.03	0.07	0.56	-0.02	-0.06	0.44	-0.22	-0.23
10	0.62	0.12	0.15	0.50	0.09	0.12	0.37	0.06	0.13
11	0.58	-0.17	-0.16	0.44	-0.06	-0.02	0.32	-0.03	-0.06
12	0.53	-0.10	-0.05	0.39	-0.12	-0.11	0.26	0.06	0.08
13	0.49	0.21	0.50	0.34	-0.00	0.06	0.21	-0.13	-0.06
14	0.44	0.50	0.08	0.30	-0.00	0.05	0.16	-0.10	0.04
15	0.40	-0.40	-0.04	0.26	-0.08	-0.05	0.12	-0.13	-0.09
16	0.35	-0.06	-0.00	0.23	-0.09	-0.02	0.09	0.04	0.06
17	0.31	-0.10	-0.06	0.20	-0.08	-0.03	0.07	-0.02	0.01
18	0.27	-0.02	-0.04	0.17	0.01	-0.04	0.05	-0.08	-0.07
19	0.23	0.14	0.24	0.13	0.17	0.26	0.04	0.01	0.13
20	0.19	-0.14	-0.19	0.09	-0.10	-0.13	0.02	-0.13	-0.19
Q (20)	693.00	25.10	51.40	528.00	22.30	48.30	429.00	50.50	111.00
S. E.	0.48	0.14	0.17	0.43	0.14	0.17	0.39	0.17	0.23

continued ...

Table A1 - continued

Lag	Variables					
	$y_t$	INV/GDP $dy_t$	$d^2y_t$	$y_t$	AST/GDP $dy_t$	$d^2y_t$
1	0.81	0.31	-0.13	0.92	-0.42	-0.75
2	0.54	-0.09	-0.36	0.88	0.30	0.45
3	0.30	-0.08	0.03	0.79	-0.25	-0.29
4	0.10	-0.11	0.11	0.73	0.17	0.13
5	-0.05	-0.22	-0.04	0.66	0.02	-0.02
6	-0.12	-0.19	-0.10	0.58	0.04	0.01
7	-0.15	-0.12	-0.01	0.49	-0.03	-0.04
8	-0.15	-0.04	0.00	0.41	0.10	0.15
9	-0.12	0.10	0.10	0.32	-0.22	-0.24
10	-0.14	0.04	0.07	0.26	0.11	0.18
11	-0.18	-0.11	-0.09	0.19	-0.07	-0.12
12	-0.18	-0.16	-0.17	0.13	0.09	0.14
13	-0.13	0.04	0.15	0.06	-0.15	-0.11
14	-0.09	0.08	0.11	0.02	-0.06	0.02
15	-0.01	-0.03	-0.18	-0.02	-0.01	0.03
16	-0.10	-0.01	-0.12	-0.05	-0.04	-0.04
17	-0.09	0.58	0.13	-0.06	0.01	0.07
18	-0.07	0.04	0.09	-0.08	-0.13	-0.13
19	-0.05	-0.01	0.00	-0.08	0.09	0.20
20	-0.03	-0.01	-0.01	-0.09	-0.18	-0.22
Q (20)	102.00	23.50	27.80	342.00	43.30	92.00
S. E.	0.22	0.15	0.15	0.35	0.16	0.21

continued ...

Table A1 - continued

Lag	Variables								
	$y_t$	CPI $dy_t$	$d^2y_t$	$y_t$	REL $dy_t$	$d^2y_t$	$y_t$	PROD $dy_t$	$d^2y_t$
1	0.24	0.17	0.13	0.91	-0.03	-0.57	0.97	0.02	-0.43
2	0.10	0.07	0.01	0.82	0.13	0.22	0.93	-0.11	-0.17
3	0.05	0.06	0.06	0.71	-0.18	-0.23	0.90	0.10	0.08
4	0.01	0.01	0.01	0.63	-0.01	0.13	0.86	0.14	0.12
5	-0.00	-0.00	-0.00	0.55	-0.10	-0.13	0.82	-0.03	-0.09
6	-0.00	-0.00	-0.00	0.48	0.07	0.16	0.78	-0.02	-0.10
7	-0.00	-0.00	-0.00	0.39	-0.09	-0.17	0.74	0.15	0.25
8	-0.00	-0.00	-0.00	0.33	0.10	0.12	0.69	-0.18	-0.24
9	-0.00	-0.00	-0.00	0.25	0.04	-0.02	0.65	0.01	0.08
10	-0.00	-0.00	-0.00	0.17	0.03	0.07	0.60	0.08	0.11
11	-0.00	-0.00	-0.00	0.08	-0.13	-0.07	0.56	-0.15	-0.08
12	-0.00	-0.00	-0.00	0.02	-0.14	-0.12	0.51	-0.17	-0.11
13	-0.00	-0.00	-0.00	-0.00	0.10	0.23	0.47	-0.02	0.04
14	-0.01	-0.00	-0.00	-0.01	-0.12	-0.18	0.43	0.06	0.14
15	-0.01	-0.01	-0.00	0.01	0.03	0.09	0.38	-0.10	-0.09
16	-0.01	-0.01	-0.00	0.02	-0.01	-0.12	0.34	-0.09	-0.01
17	-0.01	-0.01	-0.01	0.02	0.21	0.23	0.30	-0.09	-0.02
18	-0.01	-0.01	-0.01	0.01	-0.05	-0.24	0.26	-0.04	-0.06
19	-0.01	-0.01	-0.01	-0.01	0.19	0.29	0.22	0.13	0.22
20	-0.01	-0.01	-0.01	-0.04	-0.15	-0.28	0.18	-0.10	-0.16
Q (20)	5.43	2.90	1.48	266.00	22.50	80.40	668.00	18.70	42.80
S. E.	0.12	0.12	0.12	0.32	0.14	0.19	0.47	0.14	0.16

continued ...

Table A1 - continued

Lag	Variables					
	$y_t$	RWP $dy_t$	$d^2y_t$	$y_t$	MX/GDP $dy_t$	$d^2y_t$
1	0.94	-0.17	-0.62	0.84	-0.18	-0.41
2	0.89	0.12	0.26	0.72	-0.40	-0.30
3	0.84	-0.19	-0.23	0.71	0.10	0.21
4	0.80	-0.00	0.12	0.69	0.10	0.02
5	0.76	-0.05	-0.10	0.64	0.02	0.05
6	0.72	0.11	0.16	0.56	-0.17	-0.12
7	0.67	-0.08	-0.14	0.51	0.01	0.02
8	0.62	0.04	0.03	0.49	0.08	0.04
9	0.57	0.06	0.03	0.44	0.04	0.03
10	0.51	0.02	-0.02	0.37	-0.05	-0.06
11	0.44	0.05	0.06	0.32	0.01	0.00
12	0.38	-0.07	-0.12	0.27	0.07	0.10
13	0.33	0.09	0.22	0.20	-0.12	-0.12
14	0.29	-0.26	-0.28	0.16	-0.00	0.02
15	0.27	0.04	0.13	0.12	0.08	0.12
16	0.24	0.02	-0.03	0.06	-0.10	-0.14
17	0.21	0.10	0.05	0.05	0.03	0.11
18	0.17	0.06	-0.04	0.03	-0.09	-0.11
19	0.13	0.07	0.10	0.04	0.05	0.03
20	0.08	-0.15	-0.18	0.05	0.10	0.13
Q (20)	525.00	22.60	63.70	334.00	34.40	25.30
S. E.	0.43	0.14	0.19	0.35	0.16	0.15

Notes:

$y_t$ : original time series;  $dy_t$ : once differenced series;  $d^2y_t$ : twice differenced series; Q-Statistic (Box-Pierce) at lag 20; S. E.: standard error of autocorrelation estimate at lag 20; critical values for the Chi-square distributed Q-Statistic at the 5 and 10 per cent significance level: 31.41 and 28.41 [Pindyck, Rubinfeld 1991].

Source: Own calculations.

Table A2 - Test for First and Second Order Integration of Real Gross Domestic Product (GDP), 1914 - 1988

Test	First Order		Second Order	
	t-ratio	T	t-ratio	T
1.				
a	-1.3329	74	-8.1817	73
b	-1.4361	73	-6.5140	72
c	-1.7997	72	-5.4687	71
2.				
a	-1.5278	74	-8.2993	73
b	-1.6596	73	-6.7729	72
c	-1.4343	72	-6.0631	71
3.				
a	-2.1406	74	-8.3675	73
b	-2.1895	73	-6.8049	72
c	-1.8225	72	-5.9475	71
4.				
a	-2.4502	74	-8.4095	73
b	-2.5270	73	-7.0182	72
c	-2.2750	72	-6.8103	71
5.				
a	-4.3294	74	-8.3808	73
6.				
a	-4.1275	74	-8.6257	73

Notes:

1: constant only; 2: constant and linear trend; 3: constant and quadratic trend; 4: constant and cubic trend; 5: constant and trend terms from  $t$  to  $t^4$ ; 6: constant and trend terms from  $t$  to  $t^5$ ; a: no lagged dependent variable present; b: dependent variable lagged once; c: dependent variable lagged once and twice; critical values for the Dickey-Fuller statistic at the 5 and 10 per cent significance level: 1: -2.91 and -2.59; 2: -3.48 and -3.17 [Fuller 1976].

Source: Own calculations.

Table A3 - Test for First and Second Order Integration of Real Gross Investment (INV), 1914 - 1988

Test	First Order		Second Order	
	t-ratio	T	t-ratio	T
1.				
a	-1.2495	74	-6.5533	73
b	-2.2503	73	-5.9558	72
c	-2.0366	72	-5.1436	71
2.				
a	-2.3913	74	-6.5558	73
b	-3.5620	73	-5.9980	72
c	-3.1603	72	-5.3223	71
3.				
a	-1.6337	74	-6.5686	73
b	-3.1068	73	-6.0047	72
c	-2.7158	72	-5.2925	71
4.				
a	-1.2648	74	-6.5786	73
b	-2.6900	73	-6.0168	72
c	-2.2955	72	-5.2943	71

Notes:

1: constant only; 2: constant and linear trend; 3: constant and quadratic trend; 4: constant and cubic trend; a: no lagged dependent variable present; b: dependent variable lagged once; c: dependent variable lagged once and twice; critical values for the Dickey-Fuller statistic at the 5 and 10 per cent significance level; 1: -2.91 and -2.59; 2: -3.48 and -3.17 [Fuller 1976].

Source: Own calculations.



Table A4 - Test for First and Second Order Integration of Real Government Expenditure (AST), 1914 - 1988

Test	First Order		Second Order	
	t-ratio	T	t-ratio	T
1.				
a	-0.6315	74	-12.7305	73
b	-0.3397	73	-6.3364	72
c	-0.6690	72	-5.0768	71
2.				
a	-3.5367	74	-12.6317	73
b	-2.3883	73	-6.2466	72
c	-2.4375	72	-4.9683	71
3.				
a	-1.7024	74	-12.6273	73
b	-0.8352	73	-6.2544	72
c	-1.1938	72	-4.9785	71
4.				
a	-0.9797	74	-12.6309	73
b	-0.3008	73	-6.2578	72
c	-0.6823	72	-4.9788	71

Notes:

1: constant only; 2: constant and linear trend; 3: constant and quadratic trend; 4: constant and cubic trend; a: no lagged dependent variable present; b: dependent variable lagged once; c: dependent variable lagged once and twice; critical values for the Dickey-Fuller statistic at the 5 and 10 per cent significance level: 1: -2.91 and -2.59; 2: -3.48 and -3.17 [Fuller 1976].

Source: Own calculations.

Table A5 - Test for First and Second Order Integration of the Investment Ratio (INV/GDP), 1914 - 1988

Test	First Order		Second Order	
	t-ratio	T	t-ratio	T
1.				
a	-2.7762	74	-6.7320	73
b	-3.9327	73	-6.1052	72
c	-3.4038	72	-5.0062	71
2.				
a	-2.7577	74	-6.6970	73
b	-3.9525	73	-6.0996	72
c	-3.4273	72	-5.0885	71
3.				
a	-2.7660	74	-6.6078	73
b	-3.9184	73	-6.0469	72
c	-3.4048	72	-5.0440	71
4.				
a	-2.8367	74	-6.5741	73
b	-3.7320	73	-6.0906	72
c	-3.2230	72	-5.3448	71

Notes:

1: constant only; 2: constant and linear trend; 3: constant and quadratic trend; 4: constant and cubic trend; a: no lagged dependent variable present; b: dependent variable lagged once; c: dependent variable lagged once and twice; critical values for the Dickey-Fuller statistic at the 5 and 10 per cent significance level: 1: -2.91 and -2.59; 2: -3.48 and -3.17 [Fuller 1976].

Source: Own calculations.

Table A6 - Test for First and Second Order Integration of the Government Expenditure Ratio (AST/GDP), 1914 - 1988

Test	First Order		Second Order	
	t-ratio	T	t-ratio	T
1.				
a	-1.3162	74	-12.8942	73
b	-0.5848	73	-6.6621	72
c	-0.7622	72	-5.4336	71
2.				
a	-3.3609	74	-12.8439	73
b	-2.2841	73	-6.6018	72
c	-2.2485	72	-5.3659	71
3.				
a	-3.2633	74	-12.8078	73
b	-2.1811	73	-6.5724	72
c	-2.1891	72	-5.3261	71
4.				
a	-3.9597	74	-12.7312	73
b	-3.0186	73	-6.4694	72
c	-3.0201	72	-5.1911	71

Notes:

1: constant only; 2: constant and linear trend; 3: constant and quadratic trend; 4: constant and cubic trend; a: no lagged dependent variable present; b: dependent variable lagged once; c: dependent variable lagged once and twice; critical values for the Dickey-Fuller statistic at the 5 and 10 per cent significance level: 1: -2.91 and -2.59; 2: -3.48 and -3.17 [Fuller 1976].

Source: Own calculations.

Table A7 - Test for First and Second Order Integration of the Consumer Price Index (1960 = 100) (CPI), 1914 - 1988

Test	First Order		Second Order	
	t-ratio	T	t-ratio	T
1.				
a	12.5995	74	-2.0554	73
b	4.1895	73	-1.9550	72
c	5.4174	72	-1.0418	71
2.				
a	6.1251	74	-3.8676	73
b	2.6593	73	-3.9874	72
c	3.9313	72	-2.8409	71
3.				
a	0.8718	74	-5.2684	73
b	-0.2351	73	-6.0550	72
c	0.8614	72	-4.3389	71
4.				
a	-1.2466	74	-5.4117	73
b	-2.2806	73	-6.4597	72
c	-1.2319	72	-4.8279	71
5.				
a	-2.5626	74	-5.3269	73
6.				
a	-1.5748	74	-5.6004	73

Notes:

1: constant only; 2: constant and linear trend; 3: constant and quadratic trend; 4: constant and cubic trend; 5: constant and trend terms from  $t$  to  $t^4$ ; 6: constant and trend terms from  $t$  to  $t^5$ ; a: no lagged dependent variable present; b: dependent variable lagged once; c: dependent variable lagged once and twice; critical values for the Dickey-Fuller statistic at the 5 and 10 per cent significance level: 1: -2.91 and -2.59; 2: -3.48 and -3.17 [Fuller 1976].

Source: Own calculations.

Table A8 - Test for First and Second Order Integration of the Real Wage Index (1960 = 100) (REL), 1914 - 1988

Test	First Order		Second Order	
	t-ratio	T	t-ratio	T
1.				
a	-0.7811	74	-7.3494	73
b	-1.1321	73	-5.1495	72
c	-1.3362	72	-4.6919	71
2.				
a	-1.2971	74	-7.5390	73
b	-1.6575	73	-5.3923	72
c	-1.8816	72	-5.1060	71
3.				
a	-3.0494	74	-7.4781	73
b	-3.4190	73	-5.3394	72
c	-3.1590	72	-5.0526	71
4.				
a	-2.7821	74	-7.5065	73
b	-3.2738	73	-5.3473	72
c	-3.6921	72	-5.0012	71

Notes:

1: constant only; 2: constant and linear trend; 3: constant and quadratic trend; 4: constant and cubic trend; a: no lagged dependent variable present; b: dependent variable lagged once; c: dependent variable lagged once and twice; critical values for the Dickey-Fuller statistic at the 5 and 10 per cent significance level: 1: -2.91 and -2.59; 2: -3.48 and -3.17 [Fuller 1976].

Source: Own calculations.

Table A9 - Test for First and Second Order Integration of Real Productivity (GDP per capita : PROD), 1914 - 1988

Test	First Order		Second Order	
	t-ratio	T	t-ratio	T
1.				
a	-1.1305	74	-8.3162	73
b	-1.2390	73	-6.5680	72
c	-1.4389	72	-5.6366	71
2.				
a	-2.0037	74	-8.3096	73
b	-2.0608	73	-6.6260	72
c	-1.7644	72	-5.8710	71
3.				
a	-0.8410	74	-8.3597	73
b	-0.9827	73	-6.6851	72
c	-0.9012	72	-5.9204	71
4.				
a	-0.3547	74	-8.4083	73
b	-0.4770	73	-6.7462	72
c	-0.4325	72	-5.9928	71

Notes:

1: constant only; 2: constant and linear trend; 3: constant and quadratic trend; 4: constant and cubic trend; a: no lagged dependent variable present; b: dependent variable lagged once; c: dependent variable lagged once and twice; critical values for the Dickey-Fuller statistic at the 5 and 10 per cent significance level: 1: -2.91 and -2.59; 2: -3.48 and -3.17 [Fuller 1976].

Source: Own calculations.

Table A10 - Test for First and Second Order Integration of the Wage :  
Productivity Ratio (RWP), 1914 - 1988

Test	First Order		Second Order	
	t-ratio	T	t-ratio	T
1.				
a	-0.8867	74	-7.7137	73
b	-0.2358	73	-4.9143	72
c	-0.5124	72	-4.6755	71
2.				
a	-1.5015	74	-7.8638	73
b	-1.7420	73	-5.0648	72
c	-2.0086	72	-4.9015	71
3.				
a	-2.1557	74	-7.8207	73
b	-2.4066	73	-5.0157	72
c	-2.7228	72	-4.8320	71
4.				
a	-2.3816	74	-7.7660	73
b	-2.7178	73	-4.9634	72
c	-3.1839	72	-4.7614	71

Notes:

1: constant only; 2: constant and linear trend; 3: constant and quadratic trend; 4: constant and cubic trend; a: no lagged dependent variable present; b: dependent variable lagged once; c: dependent variable lagged once and twice; critical values for the Dickey-Fuller statistic at the 5 and 10 per cent significance level: 1: -2.91 and -2.59; 2: -3.48 and -3.17 [Fuller 1976].

Source: Own calculations.

Table A11 - Test for First and Second Order Integration of Exports plus Imports (as per cent of GDP) (MX/GDP), 1914 - 1988

Test	First Order		Second Order	
	t-ratio	T	t-ratio	T
1.				
a	-2.2750	74	-9.7805	73
b	-2.1468	73	-9.4219	72
c	-1.5611	72	-6.6816	71
2.				
a	-4.5840	74	-9.7132	73
b	-4.3811	73	-9.3594	72
c	-3.0684	72	-6.6417	71
3.				
a	-4.8405	74	-9.6475	73
b	-4.6492	73	-9.2949	72
c	-3.3104	72	-6.5990	71
4.				
a	-5.0692	74	-9.5703	73
b	-4.9379	73	-9.2239	72
c	-3.6545	72	-6.5557	71

Notes:

1: constant only; 2: constant and linear trend; 3: constant and quadratic trend; 4: constant and cubic trend; a: no lagged dependent variable present; b: dependent variable lagged once; c: dependent variable lagged once and twice; critical values for the Dickey-Fuller statistic at the 5 and 10 per cent significance level: 1: -2.91 and -2.59; 2: -3.48 and -3.17 [Fuller 1976].

Source: Own calculations.