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ABC's of the 2008 Recession: Robust and Reliable International Evidence on the Austrian Theory of the Business Cycle

Ioanna Konstantakopoulou[a] and Efthymios G. Tsionas[b]

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[a] *Centre of Planning and Economic Research, Athens, Greece, joannapk@aueb.gr.*

[b] *Professor, Athens University of Economics and Business, 76, Patission Str., 10445, Athens, Greece, tel. +30-2108203338, fax: +30-2108203301, tsionas@aueb.gr.* \

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Ioanna Konstantakopoulou[a],

Efthymios G. Tsionas[b]

Abstract

In this paper we test the validity of the Austrian theory of the Business Cycle (ABC). We use data for major economies over 1980-2006, well before the 2008 financial crisis. We utilize the information available in the most efficient manner, through panel unit root and panel co-integration analysis. The relationships between variables in the Austrian theory of business cycle are studied with co-integration techniques. We investigate the causality implications of the Austrian theory *at various time horizons* using the method of Dufour, Pelletier and Renault (2006). All our results tend to favour the Austrian theory in general terms. The implication is that in *short and medium term horizons* (up to 2008) credit expansion had a major role to play in the recession much like as in the 20's.

Keywords*: Austrian theory, business cycles, causality, cointegration.*

[a] *Centre of Planning and Economic Research, Athens, Greece, joannapk@aueb.gr.*

[b] *Professor, Athens University of Economics and Business, 76, Patission Str., 10445, Athens, Greece, tel. +30-2108203338, fax: +30-2108203301, tsionas@aueb.gr.*

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1. Introduction

In this paper, we put the Austrian theory of the business cycle to the test. This theory, which lays stress on the role of credit in economic fluctuation, is in the tradition of the neoclassical system, the dominant economic school in the 1920s and 1930s. It was first formulated by the Austrian economist Ludwig von Mises in 1912, in his monumental work "Theory of Money and Credit", where it is developed in great detail. Von Hayek considerably assisted the spread of the theory by publishing two books - "Monetary Theory and the Trade Cycle (1933)" and "Prices and Production" (1935) - in which he worked out further implications of von Mises' theory.

As a first approximation, we posit that the Austrian Business Cycle (ABC for short) theory is based on "misperception of the level of interest rates". For it claims that the cycle's upward phase results from intertemporal allocation errors due to an interest rate "lower than it should be". It assumes that firms initiate production processes that presuppose the existence of consumers' specific desire to postpone consumption, though this is in fact incompatible with the actual profile of their time-preferences. It is the threat that the processes, once initiated, may be abandoned or cut short that triggers the downward phase of the cycle. This model combines the standard Bohm-Bawerk view of the production process with Wicksell's theory of the relationship between natural and market interest rates.

In Section 2 we present the theoretical assumptions underlying the Austrian monetary theory of cycles. In Section 3 we deal with the econometric methods used. In Section 4 we present our conclusions.

2. The Austrian Business Cycle Theory

The Austrian Bysiness Cycle (ABC) theory adopts the natural, or Wicksellian interest rate which is determined by the supply of savings and the demand for loanable funds. In a free market, the clearing price is fully determined by (subjective) time-preference all the individuals of whom the market economy is composed. It should be noted that the term "time-preference" reflects the degree to which an individual prefers the present to the future[1]. This subjective time-preference is therefore an important factor in determining the extent to which individuals save and invest. Obviously when their time-preferences are changed, individuals may tend to reduce their consumption and increase their saving and investment; and the interest rate tends to be lower accordingly (Hayek, 1931, 1933).

The crucial question, is what happens to the economy when interest rates fall not because of lower time-preference but because of credit expansion. According to Hayek (1935, 1941) the only cause of permanent real change in economic activity is change in individuals' time-preferences (or the productivity of new technology). An interesting concept that forms the basis of the Austrian school is the "time dimension" of consumption and production. It is this concept that has given rise to the notion of "time-preference" and to the hypothesis that most "indirect production methods" yield the greatest productivity (Hayek 1933, 1935, and Bohn-Bawerkl 1889).

Production depends at any given moment not only on prior investments but on the temporal sequence in which investments have been made. The temporal structure of the

[1]The product of time-preference is the originary rate of interest, as noted by Mises (1966), who argued that there is always a discount in the price of future goods compared to the price of those same goods in the present. This discounting process is applied to all goods, not just money or capital. "If future goods were not bought and sold at a discount as against present goods, the buyer of land would have to pay a price which equals the sum of all future net revenues and which would leave nothing for a current reiterated income."

production process, as studied by Bohn-Bawerk, is of the continuous input-point output type. The Austrian theory in fact treats capital almost invariably as circulating capital; it has no room for fixed capital.

To Bohn-Bawerk's concept of production, von Mises and Hayek attached “physical capital”. Hayek's "structure of production", can be pictured as a right-angled triangle (an image fully compatible with Bohn-Bawerk's concept of capital as multidimensional in value and time). The horizontal base of Hayek's triangle stands for the time dimension of the production process; and the vertical line corresponds to the value of consumable products. The time dimension is subdivided into several "stages of production," where the output of one stage becomes the input of the next. A single “project”" to convert raw materials, the early stage, into consumables, the final stage, is an *assemblage of the plans of several producers mutually coordinated by the price system*, which of course includes the interest rate (Garrison, 2001).

Since capital is heterogeneous, differential shifts in demand by capital type will occur, in response to any change in interest rates. Hayek correlated *directly* the interest rate with the price margins between stages in production. "*The price of a factor which can be used in most early stages and whose marginal productivity there falls very slowly*", he writes, "*will rise more in consequence of a fall in the rate of interest than the price of a factor which can only be used in relatively lower stages of reproduction or whose marginal productivity in the earlier stages falls very rapidly*" (Hayek, 1967).

A basic assumption of the ABC theory is that when the market interest rate falls below the natural interest rate, investors prefer to turn to capital intensive investment and expand their investment into durable equipment, capital goods, industrial raw materials, and construction (in other words, *more capital-intensive* production processes) than into direct production of consumer goods (in other words, *less capital-intensive* production processes).

3. Empirical investigation of the ABC theory

3.1 Introduction

Our econometric analysis is constructed as follows. *First*, we detect the nature of the underlying stationary properties of each time series, using several unit root tests such as ADF and panel unit root tests; the latter are unavoidable, because they suggest a solution to the power problems of single –series based ADF tests. *Secondly*, we conduct a cointegration analysis, following the Johansen procedure (Johansen 1988) to establish how many cointegrating relationships can be found among variables related to the ABC theory. We also conduct panel co-integration tests since they can be more powerful. Co-integration vectors are estimated by means of the fully modified (FM) OLS estimation technique for heterogeneous co-integrated panels (Pedroni 2000). To study for causality at various horizons, we utilize the method of Dufour, Pelletier and Renault (2006).

All data are derived from the International Monetary Fund (IFS), for the period 1980:1-2006:4, for USA, Australia, Canada, UK, Japan, Germany, Spain, France and Italy. The variables chosen for our analysis are: Gross domestic product, gross fixed capital formation, Credit, and Interest Rates (see Table 6 for further details).

As we have noted, the ABC theory posits a chain of economic events. The most interesting link in this chain is the one connecting credit with investment and real output. We assume that *artificial changes* of credit influence investment, which in turn boosts economic activity. These *artificial changes of credit* may result from unanticipated changes in money supply or (directly) from changes in interest rates. *Artificially induced credit is in fact the starting up of the business cycle.*.

Suppose:

$$y_{it}=\beta_{oi}+\beta_{1i}I_{it}+\beta_{2i}c_{it}+\beta_{3i}r_{it}+\beta_{4i}m_{it}+u_{it} \qquad (1)$$

where y_{it} is output in country i and quarter *t*, I_{it} is investment, c_{it} is credit, m_{it} is money supply, r_{it} is the interest rate, and u_{it} is an error term satisfying the usual properties.

3.2 Testing for Integration

Our first test for integration uses the augmented Dickey-Fuller (ADF) statistic. We also this perform three panel unit root tests: the IPS test, suggested by Im, Pesaran and Sin (2003), the MW test, suggested by Maddala and Wu (1999), and a test belonging to the same category, the Choi test, suggested by Choi (2001). These tests assume non-stationarity in the null hypothesis.

The results from the ADF tests (see Table 1) indicate that at reasonable significance levels all the variables are non-stationary, with one exception, money in the UK. The tests shows that first differences of this variable are stationary.

The results from the panel unit roots tests (in Table 2) show that we can accept the null hypothesis (unit root) for all variables at levels, but we can reject it for first differences of time series. So as a working hypothesis all variables can be considered as I(1).

3.3. Testing for Cointegration

Our strategy for investigating the existence of long-run equilibrium relationships between variables is to conduct Johansen co-integration tests (Johansen, 1988) and Pedroni panel co-integration tests (Pedroni, 1999) on the variables.

The country-specific results of the Johansen co-integration test are presented in Table 3. The null hypothesis of at least one co-integration vector is accepted. We ensure conclude that there is a long-run equilibrium to which our variables in each country converge over time.

The results of the Pedroni tests are presented in Table 4. They support the hypothesis that there is a single co-integration vector irrespective of the dependent variable (output, investment, money supply and credit).[2]

3.4 Estimating the co-integration vector

To estimate the long-run relationship between variables in the ABC context, there is a choice of estimators. These include within-group and between-group fully modified OLS (FMOLS) and dynamic OLS (DOLS) estimators. FMOLS is a non-parametric approach to dealing with correlation for serial correlation. DOLS is a parametric approach where lagged first-differenced terms are explicitly estimated. in which lags and leads are included explicitly[3].

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[2] A heterogeneous specific trend is taken into account.

[3] Pedroni (2001) has suggested a between-dimension, group-means panel DOLS estimator that incorporates corrections for endogeneity and serial correlation parametrically. He used the following regression model which includes lead and lag dynamics: $y_{it}=\alpha_i+\beta_i x_{it}+\sum_{j=-K_I}^{K_I}\gamma_{ik}\Delta x_{i,t-k}+e_{it}$ where

$\hat{\beta}_{i,DOLS}=\left[N^{-1}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}z_{it}z_{it}^{'}\right)^{-1}\left(\sum_{t=1}^{T}z_{it}\bar{y}_{it}\right)\right]_1$ (*) and z_{it} is the $2(k+1)\times 1$ vector of regressors

$z_{it}=\{(x_{it}-\bar{x}_i),\ \Delta x_{it-k,.....}\Delta x_{it+K}\}$; $\tilde{y}_{it}=y_{it-}\bar{y}_i$; the subscript 1 outside the brackets in (*) indicate that only the first element of the vector is taken to obtain the pooled slope coefficient.

We follow the fully modified OLS method appropriate for heterogeneous co-integrated panel (Pedroni, 2000), in order to estimate (1). This does not have the drawbacks of OLS method of estimation, drawbacks which, as Pedroni notes, are associated with the fact that a standard panel OLS estimator is asymptotically biased and its distribution is dependent on nuisance parameters associated with the dynamics underlying the data generating processes of variables. To eliminate the problem of bias due to the endogeneity of the regressors, we use the Group-Means FMOLS estimator, by incorporating the Phillips and Hansen (1990) semi-parametric correction into the OLS estimator. We also allow for heterogeneity in short-run dynamics and via fixed effects.

Consider the following co-integrated system for a simple two variable panel of $i = 1, ..., N$ members,

$$y_{it} = a_{it} + \beta x_{it} + \mu \tag{2}$$

$$x_{it} = x_{it-1} + \varepsilon_{it} \tag{3}$$

where the vector error process $\xi_{it} = (\mu_{it}, \varepsilon_{it})'$ is stationary with asymptotic covariance matrix Ω_i. The FMOLS estimator is:

$$\hat{\beta}_{i,FMOLS} = N^{-1} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} (x_{it} - \bar{x}_i)^2 \right)^{-1} \left(\sum_{t=1}^{T} (x_{it} - \bar{x}_i) y_{it}^* - T\hat{y}_i \right) \tag{4}$$

where

$$y_{it}^* = (x_{it} - \bar{x}_i - \frac{\hat{\Omega}_{21i}}{\hat{\Omega}_{22i}} \Delta x_{it} \tag{5}$$

$$\hat{\gamma}_{it} = \hat{\Gamma}_{21i} - \hat{\Omega}_{21i}^0 - \frac{\hat{\Omega}_{21i}}{\hat{\Omega}_{22i}} \left(\hat{\Gamma}_{22i} - \hat{\Omega}_{22i}^0 \right) \tag{7}$$

where the $\hat{\Omega}$ and $\hat{\Gamma}$ are covariances and sums of autocovariances obtained from the long-run covariance matrix for the model.

Heterogenous time trends, allow for more general structure (Sollis and Harris, 2003). Fully modified OLS estimates of the cointegrating relationships are presented in Table 5 on a per country basis and for the panel as a whole.

From the *panel estimates*, including general time effects, we see that the coefficients of all variables are statistically significant when normalizing with respect to output. The effect of investment on output turns out to be positive, the estimated coefficient being 0.68 with a t-statistic of 32.32. Credit is also found to have a positive impact (0.18) on output. Money supply is statistically significant for output with a t-statistic of 2.94. Interest rates are found to have a negative impact (-0.08) on output.

On a *per country basis*, investment has a positive impact on output, though the relationship is not statistically significant in Australia. The impact of credit on output is positive in all countries, but the relationship is statistically insignificant in Italy and Spain. In the US, the estimated coefficient of credit is 0.22, with t-statistic of 2.76. In Japan, the corresponding estimated coefficient is 0.41, with t-statistic of 3.67. Money supply is statistically significant for output in nearly all countries, with Australia the only exception. In detail, money supply has a positive impact on output in the US, Canada, Germany, France and Italy, but a negative impact on output in UK, Japan and Spain. *Interest rates are statistically significant in all countries without exception*.

When *investment* is chosen as the dependent variable, we see that all other variables are statistically significant. The impact of credit on investment is positive (0.23) with t-statistic of 3.41. Interest rate has a marginally negative effect (-0.03) on investment. Output and money supply have positive effect on investment -the estimated coefficients are 1.04 in the case of output and 0.04 in the case of money supply. The t-statistics are 31.99 and 3.89, respectively. Per country, we find that there are some differences from the results above. For Canada and Spain, Credit is statistically insignificant. For Japan, interest rate is statistically insignificant.. For Australia, money supply appears statistically insignificant..

When *Credit* is chosen as dependent variable, all variables are statistically significant. The estimated coefficient of money supply is 0.21, with t-statistic of 9.00. Output has a positive effect (0.79) on credit. Investment also has a positive impact on Credit. The sign of the estimated coefficient of interest rate, on the other hand, is negative. *Per country*, we see that money supply is insignificant in Canada and Germany but in Australia money supply has a negative and significant impact on Credit. In Australia, Japan, France and Spain Credit is not influenced by interest rates. In Australia, Canada and Spain, Credit is not influenced by investment while also in Australia, Canada, Italy and Spain, Credit is not responsive to output.

The estimated coefficient for money supply which the FMOLS estimate gives is statistically significant irrespextive of the normalization. The corresponding coefficient for credit is 1.07, with t-statistic 6.33. Interest rate has a marginally negative effect on money supply. The effect of investment is positive, 2.34. By examination of our per country results we see that there are significant differences from the overall panel results: In Australia, Canada, Germany and Spain, Credit has no effect on money supply. In the UK, Italy and Spain interest rates have no effect on money supply.

The findings from panel estimates accord with the sequence of events predicted by the Austrian business cycle theory. Specifically, investment has a positive impact on output and, *more importantly, the impact of Credit on output and investment is also positive*. Credit, is found to be positively influenced to a significant degree by money supply. Per country, our findings reveal minor differences. *The ABC theory is fully verified in the US, UK, Japan, France and Italy, whereas in Spain, Canada, Australia and Germany there are some parts of the chain of the ABC theory that do not seem to be significant.*

3.5 Testing for Causality

The issue of causality is important for our analysis. To test for causality we adopt the method of Dufour, Pelletier and Renault (2006), based on running vector autoregressions at different horizons. Dufour, Pelletier and Renault (2006) use a finite order vector autoregressive model to provide tests for examining whether there are causal relationships between variables *at various horizons*.

Consider a *VAR (p)* process of the form:

$$W(t) = \mu(t) + \sum_{k=1}^{p} \pi_k W(t-k) + \alpha(t), \quad t = 1,....T \tag{8}$$

where $W(t) = (\omega_{1t} + \omega_{2t}, ... \omega_{mt})'$ is a random vector, $\mu(t)$ is a deterministic trend, and $\alpha(t)$ is a white-noise process of order two with a non-singular covariance matrix Ω. The common specification for $\mu(t)$ is that it is constant, although other deterministic trends – such as seasonal dummies- could also be considered.

This autoregressive form can be generalized to allow for projection at any horizon *h* given the information available at time *t*. Hence, the observation at time $t+h$ can be computed recursively from equation (8) and is given by:

$$W(t+h) = \mu^{(h)}(t) + \sum_{k=1}^{p} \pi_k^{(h)} W(t+1-k) + \sum_{j=0}^{h-1} \psi_j \alpha(t+h-j) \tag{9}$$

where $\psi_0 = I_m$ and $h < T$. The appropriate formulae for the coefficients $\pi_k^{(h)}$ and $\mu^{(h)}(t)$ are given in Dufour and Renault (1998), and the ψ_j matrices are nothing but the impulse-response coefficients of the VAR. Equation is an autoregression of order *p* at horizon *h* or a (p,h) -autoregression. Let us consider equation (9) written in matrix form:

$$W(t+h) = \overline{W}_p(h)\Pi^{(h)} + U(t+h) \tag{10}$$

We can estimate this equation by OLS, which yields the estimator:

$$\Pi^{(h)} = \left[\overline{W}_p(h)'\overline{W}_p(h)\right]^{-1}\overline{W}_p(h)'W(t+h) \tag{11}$$

Hence

$$\sqrt{T}\left[\hat{\Pi}^{(h)} - \Pi^{(h)}\right] = \left[\frac{1}{T}\overline{W}_p(h)'\overline{W}_p(h)\right]^{-1}\frac{1}{\sqrt{T}}\overline{W}_p(h)'U(t+h) \tag{12}$$

Under usual regularity conditions, $\sqrt{T}vec\left[\hat{\Pi}^{(h)} - \Pi^{(h)}\right]$ converges in distribution to a normal distribution with a non-singular covariance matrix. We are interested in the hypothesis that a variable ω_{jt} does not cause another one, ω_{it}, at horizon *h*, and the restrictions related to that hypothesis take the form:

$$\mathrm{H}_0^{(h)} : \pi_{ijk}^{(h)} = 0, \quad k = 1,\ldots p, \tag{13}$$

where $\pi_k^{(h)} = \left[\pi_{\iota\xi\kappa}^{(h)}\right]_{i,j=1,\ldots m}$ comes from the *(p, h)* - autoregression defined in equation (9). In other words, the null hypothesis takes the form of a set restrictions on the coefficients of the matrix $\hat{\Pi}^{(h)}$.Under the hypothesis $\mathrm{H}_0^{(h)}$ of *non-causality at horizon h* from ω_{jt} to ω_{it}, the asymptotic distribution of the Ward statistic $W\left[\mathrm{H}_0^{(h)}\right]$is $\chi^2(p)$. In order to get an appropriate distribution, we have to take in account that the prediction error $\hat{u}(t+h)$ follows an *MA (h-1)* process. We use the Newey-West procedure, which provides a general purpose positive-semidefinite covariance matrix in this instance.

The normal asymptotic distribution may not be reliable in finite samples. This may especially be the case for a VAR system with a large number of variables and/or lags. An alternative to using the asymptotic chi-square distribution of $W\left[\mathrm{H}_0^{(h)}\right]$ is to use Monte Carlo or bootstrap techniques. Since the asymptotic distribution of $W\left[\mathrm{H}_0^{(h)}\right]$ is nuisance-parameter free, such methods yield asymptotically valid tests when applied to $W\left[\mathrm{H}_0^{(h)}\right]$, and typically give better control of the test level for finite samples.

In our empirical study, ***p-values are computed using a parametric bootstrap***. The procedure can be described as follows: An unrestricted VAR(p) model is fitted for the horizon one, yielding the estimates $\hat{\Pi}^{(1)}$ and $\hat{\Omega}$ for $\Pi^{(1)}$ and Ω.

1. An unrestricted (p, h)- autoregression is fitted by least squares, yielding the estimate $\hat{\Pi}^{(h)}$ of $\Pi^{(h)}$.
2. The test statistic *W* for testing non-causality at the horizon *h* is computed.
3. N simulated samples are drawn by Monte Carlo, using $\Pi^{(h)} = \hat{\Pi}^{(h)}$ and $\Omega = \hat{\Omega}$ (given the hypothesis that $\alpha(t)$ is Gaussian); we then impose to $\hat{\Pi}^{(h)}$ the constraints of *non-causality*.
4. The simulated p-value is obtained by calculating the rejection frequency.

The ***results of per country causality tests, following the method of Dufour, Pelletier and Renault (2006***), are reported in Table 6. ***Here, we are investigating whether the ABC theory chain of events is really valid***. Particularly, in the first stage, we test whether the interest rate

is influenced by money supply. We note that the "chain" can function straight from interest rate, since this constitutes a monetary policy tool.[4] In the *second stage*, we test whether credit is affected by money supply or interest rate. ***We then investigate causality between credit and investment, the crux of the matter for verification of the ABC***. In the third and last stage, we test whether investment affects output.

We first apply the test to the **US**. The results indicate that interest rate is influenced by money supply, in short and medium term horizons. Credit in the medium term horizons is *caused* by money supply and Credit in short term horizons is *caused* by interest rate. ***The crucial link of the Austrian chain is clearly in place, since credit causes investment from horizon 6 onwards*** (up to 34). Moreover we detect robust evidence of causality from investment to output, as expected. ***The behaviour of Credit, nevertheless, is remarkable because it causes output over all horizons***. We therefore conclude that the ABC theory is strongly validated for the US economy.

For Australia, it is money supply that seems to cause interest rate, which itself clearly causes credit in the short and medium term horizons. We also observe a bi-derectional causal relationship between money supply and credit. ***The evidence supports causality from Credit to output. Here, again, the ABC theory appears to be verified***.

For **Canada**, the chain of events in the ABC theory starts from the interest rate, which causes credit over any horizon. Investment and output, are significantly affected by interest rates and output by credit. There seems to be no causal relationship between credit and investment; the main mechanism of the business cycle is apparently the interest rate.

In the **UK**, Credit is caused by interest rates, a variable which has a significant causal relationship with investment. In the UK, the main links of the ABC chain are closely connected. Output is caused by credit, and investment affects output in the short term.

In **Germany**, ***the results also seem to support the ABC theory***. The main force is money supply. It is this that causes credit, which in turn causes investment, and output. Not surprisingly output is affected by Credit. The evidence for Japan again testifies in favour the ABC theory. There are significant causal relationships from credit to output and from credit to investment, over any horizon.

The sequence of events in ABC seems to be valid for **France** as well. In particular, we detect evidence in favour of causality from credit to investment and from investment to output. Credit is caused by money supply in the short term.

In **Italy**, *investment does not cause output over any horizon*. The role of credit is crucial though, since it causes output and investment in medium term horizons so the ABC theory is fully valid.

In **Spain**, the chain of causal relationships functions only in the medium and long horizon. This is not true for the causal relationship, between investment and output, as outut seems to be caused by investment only in short term horizons.

The causality findings from our application of the method of Dufour et al. (2006) to major economies, confirm the crucial role of Credit in ABC theory so we have to consider it as a plausible explanation of the business cycle alive today as was in the 20's.

4. Summary of Findings

In this paper we set out to examine, for major economies, whether the Austrian theory of the business cycle is verified. For this purpose we combined cross-sectional and time series data, and we used reliable econometric methods.

We find that investment has a positive impact on output; credit has a positive impact on output and investment, and credit is positively influenced to a significant degree by money supply. Per country, our findings showed minor differences. For the US, the UK,

[4] However important the causality relation between money supply and interest rate, it *cannot* on its own nullify the ABC theory

Japan, France and Italy the ABC theory is fully verified. In Spain, Canada, Australia and Germany, certain parts of the ABC chain do not seem to "match".

We examined the causal relationship between variables at various horizons by means of the method of Dufour, Pelletier and Renault (2006). Our results differ slightly from country to country but the ABC theory holds in general. The implication is that in short and medium term horizons (up to 2008) credit expansion had a major role to play in the recession much like as in the 20's as the Austrian School predicted.

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Table 1: Unit Root Tests for the Variables of the ABC Theory

Countries		Levels	First Differences		Levels	First Differences		Levels	First Differences
United States	**GDP**	-2,366	-3,12***	**Money Supply**	-1,673	-3,151***	**Credit**	-1,925	-3,974**
Australia		-2,906	-10,737*		-2,494	-10,862*		-1,702	-2,903***
Canada		-2,635	-3,444***		-1,853	-12,032*		-2,359	-10,987*
United Kingdom		-2,570	-3,81**		-3,412***	-11,008*		-2,159	-3,509***
Japan		-2,254	-5,3*		-1,038	-5,123*		-2,182	-4,635*
Germany		-2,322	-4,244*		-1,758	-4,335*		-2,390	-4,278*
France		-2,598	-5,901*		-1,813	-4,127*		-1,05	-2,592***
Italy		-2,124	-10,321*		-1,783	-3,497**		-2,233	-2,98***
Spain		-1,823	-5,974*		-2,383	-3,456**		-1,820	-2,656***
United States	**Investment**	-2,273	-4,164*	**Leading Rates**	-1,906	-5,974*			
Australia		-2,916	-6,541*		-2,020	-5,921*			
Canada		-2,737	-4,336*		-2,980	-5,36*			
United Kingdom		-3,179	-10,188*		-2,343	-9,087*			
Japan		-2,567	-5,676*		-1,301	-2,88***			
Germany		-1,975	-4,179*		-3,224	-7,218*			
France		-2,837	-10,518*		-1,506	-7,034*			
Italy		-2,902	-10,094*		-1,862	-10,532*			
Spain		-2,315	-5,055*		-1,823	-2,208***			

Note: (*), (**) and (***) signify rejection of the unit root hypothesis at the 1%, 5% and 10% levels, respectively.

Table 2: Panel Unit Root Tests for the Variables of the ABC Theory						
Variables						
	IPS		**MW**		**Choi**	
	Levels	**First Differences**	**Levels**	**First Differences**	**Levels**	**First Differences**
GDP	-0,663	*-13,611*	15,939	*206,981*	-0,558	*-11,162*
Money Supply	-0,126	*-16,574*	16,267	*262,356*	0,086	*-12,691*
Credit	-1,391	*-16,225*	13,104	*270,132*	0,261	*-13,179*
Lending Rate	-0,414	*-22,821*	15,277	*193,111*	-0,338	*-13,372*
Investment	-0,945	*-16,994*	18,179	*291,909*	-0,877	*-14,533*

Note: The critical values for MW test are 37,57 and 31,41 at 1% and 5% statistical level respectively. Italics values signify rejection of the null hypothesis.

Table 3: Johansen Cointegration tests

Country		H_0 : rank = r						
1980:1-2005:4								
(a) Trace Statistic		*r=0 (69.818)*	*r ≤ 1 (47.856)*	*r ≤ 2 (29.797)*	*r ≤ 3 (15.494)*	*r ≤ 4 (3.841)*		
(b) Max eigenvalue Statistic		*r=0 (33.876)*	*r ≤ 1 (27,584)*	*r ≤ 2 (21,131)*	*r ≤ 3 (14,264)*	*r ≤ 4 (3.841)*		
United States	(a)	**123,183**	**80,690**	**50,744**	**21,188**	3,687	6 lags	**Lending Rate, Money Supply, Credit, Investment, GDP**
	(b)	**42,493**	**29,946**	**29,556**	**17,501**	3,687		
Australia	(a)	**89,532**	**53,311**	25,123	6,255	0,538	4 lags	
	(b)	**36,221**	**28,188**	18,868	5,717	0,538		
Canada	(a)	**80,446**	45,252	25,786	8,249	3,006	2 lags	
	(b)	**35,193**	19,466	17,537	5,243	3,006		
United Kingdom	(a)	**74,322**	40,937	17,475	9,898	4,310	5 lags	
	(b)	**33,985**	23,462	7,577	5,588	4,310		
Japan	(a)	**101,776**	**63,315**	**35,043**	13,304	1,355	6 lags	
	(b)	**38,461**	**28,272**	**21,739**	11,949	1,355		
Germany	(a)	**100,335**	**56,495**	**35,062**	**19,303**	**8,350**	6 lags	
	(b)	**43,840**	21,433	15,759	10,953	8,350		
France	(a)	**100,818**	**62,208**	29,093	12,689	0,078	5 lags	
	(b)	**38,611**	**33,114**	16,405	12,611	0,078		
Italy	(a)	**132,782**	**68,393**	28,002	12,318	0,131	4 lags	
	(b)	**64,390**	**40,390**	15,684	12,187	0,131		
Spain	(a)	**87,857**	47,147	24,287	10,323	0,439	5 lags	
	(b)	**40,710**	22,859	19,965	9,884	0,439		

Note: Numbers in parentheses represent the 5% critical values of the two test statistics. *r* denotes the number of cointegrating vectors. The eight column contains the optimal lag for the VARs that were selected by minimising the AIC criterion. Finally, boldface values detect evidence in favor of cointegration.

Table 4: Panel Cointegration tests			
Dependent variable:		**no trend**	**trend**
Output	**PP rho-statistic**	1,389	**2,763**
	PP t-statistic	1,230	**3,379**
	ADF t-statistic	**2,863**	**3,967**
Investment	**PP rho-statistic**	1,492	**2,344**
	PP t-statistic	1,112	**2,638**
	ADF t-statistic	1,235	**2,932**
Credit	**PP rho-statistic**	**2,992**	**4,679**
	PP t-statistic	**3,150**	**4,389**
	ADF t-statistic	0,857	**2,422**
Money supply	**PP rho-statistic**	1,274	**2,784**
	PP t-statistic	1,391	**2,859**
	ADF t-statistic	1,420	**2,731**
Interest Rates	**PP rho-statistic**	0,769	-0,038
	PP t-statistic	-1,233	-0,984
	ADF t-statistic	-1,743	-1,271

Note: Boldface values detect evidence in favor of cointegration.

Table 5: FMOLS Results

Fully modified OLS estimates (dependent variable is output)

common time dummies included

	Investment	Credit	Lending Rate	Money Supply
United States	0,67 [13,51]	0,22 [2,76]	-0,05 [-3,93]	0,13 [3,45]
Australia	0,01 [0,42]	0,08 [1,35]	-0,09 [-4,25]	0,01 [0,42]
Canada	0,72 [10,94]	0,14 [1,93]	-0,03 [-3,38]	0,04 [2,16]
United Kingdom	1,01 [8,94]	0,08 [2,52]	-0,08 [-2,52]	-0,13 [-2,75]
Japan	0,70 [7,27]	0,41 [3,67]	0,00 [-1,88]	-0,17 [-4,83]
Germany	0,36 [4,56]	0,02 [3,28]	0,01 [2,92]	0,15 [3,53]
France	0,62 [6,37]	0,06 [1,87]	0,00 [-2,37]	0,06 [2,59]
Italy	0,56 [3,92]	0,08 [0,4]	-0,15 [-5,72]	0,08 [1,53]
Spain	0,69 [23,07]	0,02 [0,43]	0,00 [-2,2]	-0,02 [-7,31]
	0,68 [32,32]	**0,18 [4,46]**	**-0,08 [-5,95]**	**0,11 [2,94]**

Fully modified OLS estimates (dependent variable is investment)

common time dummies included

	GDP	Credit	Lending Rate	Money Supply
United States	1,28 [12,3]	0,07 [2,68]	-0,05 [-4,52]	0,08 [1,67]
Australia	1,19 [17,44]	0,06 [2,17]	-0,01 [-4,71]	0,00 [-0,04]
Canada	1,20 [11,87]	0,00 [-0,05]	-0,04 [-2,78]	-0,05 [-1,88]
United Kingdom	0,78 [9,34]	0,06 [1,96]	0,01 [4,14]	0,08 [1,75]
Japan	0,96 [7,75]	0,08 [3,55]	0,00 [0,54]	0,23 [6,18]
Germany	1,08 [4,34]	0,36 [2,53]	0,01 [1,61]	0,11 [2,72]
France	0,96 [6,39]	0,43 [3,12]	0,00 [2,23]	-0,12 [-3,71]
Italy	0,56 [3,66]	0,64 [3,49]	-0,03 [-1,87]	-0,11 [-1,99]
Spain	1,39 [22,87]	0,01 [0,19]	0,01 [2,06]	0,03 [8,87]
	1,04 [31,99]	**0,23 [3,41]**	**-0,03 [-4,16]**	**0,04 [3,89]**

Fully modified OLS estimates (dependent variable is credit)

common time dummies included

	GDP	Investment	Lending Rate	Money Supply
United States	1,60 [2,53]	0,22 [1,68]	-0,02 [-1,78]	0,31 [6,15]
Australia	0,45 [0,49]	-0,21 [-0,29]	0,00 [-0,68]	-0,27 [-1,89]
Canada	0,83 [1,38]	0,03 [0,07]	-0,11 [-3,12]	0,01 [0,2]
United Kingdom	2,71 [2,83]	-1,08 [-2,1]	0,04 [2,4]	0,92 [3,81]
Japan	0,94 [3,88]	-0,20 [-1,81]	0,00 [-1,21]	0,26 [2,34]
Germany	0,03 [0,06]	0,68 [2,77]	-0,04 [-3,17]	-0,10 [-0,73]
France	-0,10 [3,37]	0,63 [3,37]	0,00 [0,09]	0,21 [10,05]
Italy	0,04 [0,23]	0,48 [3,31]	0,00 [2,25]	0,21 [6,14]
Spain	0,64 [0,8]	-0,05 [-0,09]	0,00 [0,07]	0,02 [1,91]
	0,79 [3,95]	**0,15 [1,85]**	**-0,08 [-1,84]**	**0,21 [9,00]**

Table 5: FMOLS Results

Fully modified OLS estimates (dependent variable is money supply)

common time dummies included

	GDP	Investment	Credit	Lending Rate
United States	0,78 [2,11]	1,12 [0,81]	1,23 [4,43]	-0,09 [-2,35]
Australia	0,98 [0,8]	-0,23 [-0,23]	-0,01 [-1,40]	-0,51 [-1,97]
Canada	4,37 [2,58]	-2,82 [-1,99]	0,07 [0,11]	-0,08 [-2,28]
United Kingdom	-1,94 [-3,18]	1,41 [1,93]	0,32 [3,13]	0,02 [1,26]
Japan	-1,86 [-5,4]	2,67 [6,23]	1,16 [2,53]	-0,01 [-1,54]
Germany	1,75 [3,20]	0,32 [0,94]	-0,28 [-1,04]	-0,06 [-5,64]
France	1,90 [[1,81]	-2,50 [-3,27]	3,65 [9,68]	0,00 [0,65]
Italy	0,91 [1,47]	-1,11 [-1,84]	2,69 [6,01]	0,01 [0,92]
Spain	-2,99 [-7,07]	22,21 [8,69]	0,20 [0,12]	-0,11 [-3,82]
	-0,58 [-2,58]	**2,34 [3,75]**	**1,07 [6,33]**	**-0,09 [-4,55]**

Fully modified OLS estimates (dependent variable is leading rate)

common time dummies included

	GDP	Investment	Credit	Money Supply
United States	-60,02 [-2,71]	53,02 [3,71]	-0,46 [-0,07]	-2,83 [-1,17]
Australia	72,73 [-3,47]	66,33 [4,22]	-4,88 [-0,92]	-4,92 [-1,24]
Canada	-7,41 [-0,63]	9,93 [1,05]	-2,46 [-0,60]	-2,12 [-1,73]
United Kingdom	-18,64 [-2,58]	32,13 [4,13]	3,22 [2,37]	2,47 [1,18]
Japan	18,10 [0,99]	5,86 [0,36]	-14,55 [-1,17]	-6,30 [-1,36]
Germany	41,99 [2,71]	18,24 [1,97]	-25,51 [-3,88]	-20,08 [-5,37]
France	-10,80 [-3,09]	80,33 [2,82]	3,21 [0,13]	4,43 [0,78]
Italy	-66,14 [-5,68]	8,46 [0,57]	3,12 [0,70]	49,83 [3,42]
Spain	58,63 [-1,89]	40,62 [1,90]	1,62 [0,90]	-2,47 [-3,22]
	-36,83 [-5,45]	**34,99 [6,97]**	**1,11 [-0,18]**	**-3,19 [-3,81]**

Note: Figures in brackets are t-statistics.

	Table 6: Summary of causality relations at various horizons																					
United States	***h***	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**
GDP	← ***Investment***	*	*	*	**	**	**	**				**										
	← ***Credit***	**	**	**	**	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	← ***Interest Rate***	**	**	**	**	**					**	**	**	**	**	*	*	*	*	*	*	*
	← ***Money Supply***									**	**	**							**	**	*	*
Investment	← ***GDP***	**	**	**	**	**	**	**	**	**	**	*	*	**			**	*	*	*	*	*
	← ***Credit***					**	**	**	**	**	**	**	**	**	**	**	*	*	*	*	*	*
	← ***Interest Rate***															**	**	**				
	← ***Money Supply***									**	**	*	*	*	*	*	*	**				
Credit	← ***GDP***	**	**	*	**	**	**	**	**	*	*	*	**					**	*	*	*	*
	← ***Investment***	*	*	*	**	*	**	*	*	*	*	**										
	← ***Interest Rate***		*	*	*	*	*	**	**													
	← ***Money Supply***	**	**					**	**	*	*	*	*	*	*	**	**	**				
Money Supply	← ***GDP***							**	**	**	*	*	*	*	*	*	*	*	*	*	*	*
	← ***Investment***										**	*	*	**	**							
	← ***Credit***															**	**	*	*	*	*	*
	← ***Interest Rate***																	**	**	**	*	*
Interest Rate	← ***GDP***	**	**	**	**									**	**							
	← ***Investment***	**	**	**	**	**																
	← ***Credit***	*	*	*	*	*	*	*	*	*	*	*										
	← ***Money Supply***	*	*	*	*	*	*	*	*	*	*	*	*	**								
Australia	***h***	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**
GDP	← ***Investment***	**	**	**	**	**																
	← ***Credit***						**	**	**	**	**	**	*	*	*	*	*	*	*	*	*	*
	← ***Interest Rate***	**	**	**	**	**	**															
	← ***Money Supply***															**	*	*	*	*	*	*
Investment	← ***GDP***	**	*	*	*	*	*	*	*	*	**		**	*	*	*	*	*	*	*	**	**
	← ***Credit***					**	**	**	**	**	**	*	*	*	*	*	*	*	*	*	*	*
	← ***Interest Rate***	*	*	*	*	**	**	**							**	**	**					
	← ***Money Supply***				**	**	**	**	**	**				*	*	*	*	*	*	**	**	**
Credit	← ***GDP***		**	*	*	**	**	**														
	← ***Investment***	**	*	*	*	*																
	← ***Interest Rate***	*	*	*	*	*	*	*	*	**	**	*	*	**	**							
	← ***Money Supply***	*	*	*	*	*	*	*	*	*	**	**	**	**	**	**		**	**	*	*	*
Money Supply	← ***GDP***	**	*	*	*	*	*	*	**	**												
	← ***Investment***													**	**			**	**	*	*	*
	← ***Credit***	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	← ***Interest Rate***	**	*	*	*	*	*	*	*	*	**				**	**	*	*	*	**		
Interest Rate	← ***GDP***	**	**	*	*	*	*	*	**	**					**	*	*	*	*	*	**	
	← ***Investment***															**	**	**	**			
	← ***Credit***											**	*	*	*	*	*	*	*	*	*	*
	← ***Money Supply***					**	*	*	*	*	**			**		**	*	*	**			

Source: International Monetary Fund, International Financial Statistics.
Note: (*), (**) Signify rejection of the null hypothesis at the 5% and 10% level respectively.

	Table 6: Summary of causality relations at various horizons																				
Canada	***h***	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**
GDP	← ***Investment***	**	**	**	**																	
	← ***Credit***								**	**	**	**	**	**	*	*	*	*	*	*	*	*
	← ***Interest Rate***	**	**	**	**	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	← ***Money Supply***																	**	*	*	*	*
Investment	← ***GDP***	**	*	*	*	*	*	*	*	*	*	*	*	*	*	**						
	← ***Credit***																					
	← ***Interest Rate***	**	**	**	**	**	**	**	**	**	*	**	*	*	*	*	*	*	*	*	*	*
	← ***Money Supply***																					
Credit	← ***GDP***	**	**	*	*	*	*	*	**	**	**	**	**									
	← ***Investment***										*	*	*	**								
	← ***Interest Rate***		**	**	**	**	*	*	*	**	**	**	*	*	*	*	*	*	*	*	*	*
	← ***Money Supply***	**	**	**	**																	
Money Supply	← ***GDP***						**	**	**	**				**	**	**						
	← ***Investment***																					
	← ***Credit***																**	*	**	*	*	*
	← ***Interest Rate***				**	**	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Interest Rate	← ***GDP***	**										**	**	*	*	*	*	*	*	*	*	**
	← ***Investment***																					
	← ***Credit***															**	*	**		**	*	*
	← ***Money Supply***																	**	**	**	**	**
United Kingdom	***h***	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**
GDP	← ***Investment***	**	**	**	**	**																
	← ***Credit***			**	**	**	*	*	*	*	*	*	*	*	*	*	**	**	*	**	**	**
	← ***Interest Rate***																					
	← ***Money Supply***																					
Investment	← ***GDP***	*	*	*	*	*	*	*	*	*	*		*	*	**	*	*	*	*	*	*	*
	← ***Credit***	*	*	*	*	*	*	*	*	*	*	*	*	**	**							
	← ***Interest Rate***			**	**	**	**	**	**	**	*	*										
	← ***Money Supply***																					
Credit	← ***GDP***			**	**	**	**	**	**	**	**	**		**	**				**	*	*	*
	← ***Investment***		**	**	**	**	**	**	**	**	**						**	**	**	**	**	**
	← ***Interest Rate***			**	**	**	**	**	**	**	**	**	**			**	**	*	*	*	*	**
	← ***Money Supply***																					
Money Supply	← ***GDP***																		*	*	*	*
	← ***Investment***	*	*	*	*	*	*	*	*	**									*	**	**	**
	← ***Credit***	*	*	*	*	*	*	*	*	*	*	*	**	**	**					**	**	**
	← ***Interest Rate***	*	*	*	*	*	**	**	**	**	**	**	**				**	*	*	*	*	*
Interest Rate	← ***GDP***					**	**	**	**	**												
	← ***Investment***	**	**	**	**	*	*	*	*	*												
	← ***Credit***				**	**	**	**	**	**	**	**										
	← ***Money Supply***													**	**							

Source: International Monetary Fund, International Financial Statistics.
Note: (*), (**) Signify rejection of the null hypothesis at the 5% and 10% level respectively.

	Table 6: Summary of causality relations at various horizons																					
Germany	***h***	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**
GDP	← ***Investment***				**	**	**	**	**	**	*	*	*	*	**	**	**					
	← ***Credit***	*	*	*	*	*	*	*	*	*	*	*	*	**	**	**	**	**	**	**	*	**
	← ***Interest Rate***																					
	← ***Money Supply***	**			**	**	**	**	**	**	**	**	*	*	*	*	*	*	*	*	*	*
Investment	← ***GDP***								**	**	*	*	**									
	← ***Credit***	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	**	**	**	**		
	← ***Interest Rate***																					
	← ***Money Supply***	**	**	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Credit	← ***GDP***							**	**	**	**	**	**									
	← ***Investment***						**	**	**	**	*	*	*	**	**	**	**					
	← ***Interest Rate***																					
	← ***Money Supply***			**	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Money Supply	← ***GDP***				**	**	**	*	*	*	*	*	**									
	← ***Investment***							**	**	**	**	**	**									
	← ***Credit***																					
	← ***Interest Rate***												**	**	**	**	*	*	**	**		
Interest Rate	← ***GDP***				**	**	**	**	**	**				**	**	**						
	← ***Investment***						**	**	**	**	**	**	**	*	*	*	*	*	*	**	**	
	← ***Credit***	*	*	*	*	*	*	*	*	*	*	**					*	*	*	*	*	*
	← ***Money Supply***																					
Japan	***h***	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**
GDP	← ***Investment***	**	**	**	**	**	**															
	← ***Credit***	*	*	*	*	*	*	*	**	**	*	*	*	*	**	**	**	**	**	**	**	**
	← ***Interest Rate***	**	**	*	*	*	*	*	*	*	**							**	**	**	*	*
	← ***Money Supply***		**	**	**	**							**						**	*		*
Investment	← ***GDP***																					
	← ***Credit***	**	**	**	**	*	*	*	*	**	**	**	**	**	**	*	**					
	← ***Interest Rate***								**	**	**											
	← ***Money Supply***												**	**	**							
Credit	← ***GDP***														**	**						
	← ***Investment***															**	**	**				
	← ***Interest Rate***						**	**	*	*	**	**				**		**				
	← ***Money Supply***							*	*	*	*	*	*	*	**	**	**	**	**	**	*	*
Money Supply	← ***GDP***								**	**	**	**	**									
	← ***Investment***	**										**	**	**							**	**
	← ***Credit***								**	**	**	**	**	**	**	**	**	*	*	*		
	← ***Interest Rate***	**	**	**			**	**	**	**	**	**	**	*	**		**			**	**	
Interest Rate	← ***GDP***														**	**	**	**	**	**	**	**
	← ***Investment***																	**	*	*	**	**
	← ***Credit***					**	**	**	**					**	**				**	**	**	**
	← ***Money Supply***	**	**	**	**	**	**	*	*	*	*	*										

Source: International Monetary Fund, International Financial Statistics.

Note: (*), (**) Signify rejection of the null hypothesis at the 5% and 10% level respectively.

	Table 6: Summary of causality relations at various horizons																					
France		**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**
GDP	← ***Investment***	**	**	**	*	*	*	*	*	*	*	**	**	**	*	*	*	**				
	← ***Credit***	**	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	**	**			
	← ***Interest Rate***									**	*	*	*	*	*	*	**	**				
	← ***Money Supply***								**	**	**	**	**	**	**	**	**	**	**	**	**	*
Investment	← ***GDP***													**	*	**	**	**	**	**	**	*
	← ***Credit***	**	**	**	**	*	*	*	*	*	*	*	*	*	*	*	**	**				**
	← ***Interest Rate***			**	**	**	**		**	**	**	**	*	*	*	*	*	**				
	← ***Money Supply***																					
Credit	← ***GDP***	*	*											**	*	*	*	*	*	**	**	*
	← ***Investment***	**	**	**	**	*	*	*	*	*	**	**	**	**	**	**						
	← ***Interest Rate***												**		**	**	**					
	← ***Money Supply***	**	**	**	*	*	*	*	**	**												
Money Supply	← ***GDP***	**	**								**	**	**					**	**	*	*	**
	← ***Investment***						**	**										**	**	*	*	*
	← ***Credit***	**	**		**	**	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	← ***Interest Rate***							**	**	**	*	*	**	**	**	**	**					
Interest Rate	← ***GDP***										**		**	**	**	**	**					**
	← ***Investment***	**	**	**													**					
	← ***Credit***	**	**	**	**	**	**	**									**					
	← ***Money Supply***	**	*	*	**	**	**															
Italy	***h***	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**
GDP	← ***Investment***																	**	**			
	← ***Credit***						**	**	**	**	**	**	**	**	**			**				
	← ***Interest Rate***										**	**										
	← ***Money Supply***										**	*	**	**	**	**	**	*				
Investment	← ***GDP***																					
	← ***Credit***	**	**	**	*	*	*	*	*	**	*	**	**	**	*			**	**	**	**	**
	← ***Interest Rate***																					
	← ***Money Supply***					**	**	*	**	**	*	*	**	**	**	**						
Credit	← ***GDP***																			**	**	
	← ***Investment***	*				**	**	**	**	**												
	← ***Interest Rate***	**	**	**	**	**	**	**														
	← ***Money Supply***	**	**	*	*	**	**	**	**													
Money Supply	← ***GDP***													**	**							
	← ***Investment***										**	**	**	*	*	*	*	**	**	*	*	**
	← ***Credit***	**	*	*	*	*	*	**	*	**	*	*		*	*	*	*	**				
	← ***Interest Rate***																					
Interest Rate	← ***GDP***	*	**	**				**	**	**										**	**	
	← ***Investment***	**	**	**	**																	
	← ***Credit***	*	*	*	**	**																
	← ***Money Supply***	**	*	*	*	*	**	**	**	**	**	**	*	*	**							

Source: International Monetary Fund, International Financial Statistics.
Note: (*), (**) Signify rejection of the null hypothesis at the 5% and 10% level respectively.

	Table 6: Summary of causality relations at various horizons																				
Spain	***h***	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**
GDP	← ***Investment***	**	*	*	**	**	**	**	**													
	← ***Credit***									**	**	**	**	**	**	*	*	*	*	*	*	*
	← ***Interest Rate***									**	*	*	*	*	*	*	*	*	*	**		
	← ***Money Supply***										**	**	**	**	*	*	*	*	*	*	*	
Investment	← ***GDP***	**	**							**	**	*	*	*	*	*	**	**	**			
	← ***Credit***												**	**	**	*	*	*	*	*	*	*
	← ***Interest Rate***										**	**	*	*	*	*	*	*	**	**	**	**
	← ***Money Supply***	**	**	**	**	**	**	**	*	*	*	*	*	*	*	*	*	**	**	**		**
Credit	← ***GDP***							**	**	**	*	*	*	*	*	**	*		**			
	← ***Investment***								***						**	**	*					
	← ***Interest Rate***				**	**	**	*	*	*	*	*	*	*	**	**	**	*	**	**	*	**
	← ***Money Supply***			*	*	*	*	*	*	*	*	*	*	**	**	**	**	**	**	**	**	**
Money Supply	← ***GDP***										**	**	*	**	**	*						
	← ***Investment***															**	**					
	← ***Credit***	**	**	**	**	*	*	*	*	*	*	**	**	**								
	← ***Interest Rate***									**	**	**	**	**					**			
Interest Rate	← ***GDP***		**	**	**	**	**	**						**	*							
	← ***Investment***					**	**	**	**					**	**				**	**	*	**
	← ***Credit***														**	**	**	**	**	**	**	
	← ***Money Supply***										**	**										

Source: International Monetary Fund, International Financial Statistics.

Note: (*), (**) Signify rejection of the null hypothesis at the 5% and 10% level respectively.

Table 7: Data Description

1980Q1---2006Q4		GDP		Investment		Credit		Interest Rates		Money Supply				Exchange Rates	
Billions														National Currency per US Dollar	
1	USA	11199B.CZF...	GROSS DOMESTIC PRODUCT	11193E.CZF...	GROSS FIXED CAPITAL FORMATION	Global FinData of the SDW at the ECB	Loans for Investment	Global FinData of the SDW at the ECB	Lending Rate	11134...ZF...	MONEY	11135...ZF...	QUASI-MONEY		
2	Australia	19399B.CZF...	GROSS DOMESTIC PRODUCT SA	19393E.CZF...	GROSS FIXED CAPITAL FORMATION SA	Global FinData of the SDW at the ECB	Loans for Investment	Global FinData of the SDW at the ECB	Lending Rate	19334...ZF...	MONEY	19335...ZF...	QUASI-MONEY	193..AE.ZF...	MARKET RATE
3	Canada	15699B.CZF...	GROSS DOMESTIC PRODUCT SA	15693E.CZF...	GROSS FIXED CAPITAL FORMATION SA	Global FinData of the SDW at the ECB	Loans for Investment	Global FinData of the SDW at the ECB	Lending Rate	15634...ZF...	MONEY	15635...ZF...	QUASI-MONEY	156..AE.ZF...	MARKET RATE
4	UK	11299B.CZF...	GROSS DOMESTIC PRODUCT SA	11293E.CZF...	GROSS FIXED CAPITAL FORMATION SA	Global FinData of the SDW at the ECB	Loans for Investment	Global FinData of the SDW at the ECB	Lending Rate	11235L..ZF...	MONEY PLUS QUASI-MONEY			112..AE.ZF...	MARKET RATE
6	Japan	15899B.CZF...	GROSS DOMESTIC PRODUCT SA	15893E.CZF...	GROSS FIXED CAPITAL FORMATION SA	Global FinData of the SDW at the ECB	Loans for Investment	Global FinData of the SDW at the ECB	Lending Rate	15834...ZF...	MONEY	15835...ZF...	QUASI-MONEY	158,,AE,ZF,,,	MARKET RATE
5	Germany	13499B,CZF,,,	GROSS DOMESTIC PRODUCT SA	13493E,CZF,,,	GROSS FIXED CAPITAL FORMATION SA	Global FinData of the SDW at the ECB	Loans for Investment	Global FinData of the SDW at the ECB	Lending Rate	13434..ZF	MONEY	13435..ZF	QUASI-MONEY	134,,AE,ZF,,,	MARKET RATE
7	France	13299B.CZF...	GROSS DOMESTIC PRODUCT SA	13293E.CZF...	GROSS FIXED CAPITAL FORMATION SA	Global FinData of the SDW at the ECB	Loans for Investment	Global FinData of the SDW at the ECB	Lending Rate	13234...	MONEY	13235...	QUASI-MONEY	132..AE.ZF...	OFFICIAL RATE
8	Italy	13699B.CZF...	GROSS DOMESTIC PRODUCT SA	13693E.CZF...	GROSS FIXED CAPITAL FORMATION SA	Global FinData of the SDW at the ECB	Loans for Investment	Global FinData of the SDW at the ECB	Lending Rate	13634	MONEY	13635	QUASI-MONEY	136..AE.ZF...	MARKET RATE
9	Spain	18499B.CZF	GROSS DOMESTIC PRODUCT SA	18493.CZF	GROSS FIXED CAPITAL FORMATION SA	Global FinData of the SDW at the ECB	Loans for Investment	Global FinData of the SDW at the ECB	Lending Rate	18434	MONEY	18435	QUASI-MONEY	163..AE.ZF...	MARKET RATE

Sources: a) International Monetary Fund, International Financial Statistics. B) SDW at ECD.

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