

BEATING FISCAL DOMINANCE. THE CASE OF SPAIN, 1874-1998

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Abstract

Despite the theoretical agreement on the inflationary effects of persistent deficits, empirical work did not provide supporting evidence until the inclusion of non-developed countries in panel studies. This paper proposes an alternative approach, by exploiting the changes in development in a single country in the very long run, Spain over 1874-1998. As a main result, the use of different econometric tools shows that the causality from fiscal to monetary variables weakens as time goes by. More importantly, as in previous research, the intensity of the link matches perfectly with the different degree of Spain's access to developed financial markets, *fiscal dominance* holding until the easier access to foreign markets that followed its entry into the European Community in 1985.

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BEATING FISCAL DOMINANCE. THE CASE OF SPAIN, 1874-1998**1. Introduction**

In 1992, the Maastricht Treaty imposed the cutting of deficits and debt on the countries committed to the building of the European Monetary Union (EMU). Implicit in the measure was the assumption that fiscal policy could interfere with the strict monetary policy needed by some economies to control inflation and fix the exchange rate against the euro. However, at that time the evidence for the link between deficits and prices was far from compelling. The profusion of empirical studies carried out for the USA as a reaction to its high inflation levels in the 1960s and early 1970s, yielded mixed results. While authors such as Barro (1977, 1978 a, b), Levy (1981), Hamburger and Zwick (1981), Allen and Smith (1983), Miller (1983), Ahking and Miller (1985) found some kind of relationship between fiscal and monetary variables for the USA in different periods between 1950 and 1980, others including Niskanen (1978) and Dwyer (1982) failed in the same task. The failure to find such a link was again the result of King and Plosser (1985) and Giannaros and Kolluri (1985) when studying a sample of developed countries over the period 1950-1980; Protopapadakis and Siegel (1987) only being able to find very weak evidence. More recently, Vieira (2000) again failed when studying six European Union countries in 1950-1996.

On the contrary, the evidence has proved to be much more successful in panel studies which include developing countries and/or countries with high inflation, like those considered in Fischer, Sahay and Végh (2002) and Catão and Terrones (2005). The former, working with a sample of 94 countries for 1960-1995, show the existence of a relation between fiscal and monetary variables for (non-developed) economies with very high inflation levels. This finding is confirmed in the even more comprehensive

study of Catão and Terrones (2005) which, covering 107 countries in the period 1960-2001, offers supporting evidence that fiscal deficits are linked with inflation when the most developed and low-inflation economies are ruled out of the panel. In fact, these authors sustain that the difficulties of previous studies in finding supporting evidence on the link between deficits and prices is due to the predominance of advanced or historically low-inflation countries in the samples.

What the present paper proposes is to use a different approach to test for the validity of this bias. Instead of considering differences across countries to uncover the link between fiscal and monetary variables, we propose to consider changes in the institutional and inflation features of a single country over a very long period, the case of Spain from 1874 to 1998. Between 1874, when the Bank of Spain was granted the monopoly of issue, and 1998, when the Bank lost its monetary function with the country's entry into the EMU, the Spanish economy underwent dramatic changes, both in terms of financial development and inflation. Accordingly, we think the link between fiscal and monetary variables might have changed over time. It is worthwhile remarking that in comparison with panel studies, the temporal approach proposed here offers a profusion of tools to establish the direction of the causality between variables and, consequently, to discriminate whether the link between fiscal and monetary variables is reflecting the financing of deficits through money creation or, alternatively, the simple fact that governments target the deficits in real terms ¹.

Generally speaking, there is a large narrative supporting the idea that the Spanish fiscal policy dominated monetary policy for most of the period that runs from 1874 until 1998, the year that the peseta disappeared into the euro. According to Flores de Lemus

¹ The causality analysis makes sense since the association of movements between budget and prices, as Barro (1979) pointed out, might be simply reflecting that the fiscal authorities targeted the budget in real terms. In our case, as long as prices reflected changes in money, the budget would appear related to money movements, even if budget was not causing these movements.

(1929), Olariaga (1933), Sardá (1948), and more recently, Martín Aceña (1985 a,b, 2003), the budget guided the path of money creation in Spain from 1874 to 1935. The same perception that the failure to control deficits continued to condition monetary policy and price dynamics is expressed by Poveda (1972), Rojo and Pérez (1977), González (1979), Fuentes Quintana (1995, 1996), Malo de Molina (1998, 2003) and Rojo (2002, 2004) for most of the period from the end of the Spanish civil war (1936-1939) until the Bank of Spain broke free from government with the Law of autonomy in 1994.

However, despite this general perception, the hypothesis of *fiscal dominance*, understood as the subordination of monetary to fiscal policy, has not been formally tested for the whole period, 1874-1998, in which the peseta constituted the Spanish currency². Under a regime of *fiscal dominance*, the deficits (contemporaneous or previous) drive the path of money creation. No matter whether or not deficits are immediately monetized, as King and Plosser (1985) argue, under the hypothesis of *fiscal dominance* the nexus is between deficits and the present value of the revenues from *seigniorage* (understood as the financing of deficits through monetary base creation). Our goal is precisely to test econometrically if the hypothesis of *fiscal dominance* holds for Spain in 1874-1998, and above all, to examine the possibility of the link between budget and money having changed as the Spanish economy developed.

We start by analysing the relationship between budget and monetary base. We apply a stationary VAR (Vector AutoRegressive) model and find a dynamic and causal link from budget to monetary base for the whole period. More importantly, when repeating the analysis of causality for the sub-periods identified by the Bai and Perron

² Sabaté *et al.* (2006) only test for the existence of a link between budget and the monetary base for the sub-period 1874-1935.

(1998) structural break methodology, we find that the link weakens as time goes by. According to this analysis, there are two breaks in the causality relationship between budget and changes in the monetary base, located around 1934 and 1983. If we again apply the Granger causality tests to the sub-periods delimited by the breaks, we find a very strong unidirectional causality relationship for the sub-period 1874-1934, whose significance declines in the sub-period 1935-1983 and, finally, becomes non-significant for the sub-period 1984-1998. We consider these results to be in accordance with those of Catão and Terrones (2005), for whom the strength of the link between budget and prices is inversely related to the degree of institutional development and directly related to the inflation level of a country.

Thus, the strong causality found here for the sub-period 1875-1934 is coherent with the lack of a modern (and sufficient) income tax system that, in absence of a developed domestic financial market and difficult access to the foreign market, pushed Spain towards *seigniorage*. The evidence of *seigniorage* for the sub-period 1935-1983 can be explained in similar terms. In an international framework of higher barriers to capital flows, the Spanish maintenance of a regressive tax system and a very narrow domestic asset market meant that government continued to finance deficits by expanding the monetary base. Causality from budget to monetary base did not finish until the sub-period 1984-1998, which is related to the liberalization and corresponding deepening of the domestic financial market, as well as to the easier access to foreign markets that followed the entry of Spain into the European Community.

However, the end of *seigniorage* did not mean the end of fiscal interferences in the monetary field, as we can see if we analyse the link between budget and money by considering, instead of the monetary base, the LAPS (Liquid Assets held by the Public), the aggregate on which the Spanish monetary objectives started to be fixed in 1983. By

applying the bounds-test procedure of Pesaran *et al.* (2001) to exam the relation between budget and LAPS, we again find a strong link for the whole period 1874-1998, the causality again running from the fiscal to the monetary variables. More interestingly, when testing causality recursively, we find that the link strengthens until 1935 and relaxes from then on, although there is no sharp decline in the mid-1980s that allows us to think of a break around 1983, as occurred when using the monetary base. With the LAPS the decline is delayed until the 1990s, the difference fitting in perfectly with the changes introduced in the financing of Spanish deficits, precisely in 1983, when, from being directly covered by credits from the Bank to the Treasury, they started to be covered mainly through the issue of very liquid assets. What matters is that, in practice, these very liquid Treasury bonds, working as money, constituted the most expansionary component of LAPS until 1989. This fact could explain why, despite the enlargement of financial markets, the econometric link between budget and money remains until late 1980s, when considering the LAPS instead of the monetary base. The end of interferences only arrived in the 1990s when an autonomous Bank of Spain, conveniently supported by the alleviation of deficits, showed itself capable of imposing monetary control and reducing Spanish inflation to low single digits for the first time in decades.

In this sense, our results are also in accordance with the findings of previous studies for the second half of the XXth century, in that the link between fiscal and monetary variables is stronger for countries with high inflation rates. We find that the causality link from budget to monetary base in the sub-period 1935-1983 does not disappear until the sub-period 1984-1998 when, after a decade of high two-digit levels, Spanish inflation returned to low one-digit levels. This correspondence between the strength of the link and the level of inflation appears even clearer when, instead of the

monetary base, we consider the LAPS. In this case, we extend the sub-period of fiscal interferences until the year 1990, which makes the corresponding inflation rate even lower. To sum up, the same way that in panel studies different groups of countries exhibit a link between deficits and prices or not depending on their levels of development and inflation, the Spanish case serves to illustrate how, for a single country, the link between fiscal and monetary variables also changes with its different levels of financial development and inflation.

The rest of the paper is organised as follows. In Section 2, we briefly introduce the theory of *fiscal dominance* and the econometric methodology used in testing this theory for the Spanish case. In Section 3, we present the econometric results of analysing the link between the fiscal and monetary variables and try to match these results with the Spanish narrative on monetary history. Finally, in Section 4, we conclude.

2. *Fiscal dominance*. Hypothesis and testing methodology

The concept of *fiscal dominance*, as the term itself suggests, refers to a scenario where monetary policy is driven by fiscal policy. According to King and Plosser (1985), the potential influence of fiscal on monetary policy starts with the t single-period budget constraint:

$$[1]$$

where D_t is the stock of public debt in year t ; r is the nominal interest rate; GNF_t , the non-financial public spending; T_t the taxes collected in year t and Z_t the funds transferred by the central bank to the Treasury, in other words, the *seigniorage*.

By dividing all the variables in [1] by the product of real income Y_t and the price level P_t , and solving forward³, we obtain:

$$[2]$$

where the lower-case letters indicate that the variables are divided by the nominal income and $1 + r_t$ denotes one plus the real income growth divided by one plus the real interest rate. Equation [2] expresses the intertemporal sustainability of budget constraint.

To introduce the role played by the monetary policy in this constraint, King and Plosser (1985) consider the t single-period behaviour of the central bank:

$$[3]$$

where F_t is the stock of assets held by the central bank in year t and MB is the monetary base. By transforming these variables in the same way as those of the single-period budget constraint and substituting z in [2], the consolidated intertemporal budget constraint is obtained:

$$[4]$$

where $\Delta mb_{t+j} = mb_{t+j} - mb_{t+j-1}$.

Given this constraint, fiscal policy is said to be dominant when the fiscal authorities autonomously fix the path of spending, taxation and debt, leaving the monetary authorities to decide only about the rhythm of money creation revenues to satisfy this intertemporal budget constraint. Thus, as the authors themselves point out, under a regime of *fiscal dominance*, the theoretical nexus is between deficits and the present value of the revenue from *seigniorage*. In other words, the hypothesis of *fiscal*

³ The real interest rate being $R_{t-1} = P_{t-1}(1+r_{t-1})/P_t - 1$.

dominance requires the existence of a dynamic causal link from deficits (contemporaneous or previous) to money creation⁴.

As we said, the aim of the present paper is to test for the existence of a dynamic causal link between a fiscal (budget) and a monetary variable (monetary base and LAPS). The first step will be to study the order of integration of these series by applying the ADF tests of Dickey and Fuller (1981), the PP of Phillips-Perron (1988) and the MZ-GLS of Perron and Ng (1998) and Ng and Perron (2001), to detect the presence of unit roots. As a complement, the KPSS test of stationarity of Kwiatkowski *et al.* (1992) will be also applied. If the results confirm that all the series, budget, changes in the monetary base and changes in LAPS are $I(0)$, a stationary VAR will be used to study the relationship between budget and each measure of money.

In a general form, a p-order VAR can be expressed as:

[5]

where D_t is a vector of k endogenous variables and D_t may include the deterministic components, intercept, trend or dummy interventions. In our case, we have two variables (k=2) and will use the following specification:

[6]

[7]

⁴ As King and Plosser (1985) themselves suggest, one possibility for this link to exist is the well-known case modelled by Sargent and Wallace (1981) where fiscal authorities autonomously fix deficits that, in a framework of monetary restrictions, are initially financed via debt. Even then, the deficits end up causing money creation if, due to monetary control, the increasing interest rate of bonds exceeds the rate of growth of the economy. Once the placement of bonds reaches its limit in terms of the size of the economy, there would be no alternative but to cope with the financial costs of debt via *seigniorage*.

We can test for causality between Y_1 and Y_2 in the sense of Granger (1969, 1988) according to which Y_2 is not causing Y_1 if all lagged values of Y_2 are zero in [6], and Y_1 is not causing Y_2 if all its lagged values are zero in [7]. In practice, we will test for the null of non-causality by applying a Likelihood Ratio test (LR), that is to say, by making

in [6] and in [7].

We will do this after ensuring the correct specification of the model and the selected order of the VAR. Moreover, we can complete the causal analysis by computing the Forecast Error Variance Decomposition (FEVD) and estimating the Impulse-Response Functions (IRF), both very suitable tools to analyse the causality pattern in a VAR system (Lütkepohl, 1991).

Finally, once the causal relationship has been examined for the whole period 1874-1998, we can apply the methodology of Bai and Perron (BP) (1998, 2003a, b) to test for the presence of structural breaks in the causality relation between budget and money. Based on the principle of global minimizers of the sum of squared residuals, the BP methodology looks for multiple structural breaks, consistently determining the number of break points over all possible partitions as well as their location. They consider m breaks ($m+1$ regimes) in a general model of the type:

$$[8]$$

where y_t is the dependent variable; x_t ($px1$) and z_t ($qx1$) are vectors of independent variables of which the first is univariate and the other can change, β and δ_j ($j=1, \dots, m+1$) are the corresponding vectors of coefficients and $T_1, \dots, T_m$ are the break points treated endogenously in the model.

Using this method, Bai and Perron (1998) suggest carrying out three types of tests. The first one, $\sup F_T(k)$, tests the null hypothesis that there are no breaks ($m=0$) against the alternative that there are $m=k$ breaks. The second one, $\sup F_T(l+1/l)$, tests the null

$m=l$ against the alternative $m=l+1$. Finally, the so-called ‘double maximums’ tests, UDmax and WDmax, test the null of the non-existence of structural breaks against the alternative of an unknown number of breaks. Following their own proposal, we will use a double procedure to select the number of breaks: the SBIC information criterion and a sequential method based on the application of $\sup F_T(l+1/l)$. If breaks are found, it means that the nature of the link has changed over time and we will repeat the analysis of causality for each of the sub-periods identified, trying to relate the results with our knowledge of fiscal and monetary policies.

However, the methodology summarized above serves only for stationary variables. If the fiscal and monetary variables under study are not of the same order, we should apply, as Pesaran *et al.* (2001) suggest, the bounds testing ARDL procedure to test for the existence of a long-run relationship in models including both $I(0)$ and $I(1)$ variables, or variables of an undetermined order of integration (maximum $I(1)$). These authors use a conditional ECM to estimate the following relationship by least squares:

$$[9]$$

where D is a vector of deterministic terms; Z includes lags of the monetary (dm) and fiscal (db) variables, and α_1 and α_2 are the long-run multipliers for these variables, respectively; β_1 represents the short-run dynamic coefficients and δ the contemporaneous correlation with db . The authors propose a joint test on the long-run coefficients of the forcing variables, where the null hypothesis is the non-existence of a long-run relationship between the considered variables, that is, $H_0: \pi_1 = \pi_2 = 0$ in [10] against the alternative $H_1: \pi_1 \neq 0$ or $\pi_2 \neq 0$. What is special here is that the test, as it is not certain whether the integration order of the series is $I(0)$ or $I(1)$, works with two sets of critical values, one for each extreme case, namely, “all the variables are $I(0)$ ” and “all

the variables are $I(1)$ ". Thus, if the resulting statistic lies outside the upperlimit of the critical values bound, the null hypothesis will be rejected. If it lies below the lowerlimit it cannot be rejected. If evidence is found in favour of the existence of a long-run relationship between the fiscal and monetary variables, the next step will be to estimate its defining parameter.

The ARDL approach discussed in Pesaran and Shin (1999) consistently estimates the levels effects and short-run dynamics of the relation $b-dm$ by OLS, obtaining the long-run coefficients no matter whether the regressors are $I(0)$ or $I(1)$. For example, in the case of an ARDL (2,1) model, the equation to estimate will be the following:

$$[10]$$

where the deterministic variable w_{it} can include a constant and different dummies, and the long-run parameter to study would be . To select the order of the ARDL model the SBIC criterion is suggested.

As regards causality, we will use the "lag-augmented VAR" method proposed by Toda and Yamamoto (1995) and Dolado and Lütkepohl (1996), especially useful when there is some uncertainty concerning the order of integration of the series. This approach employs a VAR ($p+1$) model with an order that is one higher than the possible order of integration of the variables (p), and then applies a Wald test only on the coefficients of the first p lags. Finally, if causality from budget to money for the whole period 1874-1998 is established, the changing nature of the link over time can be examined by a recursive analysis of the causal relationship.

3. Matching econometric results with economic narrative

As we said, we want to exam the link between Spanish budget and two monetary variables in the very long run. First, we will examine the link between public budget in relation to nominal GDP [] and the monetary base growth, also in relation to nominal GDP []. Then, we will analyse the link between budged and the LAPS growth []. All of the data are annual and the results of analysing the properties of these three variables are shown in Table 1. According to these results, series b and dmb are $I(0)$, so we can apply a stationary VAR model to study the relationship between them. Nonetheless, the order of integration of the broader monetary aggregate, $dlap$, is more ambiguous. The test points to a stationary series with a deterministic trend but it does not offer a conclusive result in the model with an intercept and no trend. So, to study the relation between b and $dlap$, it is more suitable to use the aforementioned bounds testing-ARDL procedure proposed in Pesaran, Shin and Smith (2001) and Pesaran and Shin (1999).

To start with, in Table 2 we present the results of estimating the link between budget and changes in the monetary base carrying out a Granger (1969, 1988) causality analysis based on a stationary VAR model. There is a strong Granger causality (at the 1% level of significance) from budget to changes in the monetary base⁵. On the other hand, high-powered money growth never causes the budget. This result is supported by computing the Forecast Error Variance Decomposition (FEVD), whose evolution

⁵ The series of Spanish budget requires the inclusion of three dummy variables. The first one covers the Spanish war years against Cuba and USA ($dCuba$ 1896-1898) due to our ignorance of the real deficit in the period. Two more dummies ($dmor1$ 1909-11 and $dmor2$ 1921-22) are included to remove atypical fluctuations in deficit caused by the conflicts with Morocco. Finally, the dummy $d90$ removes the impact of an outlier in the dmb series due to the restrictions imposed by the government on private sector credit.

(Figures 1 and 2) shows the non-influence of innovations in money on the budget, at the same time as it shows that nearly 15% of the forecast error variance of the monetary base is due to fiscal shocks⁶. This fact is consistent with the hypothesis that money has behaved endogenously to fiscal policy in the long run, which is also supported by the corresponding Impulse-Response Functions (IRF). Orthogonalized (Figures 3 to 6) and generalized IRF (Figures 7 and 8) show that the negative impact of a shock in budget on the evolution of the monetary base is stronger, and longer-lasting, than the impact of money on the dynamics of budget (Figures 5 to 7), the latter being non-significant at the 5% level (Figure 5) anyway. To sum up, the hypothesis of *fiscal dominance* holds for Spain in the period in which the peseta constituted the country's currency. The next step is to exam whether the intensity of the link from budget to monetary base changed over time. We deal with the problem by applying an analysis of structural breaks.

Given the number of lags (one) selected, the following representation may be considered to test the changes in the causality relationship:

$$[11]$$

where we have taken a maximum number of 5 breaks, in accordance with the sample size $T=124$, and we suppose a trimming $\varepsilon=0.10$. It is a pure structural change model, where all parameters can be different between regimes $p=0$ and $q=3$. The process is allowed to present autocorrelation and heteroskedasticity, while a non-parametric correction has been employed to take these effects into account.

The results of applying the multiple-break tests are presented in Table 3. As we can observe, the $\text{supF}_T(1)$ test is significant at the 5% level and the supF_T for 2, 3, 4 and

⁶ The study of FEVD has also been carried out changing the order of the variables and using the generalized method proposed by Pesaran and Shin (1998). No significant differences have been found. Details can be obtained from the authors upon request.

5 breaks at 1%. However, the $F_T(l+1/l)$ is only significant at a conventional level for $l=2$. The sequential procedure also selects two breaks and the BIC one. As the $\sup F_T(2/1)$, the UDmax and the WDmax tests are all significant, the results, overall, suggest a model with two breaks. The location of these two breaks (around 1934 and 1983) and the estimation for the sub-periods identified by the breaks are displayed at the bottom of Table 3. They suggest a decreasing intensity in the causality relationship (note the absolute value of the negative parameter), as well as a decreasing significance by sub-periods (the last one even becoming non-significant). This finding is confirmed if we apply the Granger causality test again to the three regimes delimited by the break points, modelled as three respective VAR models. The results, as displayed in Table 4, show a very strong unidirectional causality relationship for the first period (1875-1934), that declines in the second (1935-1983) and, finally, becomes non-significant in the third (1984-1998)⁷. In any case, as pointed out before, these results perfectly reflect the narrative on Spanish fiscal and monetary history.

In 1874, when the Bank of Spain was granted the monopoly of note issue, the corresponding Law was explicitly grounded on the necessity of financing deficits. The argument was that, even in a framework of increasing international capital mobility, the risk of Spanish public default made the costs of borrowing high enough to make the government, the domestic market being considered exhausted, grant the monopoly of issue for exchange of financial help⁸. In fact, in exchange for the monopoly, the Bank granted an interest-free loan to the Treasury, also agreed to anticipate money on some tax revenues and started buying bonds from the Treasury. But the bonds in question, that were initially very short-run securities, ended up being successively renewed. As a

⁷ To save space we do not show the FEDV and the IRF figures that corroborate these findings.

⁸ A detailed exam of the Spanish fiscal and monetary policies from 1874 to 1935 in Sabaté *et al.* (2006). For a recent survey of the phases that the internationalisation of financial markets has gone through since the XIXth century, see Obstfeld and Taylor (2003).

consequence, the Bank registered an increasing accumulation of bonds, until by a Law of 1881, all of them were finally exchanged for redeemable Government bonds of a 40-year maturity. In this way, first by purchases of short-run bonds, renewed later into longer-run bonds, the public component of the monetary base expanded continuously, especially when, in the mid-1880s, the Spanish agricultural crisis began to seriously affect tax revenues. Then, the sale of short-run Treasury bonds to the Bank resumed, to the extent that, in 1890, the Spanish authorities decided to double the limit of note issue. In return, the Bank granted the Treasury a new interest-free loan and agreed to continue buying short-run Treasury bonds to finance deficits, which again ended up exchanged, in 1899, for bonds of longer maturity. By then, note circulation had increased, furthermore, through sales to the Bank of Spain of the special Treasury bonds (the so-called *Pagarés de Ultramar*) issued to cover the exceptional spending of the Spanish colonial war in Cuba (1895-1898) and the related war against the United States (1898). Altogether, the ordinary and war bonds held by the Bank tripled between 1895 and 1898, while the monetary base averaged a yearly growth rate of nearly 20%. As reflected in Table 5, the special financial requirements of the overseas war, by expanding the public component of the monetary base, culminated the long period of deficit monetization that ran from 1874 to 1898.

There was a brief respite from 1899 to 1913, when deficits were kept under control thanks to a program of stabilization implemented to overcome the financial effects of the war. The program focussed on cutting debt expenditures, once again, through the exchange of Treasury bonds for perpetual bonds, along with a fifty per cent reduction of the coupons of certain war bonds held by the Bank. The sale of Treasury bonds to the Bank was prohibited and, moreover, surpluses were directed to redeeming part of the public debt held by the Bank. But the fiscal control only lasted until the

Great war, when Spanish deficits deeply worsened. The financial problems of the Treasury were then aggravated as Spanish political instability made it impossible to approve new Government budgets, and tax revenues did not increase sufficiently to meet the inflated spending that the wartime context provoked. In fact, the budget of 1914 remained in force until 1921, when a new one was passed⁹. However, even when normality was restored, taxes were unable to finance the spending on infrastructures of the 1920s. The inability of the Spanish authorities to reform the fiscal system by promoting taxes on personal income in order to face the increasing financial needs of the Treasury was present throughout the sub-period 1914-1935 (Fuentes-Quintana, 1961; Comín, 1988). In fact, the monetization of deficits and the consequent separation of domestic from foreign prices are seen as the channel that Spain used to avoid the tax reform necessary to make the fiscal system more flexible and sufficient (Martín-Aceña, 1985a), which, in turn, prevented the country from joining the gold standard. This non-adherence, given that it did not provide a *seal of approval* (Bordo and Rockoff, 1996) for domestic debt, contributed to the Spanish isolation from international capital markets (Martín-Aceña, 1981)¹⁰.

Thus, for the sub-period 1814-1935, financing needs drove the Treasury once again towards the central bank. However, the scheme used had to be different because, as just mentioned, the Treasury had been banned from selling bonds to the Bank of Spain. The new procedure began working in 1917 and consisted of selling Treasury and Government bonds to private buyers, basically private banks, with the added feature that these bonds could be automatically pledged at the Bank of Spain at a lower interest

⁹ In those years, the Spanish Government changed Prime and Treasury Ministers around twenty times.

¹⁰ Once *seigniorage* started, isolation from international capital markets was the cost Spain had to pay, according to Martín-Aceña (1981). Among the benefits of not joining the gold standard, Gadea and Sabaté (2004) show how the floating regime helped a peripheral country like Spain, with a very erratic agricultural trade balance, to smooth out the external balance of payment adjustment process.

rate than the yield on bonds received by the subscribers. Therefore, as some authors remarked (Flores, 1929; Olariaga, 1933), there was an immediate profit in buying these bonds just to pledge them at a lower rate than their yield, which made the procedure a new privileged financing channel for the Treasury. The only difference was that, from 1917 on, the deficits were not monetized through the sales of Treasury bonds to the Bank, but through loans to the private sector against the pledging of those bonds. In this way the link between the Treasury and the Bank of Spain supposedly continued until 1935, even if, in accounting terms, as shown in Table 5, the contribution of the public component to the growth of the monetary base disappeared.

This explain the relevance of the influence uncovered in the pages above, when the causal link from budget to monetary base is econometrically confirmed for the sub-period 1874-1934. The link reflects the insufficiency of the tax system and the absence of a financial market deep enough to give the Spanish Treasury as much latitude to manage intertemporal fiscal constraint, as the markets supposedly did in the so-called core countries, like Britain or the USA, for which no link between fiscal and monetary variables has been found in those years (Joines, 1985; Barro, 1987). As we have said, this is a finding that fits in perfectly with the typology of Catão and Terrones (2005), according to which fiscal deficits are especially inflationary in non-institutionally developed countries.

With regard to the second sub-period, 1935-1983, the maintenance of causality from budget to monetary base is equally consistent with the Spanish monetary literature. For the years of Franco's autarky, 1939-1959, there is general agreement about the insufficiency of revenues of a system that continued to be based on indirect taxes and

tolerated a high degree of fraud¹¹. Spain did not participate in the recovery of the international capital market that slowly followed the end of the WWII , so that, given the reduced domestic market, the deficits continued to be financed mainly according to the previous scheme. We refer to the issuing of Treasury bonds with a privileged discount clause, which again were quickly discounted in the Bank of Spain (Poveda, 1972). Besides, in those years, the link between the Treasury and the Bank was simultaneously reinforced through the overdraft account, as is reflected in Table 5 in the direct contribution of the public sector to the growth of the monetary base. Therefore, pledging plus overdrafts supposedly governed the path of money until 1959.

That year, the Plan of Stabilization and Liberalization put an end to the Spanish autarky (Fuentes-Quintana, 1984; Barciela *et al.*, 2001). Apart from removing the constraining system of quotas that regulated the country's foreign trade, the plan forbade the issue of public bonds with a privileged clause of pledging in the Bank and imposed monetary and fiscal controls. As a consequence, deficit burden was reduced noticeably for some years, while the foreign sector, as shown in Table 5, by reflecting the process of Spanish external openness, dominated the growth of the monetary base. The public component did not recover leadership until the 1970s, when it started to reflect the loans obtained by the government from the Bank of Spain to cover the high deficits resulting from the coincidence of the Spanish democratic transition, initiated in 1975, with the two oil crises and the corresponding increase of social and economic expenses. In the late 1970s, as a part of the transition program, the tax system was deeply reformed with the introduction of a new personal income tax, but even if

¹¹ For the Spanish monetary history during Franco's autarky see Sardá (1970) and González (1979). Fiscal and monetary decisions during the 1960s are treated in Poveda (1972). For the 1970s and early 1980s, we suggest Rojo and Pérez (1977) and Aríztegui (1988, 1990). An overall view of fiscal and monetary policies implemented in Spain from the democratic transition to the joining to the EMU is to be found in Malo de Molina (1997).

revenues increased spectacularly, this increase was not sufficient to equal that of expenses. This explains the relevance of deficits and credits to finance them. From 1977 to 1982, these credits grew from accounting for 25 to 55% of the total value of the assets held by the Bank (Domingez, 1990), which meant that a little over 80% of deficit was immediately monetized (Ortega, 1984). These credits came to an end in 1983, precisely the year for which the econometric analysis identifies a second break in the relation of causality from budget to monetary base. From that year onwards, following official declarations of wanting to improve inflation control, deficits were mainly financed through the issue of Treasury bonds which, in tune with these declarations, did not incorporate any clause for privileged pledging. Therefore, the disappearance of the link between the budget and the monetary base or, in other words, the ending of *seigniorage* in the period 1983-1998, can no doubt be related to the enlargement of financial markets, both domestic and foreign, in which to place the new Treasury bonds. However, the ending of *seigniorage* did not mean the end of fiscal interference in the monetary field, as can be seen if we analyse the link between budget and money by considering, instead of the monetary base, a broader monetary aggregate, the LAPS.

In the early 1980s, in a context of financial liberalization, the proliferation of very short-run assets led the Bank of Spain to take LAPS as the variable representative of the quantity of money. This meant that the monetary objectives changed from being fixed in terms of monetary base and M3 (effective plus deposits) to being fixed in terms of LAPS (M3 plus Other Liquid Assets, OLA). The relevance of the process of innovation we are referring to is shown in Figure 9, where it can be seen how the growth of OLA remained clearly higher than that of M3 in the 1980s. More importantly, from 1983 onwards, a substantial part of Spanish deficits was financed through the issue of very liquid public assets. In fact, these public assets constituted, until 1989, the most

expansionary component of OLA. The last column in Table 6 shows the contribution of the Treasury bonds to their growth. So, even if the break of 1983 can be accepted as the ending of *seigniorage* (that is, the financing of deficits via monetary base), this year is not considered as the ending of Spanish fiscal interference in the monetary field. This idea is confirmed when investigating the relationship between budget and the growth of LAPS, which given that the latter does not seem to be $I(0)$ like the budget, requires the use of the aforementioned bounds-testing procedure.

Of the five cases proposed by Pesaran *et al.* (2001) we only consider the cases I (no intercept and no trend), II (restricted intercept and no trend) and III (unrestricted intercept and no trend)¹². The results are shown in Table 7 and point to a very clear long-run relationship between the two variables (b and $dlap$) during the full sample. The bound tests are very conclusive and the null hypothesis that there is no level relationship is rejected at the 5% level (no matter whether the regressors are purely $I(1)$, purely $I(0)$ or mutually cointegrated). This finding is even stronger when the F-bounds test is applied in the models with an intercept. Consistently, the latter (and especially model II) are selected as the most suitable.

With respect to defining the parameters of the relationship between budget and the growth of LAPS, results are displayed in Table 8 for the full sample and some sub-periods of interest. Consistently with what was seen in the case of the monetary base, we can observe that the parameter $\hat{\theta}$ is significant at the 1% level in the sub-period 1874-1935, for which it has a high value of 3.56 with the expected negative sign. Its significance decreases to the 5% level when we enlarge the sample to 1983, its value

¹² The other two cases in Pesaran *et al.* (2001) are IV: unrestricted intercept and restricted trend and V: unrestricted intercept and unrestricted trend. The inclusion of a trend in the ECM would imply a quadratic trend in the level dependent variables, which is not very plausible in the case of the growth of monetary aggregate $dlap$. All the cases can be tested with F statistics and cases I, III and V with the Wald t statistic, as well. Critical values are tabulated in Pesaran *et al.* (2001).

also falling in coherence with what we found in the monetary base analysis. However, if we enlarge the coverage until 1989, to include the years of strongest issuing of public liquid assets, the significance remains almost unchanged, even increasing slightly, unlike what happened to the link between budget and monetary base, broken in 1983. Here, there is no perceptible weakening in the relation until we add the 1990s to the sample. Then, for the whole period 1874-1998, the value of the parameter falls, though still rejecting the null hypothesis of non-significance at around the 10% level.

As regards causality, the results offered in Table 9 confirm the existence of a very strong causality from budget to LAPS growth, while the influence in the opposite direction is not acceptable at conventional levels of significance. Nonetheless, although this relation is firmly corroborated for the overall period, the Wald statistics fluctuate when recursively computing causality for selected years. According to the results obtained, the strongest negative unidirectional causality from budget to LAPS appears again for the years 1874-1935, decreases when we expand to 1983, but remains unaltered if we enlarge to 1989, not decreasing until the inclusion of the 1990s. Interestingly, the stable causality relation between budget and LAPS growth when the sample period is enlarged to 1989, suggests that a break analysis would have not selected 1983 as a structural change point in the relation, as occurred with the monetary base. This is why we say that 1983 can be considered a key year for defining the end of *seigniorage* in Spain, but not as the end of fiscal interference in the monetary field.

The end of interference did not arrive until the 1990s, when the noticeable expansion of investment funds strongly reactivated the demand for long-run bonds, which, unlike the short-run Treasury bonds mainly used throughout the 1980s to finance deficits, did not inflate the LAPS (Marín and Peñalosa, 1997). More importantly, the signing of the Treaty of Maastricht in 1992 meant the country had to accomplish the convergence

criteria required to join the EMU. As is well known, one of them was the reduction of domestic inflation rates to less than 1.5 % above the rate averaged by the three least inflationary European Union countries. To join the EMU, countries also had to achieve ratios of deficit and debt over domestic GDP of under 3% and 60%, respectively. The idea was that only by reducing fiscal financing pressures could the legal independence of central banks imposed by the Treaty become effective, and, in this way, monetary control be achieved. In the case of Spain, the central bank obtained its legal independence through a Law of 1994 and, from then on, advances in the reduction of deficits seemed to contribute to making it functional (Canzoneri and Diba, 1997). As a result, Spain was able to accomplished the requirement to reduce the inflation to under 3% and entered the EMU. Coherently with this achievement, the significance of the defining parameter and the long-run causality relationship found in this paper between budget and LAPS for the whole period 1874-1998, weaken when the 1990s are included in our estimation.

With respect to the low single digit inflation levels of the last years of the sample, it is worth pointing out that the finding fits in perfectly with the results of previous studies for the second half of the XXth century, according to which the influence of deficits on monetary variables appears clearer for countries with high inflation rates. For Spain, during the sub-period 1935-1983, the existence of causality from budget to monetary base corresponds to an average rate of inflation of 10.5%, substantially above the rate averaged in the following sub-period 1984-1998, when there is no causality and the rate of inflation averaged 6.1%. The association appears even clearer when, instead of the monetary base, we consider the LAPS. If we accept the 1990s as the end of fiscal interference in the monetary field, the annual level of inflation corresponding to the last sub-period is reduced to 4.7%.

4. Conclusions

The Treaty of Maastricht in 1992 imposed the cutting of deficits and debt on the countries that intended to constitute the EMU. Behind the measure was the agreement that fiscal policy could interfere with monetary policy, preventing some countries from controlling inflation and fixing the exchange rate against the euro. However, by then, the idea that sustained deficits necessarily provoked inflation, although widely accepted in theory, was far from being so widely supported by empirical work. One reason for this difficulty in uncovering the relation between fiscal and monetary variables has been recently related to the bias in favour of advanced and historically low-inflation countries in the sample selection. In fact, when panel studies enlarge the sample to include developing countries, results have proved much more successful in uncovering the link. The association between the strength of this link and the level of development is a finding that the present paper confirms by considering the changes experienced by a single country in the very long run, the case of Spain over 1874-1998.

We apply a VAR to model the relationship between budget and monetary base and find the existence of a dynamic and causal link from the first to the second variable for the overall period 1874-1998. But, more importantly, we find that the link weakens as time goes by. There is a very strong unidirectional causality relationship for the sub-period 1874-1934, whose significance relaxes in the sub-period 1935-1983 and, finally, becomes non-significant for the sub-period 1984-1998. With regard to the relevance of *seigniorage* for the first sub-period, we relate it to the insufficiency of the tax system and the absence of a deep financial market, typical of peripheral countries like the Spain of the time, for which access to the core financial markets was not easy. In similar terms, we explain the maintenance of *seigniorage* in the second sub-period. The fiscal

insufficiency and fraud present for most of this sub-period, along with the lack of a developed domestic financial market and the severe difficulties in accessing a foreign market much less open than in the previous sub-period, are behind the continuing influence of budget on the monetary base. Finally, the absence of causality for the third sub-period is fully consistent with the government's stated intention in 1983, to limit the Treasury's direct access to the Bank, an intention that was only feasible because of the enlargement of the financial markets, both domestic and foreign.

However, the initial predominance of very liquid assets to finance Spanish deficits meant that the end of *seigniorage* did not bring about the end of fiscal interference in the monetary field. As shown by applying the bounds test ARDL procedure to model the relation between the budget and the LAPS, the decline of the influence of deficits on the monetary variable was delayed until the 1990s when, following the approval of the Law of autonomy, the Bank of Spain was able to impose monetary control and brought down inflation to low single digits. Paradoxically enough, the success in beating *fiscal dominance* and allowing the country to enter the EMU, meant that the Bank of Spain lost its recently gained monetary autonomy forever.

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Table 1. *Unit root and stationarity tests*

With constant and trend	ADF	PP	MZ _t -GLS	KPSS ()
<i>dmb</i>	-5.48**	-9.24**	-4.29**	0.11
<i>dlap</i>	-5.58**	-5.48**	-4.37**	0.13
<i>b</i>	-3.22	-4.05**	-3.29*	0.07
With constant	ADF	PP	MZ _t -GLS	KPSS ()
<i>dmb</i>	-5.13**	-8.83**	-3.26**	0.59*
	<i>dlap</i>	-3.09*	-4.24**	-2.45*
0.97**		<i>b</i>	-3.05*	-3.67**
-3.11**	0.33			

Notes: Critical values for ADF and PP test in McKinnon (1996). The number of lags of ADF and MZ_t-GLS have been selected in accordance with the method of Ng and Perron (1995) and with the SBIC criterion, respectively. In the PP test, Bartlett's window has been used as a kernel estimator, choosing the bandwidth in the PP and KPSS tests by Newey and West method (1994).

* Significant at the 5% level.

** Significant at the 1% level.

Sources: The monetary base series was reconstructed with data coming from Anes (1974 a,b,c), Martín Aceña (1985b, 1988), *Series Históricas* of the Bank of Spain (1982) and *Boletines Estadísticos* of the Bank of Spain (several years). The LAPS series from *Series Históricas* (1982) and *Boletines Estadísticos* of the Bank of Spain (several years). Government budget and GNP series in Comín and Díaz (2006) and Prados (2003).

Table 2. *Causality relationship and contemporaneous correlation between monetary base changes *dmb* and budget *b* (1874-1998)*

Causality	$b_{t-1} \rightarrow dmb_t$ 12.41 (0.000)	$dmb_{t-1} \rightarrow b_t$ 1.76 (0.185)
Contemporaneous correlation <i>dmb</i>	<i>b</i> 0.69	

Notes: The table shows the LR test to test for causality in the Granger sense; p-value in brackets. The number of lags in the VAR models (1) are selected in accordance with SBIC and AIC criteria. Moreover, we check autocorrelations, heteroskedasticity and normality in the residuals. The contemporaneous correlation has been tested by a log-likelihood ratio statistic, where the null hypothesis is contemporaneous no-correlation, and LL_u and LL_R are the log-likelihood functions under H_1 and H_0 . Under the null, its distribution is a χ^2 of 2 degrees of freedom (critical value of 5.99 at 5% level). The exclusion of the four dummy variables has been tested by a LR test.

Table 3. **Multiple structural breaks in the causality relation between budget b and changes in monetary base dmb (Bai-Perron methodology)**

Specifications:					
	$q=3$	$p=0$	$\varepsilon=0.10$	$m=5$	
SupF _T → no breaks $m=0$ versus $m=k$ breaks:	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
	17.84*	20.34**	16.47**	16.53**	16.50**
No breaks versus undetermined number of breaks:		UDmax		20.34**	
		WDmax		23.57**	
SupF _T ($l+1/l$) → l breaks versus $l+1$ breaks:	$l=1$	$l=2$	$l=3$	$l=4$	
	16.26*	13.22	11.61	4.15	
Number of breaks selected:		2			
Sequential method		2			
SBIC criterion		1			
Estimation with <i>two</i> breaks:					
	1874-1934	0.02	0.10	-0.55	
		(0.993)	(0.345)	(0.000)	
	1935-1983	0.01	0.18	-0.10	
		(0.000)	(0.153)	(0.069)	
	1984-1998	-0.02	-0.22	-0.84	
		(0.579)	(0.447)	(0.265)	
Break points and confidence intervals:					
		1934		1983	
		(1925, 1944)		(1976, 1984)	

Notes: Changes in the pure structural model are tested selecting a trimming $\varepsilon=0.10$ and a maximum number of 5 structural breaks. Serial correlations in the errors is allowed. The consistent covariance matrix is constructed using the Andrews (1991) method. The first subperiod estimation results include the dummy variables *dcuba*, *dmor1* and *dmor2*.

*, **: Significant at 5% and 1% level respectively; p-values in brackets. Critical values appear tabulated in Bai and Perron (1998).

Table 4. *Causality relationship and contemporaneous correlation between monetary base changes dmb and budget b for different periods*

Causality 1874-1934	$b_{t-1} \rightarrow dmb_t$	$dmb_{t-1} \rightarrow b_t$
	15.47 (0.000)	1.50 (0.221)
1935-1983	3.56 (0.059)	2.24 (0.134)
1984-1998	0.00 (0.987)	0.33 (0.567)
Contemporaneous correlation dmb	b	
1874-1934	3.18	
1935-1983	1.44	
1984-1998	1.16	

Notes: See Table 2.

Table 5. *Monetary base and components*

	Sectorial contributions to MB growth (%)				Rates of growth (%)			
	$c(for)$	$c(pub)$	$c(priv)$	$c(other)$	MB	$LAPS$	B/GDP	$Deflator$
1875-1935	1,13	0,66	1,39	-0,37	2,81	3,92	-0,80	1,10
1875-1898	0,58	3,47	0,32	-1,38	2,98	3,17	-0,35	-0,30
1899-1913	0,44	-3,37	2,07	0,71	-0,15	0,80	0,31	0,68
1914-1935	2,22	0,34	2,09		4,65	6,86	-2,04	2,90
1936-1983	4,79	5,86	2,37	0,45	13,46	16,20	-1,5	10,49
(1936-1989)	5,66	4,56	3,96	0,41	14,60	15,90	-1,78	10,24
1936-1959	-0,36	3,34	7,88	-0,09	10,77	13,39	-2,13	10,52
1960-1971	9,84	1,08	2,64	0,17	13,73	18,12	-0,06	5,78
1972-1983	7,47	14,41	-6,17	1,54	17,24	18,48	-1,80	15,14
(1972-1989)	8,91	8,08	0,93	1,08	19,00	16,92	-2,57	12,82
1984-1998	9,42	-6,11	8,80	-1,95	10,16	9,93	-3,79	6,11
(1990-1998)	7,84	-7,14	4,58	-3,36	1,92	7,50	-3,57	4,73

Notes: $c(for)$ denotes the foreign sector contribution to monetary base growth, $c(pub)$ the public sector contribution and $c(priv)$ the private sector contribution. The three of them are calculated as the sectorial component growth in relation to the monetary base, that is,

The $c(others)$ contribution emerges as the difference between the monetary base and the sum of foreign, public and private sectorial contributions.

The columns of sectorial contributions, MB and $LAPS$ growth for the periods including the Spanish Civil War (1936-1983, 1936-1959 and 1936-1989) are calculated with 1941-1983, 1941-1959 and 1941-1989 data, respectively.

Table 6. *Treasury debt*

	million <i>pesetas</i>	Contribution to <i>OLA</i> growth
1982	24,100	11,61%
1983	291,900	54,57%
1984	703,200	55,54%
1985	1,443,300	90,54%
1986	3,404,100	166,80%
1987	4,014,300	31,07%
1988	5,096,600	35,60%
1989	6,373,900	35,80%
1990	7,358,900	22,82%

Notes: Contribution to *OLA* growth calculated as $\frac{X}{Y}$, being X = *Treasury bonds* and Y = *OLA*.

Sources: *Boletines Estadísticos* (several years), Bank of Spain.

Table 7. *Bounds tests for level relationship between public budget b and LAPS growth dlap (Pesaran, Shin and Smith (2001) methodology)*

	With intercept			Without intercept	
	F_{II}	F_{III}	t_{III}	F_I	t_I
1874-1998	9.49 ^c	9.48 ^c	-3.06 ^b	4.96 ^c -2.21	^b

Notes: ^b indicates that the statistic falls within the bounds at the 5% level of significance and ^c indicates that it lies above the upper bound at 5% level. Critical values in Pesaran *et al.* (2001). Information criteria, both AIC and SBIC, selected a lag length of 1 starting with a maximum of 4.

Table 8. *Long-run estimation of the relationship between budget b and LAPS growth dm (ARDL approach by Pesaran and Shin (1999))*

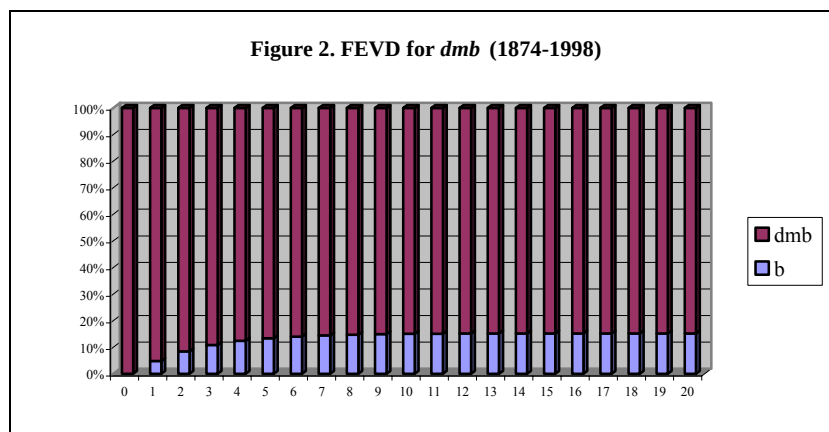
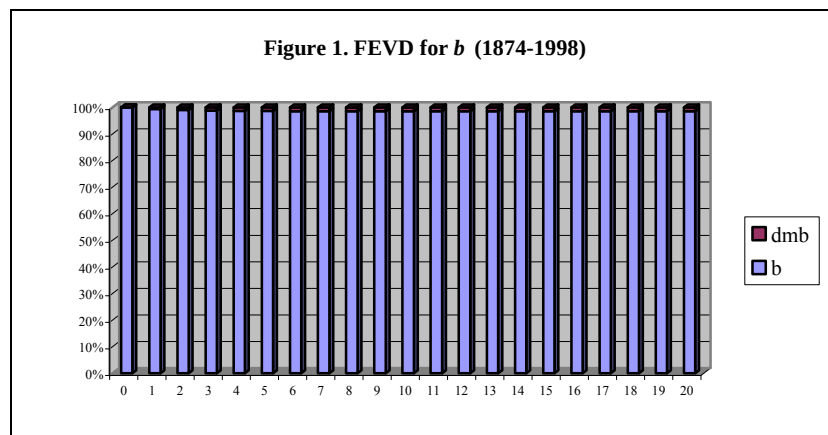
	$\hat{\theta}$	c	$dcuba$	$dmor1$	$dmor2$	ARDLmodel
1874-1934	-3.56 (0.000)	0.00 (0.751)	0.13 (0.000)	0.03 (0.317)	-0.10 (0.249)	(4,2)
1874-1983	-2.92 (0.048)	0.05 (0.083)	0.43 (0.044)	0.05 (0.729)	-0.27 (0.163)	(2,1)
1874-1989	-2.50 (0.047)	0.05 (0.060)	0.42 (0.038)	0.05 (0.733)	-0.25 (0.167)	(2,1)
1874-1998	-2.06 (0.081)	0.05 (0.100)	0.44 (0.037)	0.06 (0.679)	-0.24 (0.202)	(2,1)

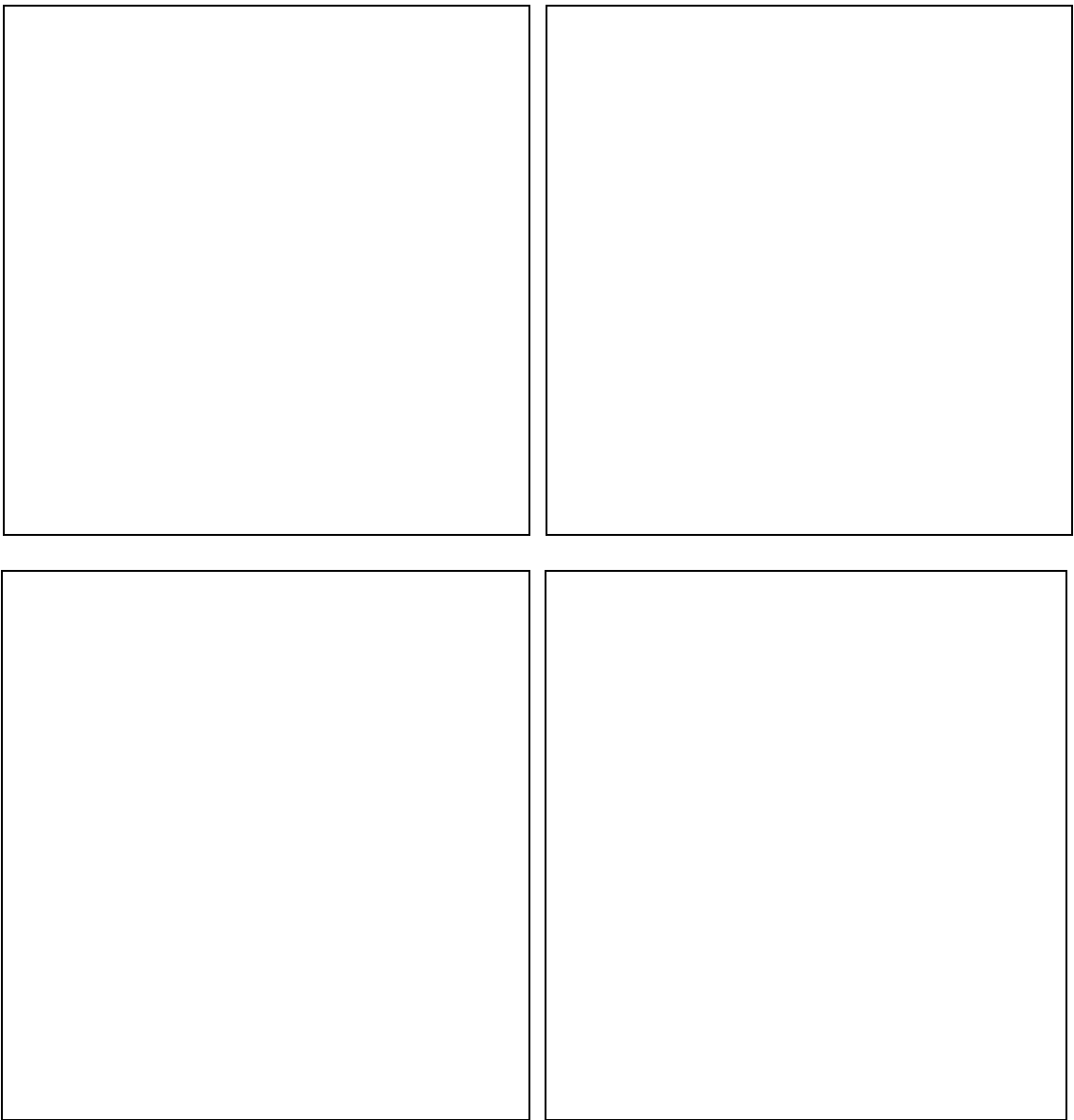
Notes: *p-values* in brackets. SBIC criterion selects the orders of the ARDL model.

Table 9. *Causality relationships between public budget b and LAPS growth dlap*

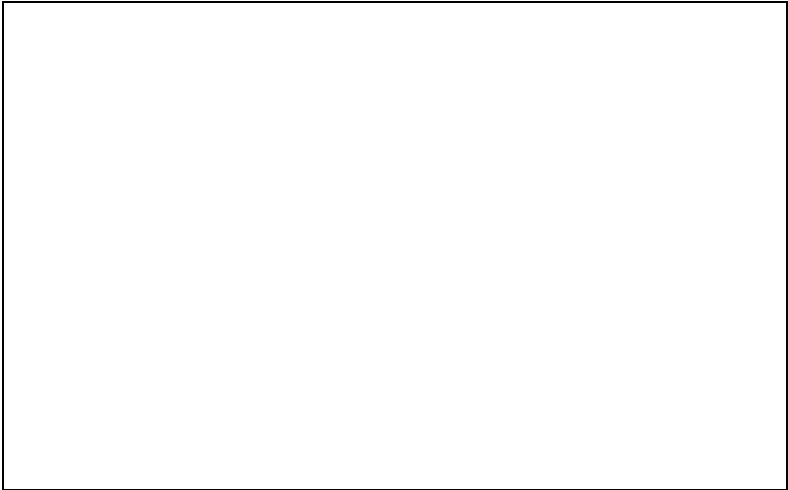
	$b_{t-1} \rightarrow dlap_t$	$dlap_{t-1} \rightarrow b_t$
1874-1998	10.07 (0.002)	2.45 (0.118)
1874-1934	18.33 (0.000)	1.01 (0.315)
1874-1983	10.55 (0.001)	2.40 (0.121)
1874-1989	10.51 (0.001)	2.57 (0.109)

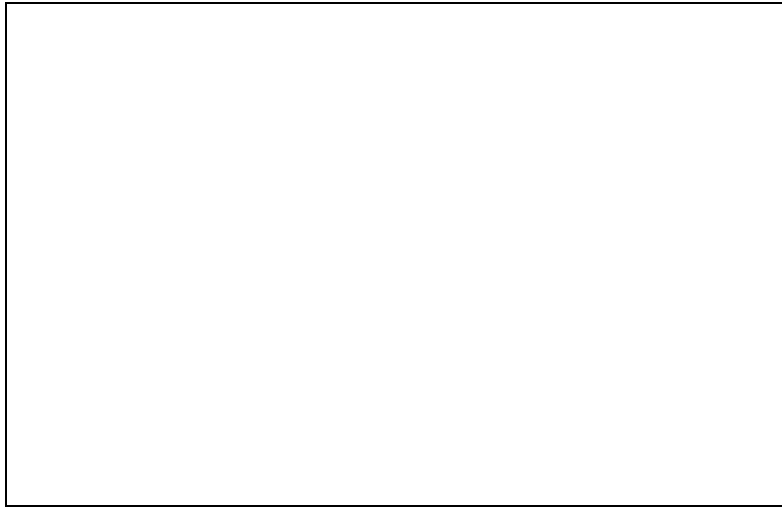
Notes: We applied the Wald test suggested in Dolado and Lütkepohl (1996) in a VAR (2) model. The deterministic component of the model includes the dummy variables *dcuba*, *dmor1* and *dmor2*.





Notes: Discontinuous lines represent upper and lower bounds of the IRF confidence interval at the 85% level of significance. Thicker continuous lines are the IRF of the corresponding variable when the other suffers a unitary shock. The same scale is maintained to allow comparisons.





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