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## Conference Paper

# The EMU and the Spanish term structure of interest rates

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**“The EMU and the Spanish Term Structure of Interest Rates”**

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***Abstract***

Since the Spanish Government passed the "Central Bank Independence Law", The Sasp Spanish Central Bank, in order to form part of the European Central Bank (ECB) in the future EMU, has recently changed its monetary policy framework. Nowadays the Spanish policy monetary authority has an especific and main duty: :succeed in maintaining the prices under control. From then on, the term structure of interest rates (TSIR) is an important indicator of future inflation as well as a key variable to understand the transmission mechanism of monetary policy. So, the study of the term structure of interest rates has become an especially and lively topic for economists. The growing importance of the TSIR has demanded our attention. The main aim of this work is to analyse if the Spanish TSIR is determined by the foreign term structure.

In order to , the study has structured as follows: in the 1st. section the concept and importance of TS are introduced; in the 2nd. throug a set of indicators, it is demonstrated that the Spanish capital market , engaged in a EMU project, presents a high degree of linking with other capital markets, especially with european capital markets. The 4th. section is devoted to test staisically the hypothesis ,based on the Exogenesi theory, that the Spanish TSIR is determined, in large measure by the German termstructure. Finally, in the last section the main conclusions are presented.

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### I Introduction

The autonomy law of the Banco de España, subscribed in August of 1994, according to the Maastricht Treaty to allow the joining of Spain in the Economic and Monetary Union (EMU) had important consequences for the planning and execution of the monetary policy. Despite the main goal is still the price stability, the two stage based instrumentation (1) has reached an end to follow nowadays a direct control on inflation.

Among the reasons that led this policy design change we can point out the nearly absolute free movements of capitals and the far development of the financial markets. Furthermore, the recognised fact that inflation must not be considered an exclusive monetary phenomenon casts doubts about the success of those monetary policies directed to control the monetary aggregates.

It is under this new legislative framework that the analysis and transmission of the monetary policy has been upgraded. If we take into account that the term structure of the interest rate (TSIR) determines the mechanism of monetary transmission and, consequently, the ability of the Central Banks to influence the macroeconomic variables (2), it is logic that to instrument this new monetary policy scheme it is necessary to interpret and follow a “basket” of indicators among we can find the TSIR (3). This new basket of indicators can be defined as the relationship between the interest rate and their maturity. Its graphic representation is the so-called yield curve.

We have just emphasized that the TSIR is basic for the instrumentation of the monetary policy, in so far it can be considered “*the heart of the transmission of the monetary policy*” (Gourlaouen, 1988). The importance we can derive from its analysis is so obvious that there have been many the papers that have pretended to investigate which were the determinant factors of the TSIR. Thus, we can find the so-named traditional theories: theory of the expectations, theory of the segmentation and theory of the preferred habit(4); They all share the fact that the TSIR exclusively depends on the internal or domestic factors. Nevertheless, the dismantling of the capital controls, along with the developments in telecommunications and financial engineering have contributed to intensify the interconnection among the different markets. Therefore, the markets, which were purely domestic, have gradually internationalised. So the internationalisation of the markets casts doubts about the capability of the traditional theories, so far as we can no think of any economy to work absolutely isolated from the rest of the world economy. In an effort to give an answer to the internationalisation the Theory of the was formulated Exogenesis (Beenstock and LongBotton, 1981). This theory considers that the TSIR of a relatively small country is determined by the term structure of another country.

Given that Spain has not been apart from this international integration process, mainly inside the European context, as we show in section II, we propose in this paper to determine to what extension the gradual process of opening the frontiers has supposed the internalisation of the Spanish TSIR.

The consequences we can draw from this paper are important, specially to design economic policies. Thus, if we conclude that the Spanish TSIR is conditioned by the foreign TSIR, it is easy to defend that the Central Bank will not be able to design a

different monetary policy respect to other countries. Opposite, if we conclude that the TSIR is not determined by the foreign TSIR, it would imply a higher degree of autonomy to design the monetary policy.

## II. Spanish Financial Integration

One of the more obvious characteristics of the Occidental economies and their financial markets is their higher foreign dependence in the last years as a consequence of a gradual drop of the fiscal barriers and the exchange rate controls to the international movements of capitals. Along with telecommunication developments it has caused a strength of the interconnection of the markets.

The Spanish financial system has not been apart from this general process. Despite since the very end of the 70's the first liberalisation measures were launched, it would not be until 1986 with the Single Act when this process would be definitely supported.

Since then the Central Bank and the Central government signed measures to enforce the deregulation of the financial system. The highest point was reached on the first of febreuary of 1992 when the movements of capitals were set free with any country in the world.

In order to show to what extent the Spanish financial market has integrated we can see some indicators(5).

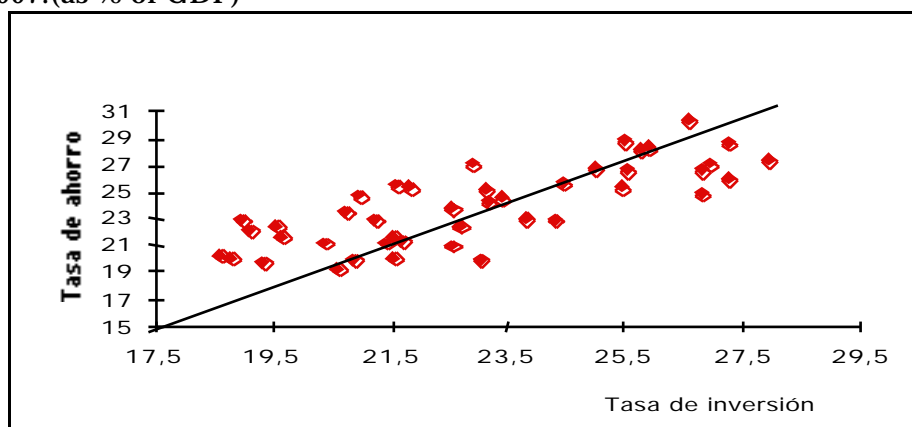
### II.1. Financial integration indicators in Spain

#### II. 1.1. The Feldstein-Horioka Test: The relation between investment and savings

One indicator, proposed by Feldstein and Horioka(1980), consists in analysing the relationship between two key variables for the economy as investment and savings. According to these authors, in a context of perfect mobility of capitals it could be thought that the relationship between national savings and national investment could be weak. The reason is that savings have more possibilities to attend more profitable foreign markets. That is to say, once capital can go abroad, neither domestic savings need not to be invested in the own country, nor domestic investment has to be financed through domestic capitals. Therefore, Feldstein and Horioka postulate that the more integrated a financial system is respect the rest of the world, the weaker the relationship between domestic saving and domestic investment.

A first approach to the degree of integration for the Spanish case is shown in graphic 1, where we highlight the relationship between national saving and national investment for the period 1955-1997

Graphic 1. The relationship between saving and investment in Spain: 1955-1997.(as % of GDP)



Source: National Accounting, INE.

From graphic 1 we observe that the positive relationship between both variables.

In order to determine to what extent the deregulation process has changed the relationship between both variables we run an OLS regression of the type proposed by Feldstein and Horioka (1980) for the period 1955-1997 and shorter periods (1955-1970), (1970-1997), (1970-86) and (1987-1997) (6).

$$(I/Y)_i = \beta_0 + \beta_1 (S/Y)_i + U_i$$

, where I is the national investment, Y the national GDP, S the national saving,  $\beta_0$  and  $\beta_1$  are the parameters and  $U_i$  the error term which we will suppose estochastic.

**Table 1**  
**Results of the regression  $(I/Y)_i = \beta_0 + \beta_1 (S/Y)_i + U_i$**

<b>period</b>	<b>c</b>	<b><math>\beta</math></b>
<b>1955-97</b>	4,244 (1,765)	<b>0,845</b> (8,178)
<b>1955-1970</b>	-1,095 (-0,2837)	<b>1,062</b> (6,714)
<b>1970-97</b>	5,925 (1,897)	<b>0,776</b> (5,615)
<b>1970-86</b>	4,82 (1,187)	<b>0,821</b> (4,757)
<b>1986-97</b>	11,3 (1,23)	<b>0,512</b> (1,933)

(\*) The statistic T-Student is in parenthesis.

Table 1 shows the estimated values of the parameter  $\beta$ , known as the retention coefficient (Feldstein & Bacchetta, 1991), which links investment and savings and that can be interpreted as the marginal propension to invest in the own country for the period 1955-1997 and shorter intervals. The parameter shows a relatively high value, 0,845 (7) for the whole period. It could be interpreted as there was a reduced movement of capital (8). That is, when there was a one point percentage increase in the saving rate it should imply an increase of 0,845 points in the investment rate. When we do the same for the reduced period 1986-1997, when the deregulation process were already running, and consequently there were free movements of capitals, the coefficient of retention was lower, 0.51. Nevertheless, the value of the coefficient is remarkably high, as other papers highlight (9), showing that the theoretic degree of openness is not so high as thought, due to a certain degree of segmentation of the financial markets (Feldstein and Horioka, 1980) (10).

They have been numerous the works that have tried to explain this strong relationship between savings and investment. The first hypothesis was that the financial markets are segmented (11). The financial segmentation is explained by what French and Poterba(1991) have called the "home bias"; that is to say, the investors prefer to take financial assets issued by firms and institutions that operate in their country and that are faced with the same currency (12). From it we can derive that one of the reasons that prevent investing abroad is the likelihood of currency fluctuations (Bachetta and Van Wincoop, 1995).

In other words, in spite of the achievement of deregulating the movements of capitals to ease the integration of the financial markets, a higher degree of riskness of the currency currency not encourage borrowers to borrow in foreign currency. Therefore, the movements of capitals among countries are lower. The fact that during the last studied period (1986-1997) the Monetary Storm took place, which implied three devaluations of the peseta, could explain the higher than expected value of  $\beta$ .

A second argument that could explain the parallel movements of saving and investment can be found in the behaviour of the policy designers who in the aim of precluding an excessive current account deficit opt by adjusting the aggregate demand through the fiscal policy

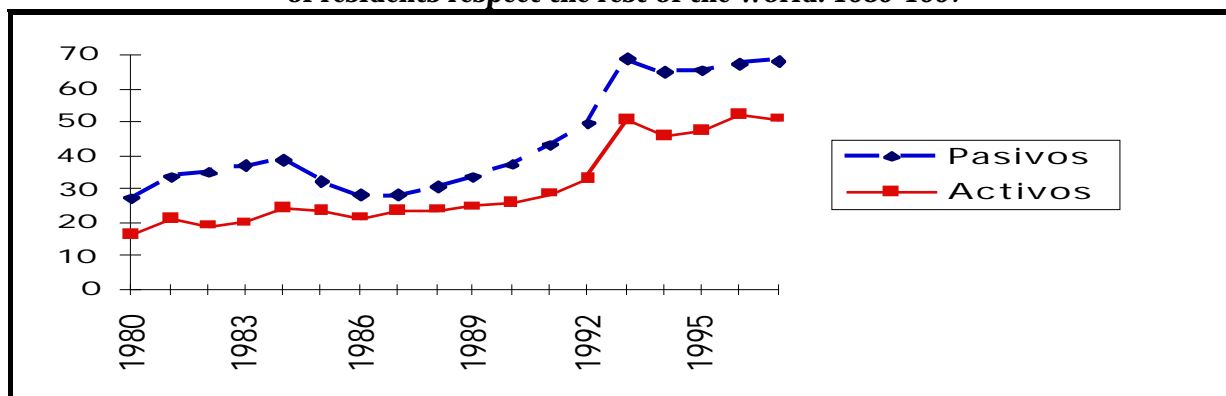
measures (Fieleke, 1982; Summers, 1988) (13) as restrictions to the mobility of capitals to assure the Balance of Payments target.

However, we think that as long as the monetary integrations will take place, specially after the elimination of currency rate fluctuations of the Euro area, the degree of segmentation will tend to be lower. In other words, the coefficient of retention will become even lower.

### II. 1. 2. Relation of assets and liabilities respect to other countries

A second indicator that is used to illustrate the degree of integration reached by the Spanish financial system is the percentage that the non-residents hold in some economic aspects. The fact that the foreign liabilities of the Spanish economy increased notably, from a 27% of GDP in 1980 to a 70% in 1997, and that the foreign assets reached a 53% of the GDP in 1997, compared to a 17% in 1980, become evidence in favour of a growing integration process of the Spanish financial market.

**Graphic 2**  
**Financial assets and liabilities (as a % of the GDP)**  
**of residents respect the rest of the world: 1980-1997**



Source: Banco de España (financial account) y elaboración propia

### II. 1. 3. The association of the interest rates

So far we have considered the degree of financial integration related to the mobility of capital. There exists, however, a third indicator that measures it in terms of the price levels, the interest rates on which even assets are negotiated in different financial places (14). We have to take into account that the investor includes as key variables the riskness of the currency rate, the different liquidness and fiscal measures of the markets along with the return of the financial assets faced in his own or foreign currency. So every thing taken into account the investor will decide which geographic area will send his investment to. The previous points out some kind of arbitrage that tend to equalise the interest rates negotiated in those markets.

Therefore, the investor will decide to maintain a percentage of his wealth (W) in domestic financial assets, depending on the differences between the national interest rates (R) and foreign interest rates ( $R_{Ext}$ ), the predicted appreciation of the domestic currency and other factors related to fiscal and liquidness (Z). Roughly speaking the previous idea can be written as:

$$[1] \quad (D/W) = F [R - R_{Ext}] + ((S^e - S) / S) - (G)(Z), [0 < F < 1] F' > 0$$

The meaning of each variable is as follows:

R = domestic interest rate.

$R_{Ext}$  = mean of the interest rate of the rest of the world.

W = measure of the portfolio.

S = exchange rate.

$S^e$  = predicted exchange rate.  
 $Z$  = fiscal risk + liquidity risk.

So that:

$D/W$  means the share of our portfolio that is invested in domestic assets.

$S^e - S/S$  = predicted appreciation of the domestic currency (d) respect to the world currency (Ext).

Equation [1] establishes that if the predicted turn out of the domestic assets increases, the share of these domestic assets will increase, therefore generating a flow of capitals that will be reflected in the Balance of Payments.

The value of  $F'$  will depend on the elasticity-substitution between the financial assets of the international trade. The higher the substitutibility (ceteris paribus the same fiscal regime,...), the higher the value of  $F'$  will be. Thus as long as the countries will join into the deregulation process and fiscal reforms take place,  $F'$  will tend to unity. If we arrive at the conclusion that the financial assets are perfectly substitutives, expression [1] gets reduced to:

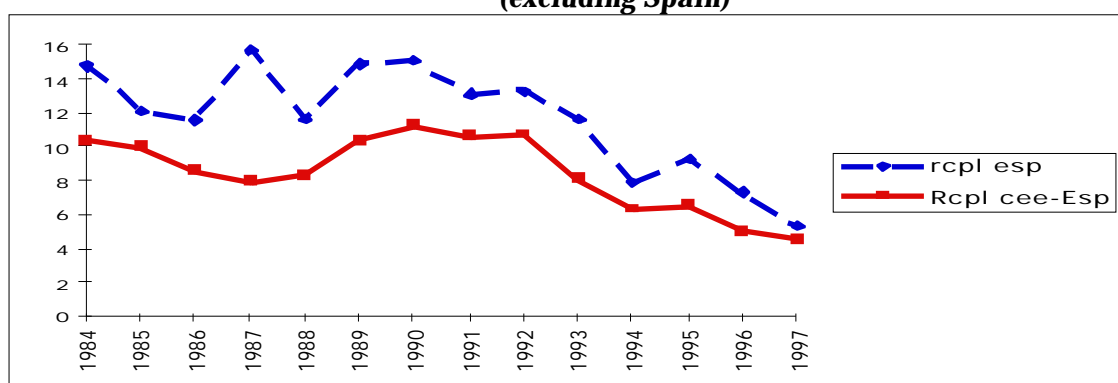
$$[2] \quad R_{Ext} = R + (S^e - S) / S$$

This expression is known as the condition of the unhedged interest rate parity (Frankel, 1991). That is to say, the difference between the nominal interest rates of two countries with free movement of capitals, has to be equal to the risk premium for devaluating the currency (15).

Finally, we can indicate that in the hypothetical case where there is a credible commitment of no devaluation or when there is no possibility of changes, as the case of the UME nowadays, it is thought that pure arbitrage will bring the interest rates to converge (16) as long as there is no suspicious of revocableness and undo the previous currency dropping.

Once justified why a convergence between the interest rates of the same term can be interpreted as evidence that the financial markets are more integrated, we present the evolution of the Spanish and European short-run interest rates, after the removal of the Spanish restrictions (17), for the period 1984-1997 (18).

**Graphic 3**  
**Evolution of the short-run interest rate (interbank in three months) Spanish and European (excluding Spain)**



Source: Banco de España

From the analysis of this graphic we detect, firstly, a clear parallelism that can be interpreted as evidence of the dependency of the Spanish interest rates respect to the European interest rate. Secondly, we see how the degree of dispersion between both interest rates has been decreasing over the years (19).

If we do the same exercise for some European countries and the United States, due to these are the countries more likely to condition the behaviour of the Spanish interest rates, we conclude that the European markets are in a path of increasing integration (20).

To measure the degree of integration of the Spanish market respect to the other countries we have run a Pearson correlation coefficient between the Spanish three month interbank interest rate (monthly data) and the same interest rate for other European countries as well as for the USA for the period 1980-97 and the subperiods 1980-1992 and 1992-1997.

**Table 2**  
**Correlation coefficients between the foreign interest rates and the Spanish one**

Country	1980-97	1980-92	1992-97
Germany	0,522	0,148	0,858
France	0,844	0,356	0,934
Italy	0,727	0,086	0,895
Belgium	0,746	0,232	0,877
Denmark	0,765	0,192	0,763
Holland	0,855	0,411	0,901
Ireland	0,644	0,157	0,836
Great Britain	0,655	0,116	-0,216
EU	0,748	0,052	0,7562
EMS	0,857	0,359	0,9626
EMS*	0,842	0,429	0,934
USA	0,451	0,232	-0,6195

Source: Banco de España.

From table 2 we can point out that the evolution of the Spanish short-run interest rates has been by far influenced by the evolution of the interest rates of the other European countries, except Great Britain and USA. This weaker dependency respect the anglosaxon interest rates can be explained by the fact that both countries will not join into the Euro area. At the same time we want to mention the fact that the degree of correlation has increased over the last years, turning into evidence of a deeper degree of integration, as we expected. Generally speaking, it can be deduced that the evolution of the short-run interest rates has been associated with the evolution of the European ones, which demonstrates the real globalisation of the financial markets, mainly thanks to the expectations created around the euro. This unifying factor conditions the necessity for instrumenting an uniform monetary policy, as the behaviour of the interest rates show up. This last factor explain the weaker interconnection between the Spanish interest rates and the ones determined in the USA or the United Kingdom.

To sum up, from the analysis of the indicators we have presented it can be affirmed that, generally, the Spanish financial market has increased its integration into the international context, specially in the European context.

Thus, for the Spanish case, despite the integration process is running, it will be reenforced by the EMU: If this is the case, explaining the Spanish TSIR according to the traditional theories, i.e. do to domestic factors, seems unrealistic. This is why in the next section we analyse if the TSIR of a relatively small country as Spain can be explained by exogenous factors. In other words can the Spanish TSIR be explained by the theory of the exogenesis?.

### III. The internationalisation of the Spanish TSIR: the application of the theory of the exogenesis

A review to the economic and financial literature on the determinants of the TSIR points out that there are three theories, the traditional theories; the theory of the established expectations (Hicks, 1939), Lutz (1940) et al, the theory of the segmentation (Culbertson, 1957) and the theory of the preferred habitat (Modigliani and Sutch, 1966).



These three theories model a closed to the rest of the world. So any of these three theories do not take into account the evolution of the foreign interest rates.

Nowadays this approach seems quite unrealistic. Therefore, the globalisation process we have been talking about in this paper points to the incorporation of other variables, foreign variables, to explain the Spanish TSIR. The globalisation process was the cause that led to Beenstock and Longbotton (1981) to propose a new theory, the theory of the exogenesis (21). This theory, which is compatible with the traditional theory, considers that the TSIR of those small countries are conditioned to a far extent by the term structure of the foreign interest rates.

Thus in a context of globalisation of the financial markets and in a monetary union process we want to study to what extent the Spanish TSIR is determined by other financial markets, specially the European ones. To do it we will apply the theory of the exogenesis to the Spanish case(22).

Despite there have been written many papers that demonstrates that the foreign interest rates determine the national interest rates, for the Spanish case the articles so far presented highlighted that opposite to the international evidence foreign determinants has weak power explanation. It could be explained by the several obstacles to move capitals that were operating until recent years, which prevented from a deeper integration. Later papers, which took into account more updated years, already noticed the higher correlation with the foreign interest rates, and consequently stressed their influence on the determination of the Spanish TSIR (23).

In order to examine the theory of the exogenesis we need a measure capable of getting the maximum information on the return over the life of the assets until its maturity. A review to the literature points that there are two alternatives. The first one consists of identifying the TSIR as the difference between the long-run and the short-run interest rates. This has been, by far, the more used measure, because it presents some advantages on the others; among those advantages we can enumarate its simplicity of calculus (its only a difference), its easy interpretation (for its analysis as well as to relate to other relevant variables) and finally, because it demonstrates that the spreads interest rate differential is an adequate instrument to score the monetary policy. In spite of its advantatges, to be honest this technique is not exempt of difficulties. Among them its implemention can derive into a loosening of a wider picture. Given that it implies only taking into account two extreme interest rates(short-run and long-run interest rates), we are ignoring the behaviour of other intermediate interest rates. Therefore, the yield curve does not offer all the needed information when it does not follow a monotonous behaviour.

This critique led to develop a second technique known as the first components (Egginton and Hall, 1993; Frasser, 1995). This tecnique allows to draw out relevant information from the interest rates series and not facing the collineality problems that appear when we have different maturities and to choose between two arbitrary points(Pérez de Gracia, 1997).

In this article we have opted for the first alternative, that is, we identify the term structure as a differential between the short-run and the long-run interest rates. Therefore, we have to decide which long-run and short-run interest rates we will use. We decided to use the three month interbank interest rate and the return on the three years public debt as the long-run interest rate.

Thus, once we have considered that the TSIR is determined by the differential between the long-run and the short-run interest rate, which representation is known as the yield curve, we analyse the foreign influence on the TSIR.

A first approach to this analysis consists of determining the degree of correlation between the differential of the Spanish and foreigners interest rates. The results are shown in table 3.

The values for the case of the EU are the result of weighting each interest rate by the GDP of its country.

**Table 3**  
**Correlation coefficient between the Foreign and the Spanish interest rate**

period	Germany	France	Italy	United Kingdom	EU	USA
1980-1997	0,133	0,236	-0,017	0,216	-0,019	0,129
1980-87	0,189	0,150	-0,382	-0,062	0,315	0,062
1988-97	0,668	0,583	0,255	0,617	-0,050	0,223
1992-1997	0,747	0,620	0,58	0,739	0,873	0,075
1992-1995	0,9816	0,886	0,704	0,768	0,971	-0,092

Source: Banco de España

From table 3 we can detach that the differential respect the European interest rate has increased, specially since the dropping out of restrictions to mobilise the capitals and the expectation of the euro area. This last point could explain the extremely low correlation with the American interest rate. Therefore, to what extent the Spanish TSIR can be explained by the EU's TSIR ?

To develop this issue we proceed estimating an univariant model of the type:

$$[3] \quad (R_{LE} - R_{cE}) = \alpha + \beta (R_{LEU} - R_{cEU}) + \mu_t$$

, where the lower letter c and L means the short-run and long-run interest rates, respectively; E and EU refer to the Spanish and European interest rates. Thus,  $(R_{LE} - R_{cE})$  and  $(R_{LEU} - R_{cEU})$  indicate the Spanish and European spreads, respectively.

To avoid the autocorrelation problem of the residual we have proceed to estimate the model by the generalised ordinary least square through the iterative Cochrane Orcut procedure to estimate the parameter P, defined as  $\mu_t = P \mu_{t-1} + \eta_t$ ; where  $\mu_t$  is a spheric residual (stacionarity, homokedasticity, no autocorrelation and normality). Given that we suspect that the coefficient has changed its value throughout the years we have run the regression for different periods.

From the analysis of table 4 we must enfasize how the parameter  $\beta$ , which measures the degree of dependence of the Spanish differential respect to the European one, has increased over the years; thus, meanwhile its capacity of prediction was nearly nul at the beginning of the 80's, it has reached a high level in the last years, specially after 1992. At the same time, as we expected, the signe is positive, that is, both differentials vary in the same way.

**Table 4**  
**Regression: Spanish Spread = c +  $\beta$  Spread EU + p**

Period	Constant	$\beta$	P	R <sup>2</sup>
1984-97	-0,249 (-1,357)	-0,000001 (-0,044)	0,931 (29,687)	84,3
1992-97	-0,855 (-0,595)	0,969 (2,165)	0,898 (7,160)	79,8
1993-97	-0,905 (-1,359)	1,435 (4,059)	0,798 (3,833)	80,66
1994-97	-1,17 (-1,700)	1,763 (3,296)	0,704 (2,888)	89,1

(\*)In paréntesis there is the T-Student statistic.t

\*\*The value of the test of Durbin-Watson does not allow to reject the no autocorrelation hypothesis.

If we analyse the coefficient of determination, which indicates a measure of the variation of the dependent variable that can be explained by the independent variables, we see that it

approaches to unity when we consider nearer periods. This reinforces the idea that the more globalised the Spanish financial markets are, the higher the dependency of the Spanish TSIR on the foreign term structure is. Specifically speaking, on the European one.

Once we have demonstrated that the Spanish TSIR is strongly determined by the UE TSIR, we think it could be interesting to test the same issue respect to leader country in the field of the monetary policy, and consequently in the field of the interest rates, i.e., Germany.

There are several reasons to explain why Germany has become the key reference in the transmission of the interest rates from that country to the rest of the countries, specially the European ones. First of all, the German Central Bank has always been remarkably independent from the government, fact that allowed the former to implement an antiinflationist policy. The other countries, has accomped their interest rates to the German ones, in the aim of benefiting from the German credibility.

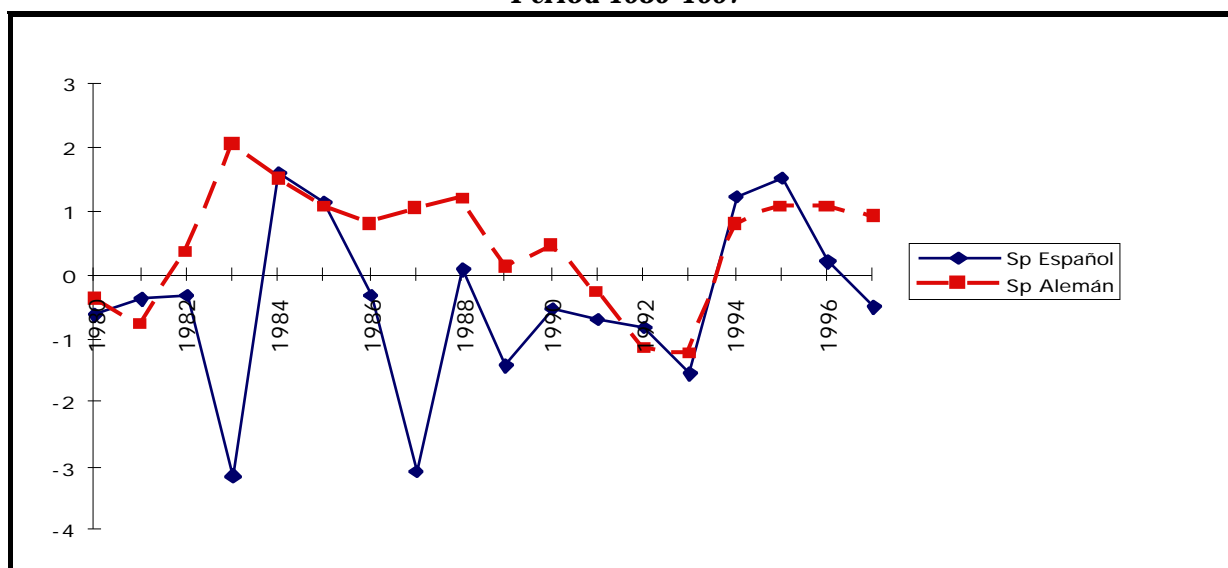
A second reason to explain the parallelism between the German and the Spanish interest rates is the necessity to perform the convergence test relative to the interest rates of the European Union Treaty.

Finally, if we run a correlation coefficient between the German and the EU short-run interest rates, once we have excluded Germany, we get a value of 0,663 for the period 1984-1997 (24), which is a relatively low value. It can be interpreted as that despite the behaviour of Germany possibly conditions the behaviour of the other European countries, the behaviour of the interest rates of the other European countries does not influence the German interest rates (Raymond and Mauleón, 1997, p. 200). In other words, Germany would be the leader, because its decisions on the interest rates affect to the rest of Europe, meanwhile the opposite is not true. So the results reflect a relatively autonomy of the behaviour of the German interest rates.

Respect to the dependency of the Spanish TSIR respect to the German TSIR, table 3 points out that dependency. In that table we can see how the spread of the Spanish interest rates present a high correlation respect to the German spread. Whatsmore, the correlation increases the nearer the considered period. Therefore, meanwhile for the first subperiod, 1980-87, it hardly influenced, the coefficient value was only 0,188, in the following period the value comes close to unity.

Another alternative way to detect similarities between the evolution of both interest rates is offered in graphic 4. From it it can be detected that despite in 1987 the relationship between the spread of the Spanish and German interest rates narrows, its allignment is even higher since 1992, i.e. just after the removal of financial regulations. Simultaneously to the strength of the EMU, the synchronism is getting deeper.

**Graphic 4**  
**Evolution of the Spanish and German Spreads**  
**Period 1980-1997**



Sourcee: Banco de España

So the next step, along with other works (25), is to measure this relationship. To obtain it we present an equation similar to the one presented in [3]:

$$[4] \quad (RLE-RcE) = a + \beta (RLG-RcG) + \mu t$$

, where (RLE-RcE) and (RLG-RcG) mean the spreads of the Spanish and German interest rates, respectively.

**Table 5**  
**Regression: Spanish Spread = constant +  $\beta$  German Spread + P**

Period	Constant.	$\beta$	P	R2
<b>1980-97</b>	-0,703 (-1,243)	0,142 (0,792)	0,906 (28,581)	79,7
<b>1980-87</b>	-0,498 (-0,534)	-0,189 (-0,685)	0,890 (18,749)	79,8
<b>1988-97</b>	-1,007 (-1,093)	0,873 (3,814)	0,938 (14,960)	80,9
<b>1988-92</b>	-0,793 (-3,741)	0,601 (3,428)	0,792 (8,783)	77,8
<b>1992-97</b>	1,698 (0,335)	1,244 (3,395)	1,042 (10,723)	80,4
<b>1993-97</b>	1,664 (0,323)	1,359 (3,315)	1,050 (8,982)	80,27
<b>1994-97</b>	1,180 (0,305)	1,490 (3,141)	1,071 (7,833)	83,1

(\*)In paréntesis there is the T-Student statistic.

\*\*The value of the test of Durbin-Watson does not allow to reject the no autocorrelation hypothesis.

Source: Banco de España

The analysis of table 5 confirms that since Spain freed the movements of capitals in 1992, the German TSIR strongly influences the Spanish TSIR. Thus we can conclude that any prediction of the Spanish interest rates must take into account variables from other countries. That is to say, the monetary policy in Europe belongs to a lesser extent to the States and progressively more to the Bundesbank and later to the European Central Bank.

#### IV. CONCLUSIONS

Since 1986 the Spanish economy started a process of financial openness which had its main end in february of 1992 when the movements of capitals were absolutely liberalised. This process has implied the internalisation of the term structure. Thus, we conclude that nowadays it is impossible to explain the term structure of the interest rates attending only to internal factors as the traditional theories point. As we have stressed in this article the Spanish TSIR is strongly conditioned to the evolution of the European TSIR, in broad terms, and more specifically to the German TSIR. Therefore, the former confirms the application of the theory of the exogenesis.

The previous is relevant if we remember that in this scenario the financial markets are the ones who continuously evaluate the discipline of the national economic policy. Any error in the implementation of any policy will receive a penalty from the markets, through higher risk premiums (Donges, 1996; Rojo, 1994). Therefore, the authorities can not implement economic policies different from the ones implemented in the other European countries.

Nevertheless, despite this cost, we think that the former will bring a better allocation of the financial resources and, therefore, economic resources, so as to improve the economic productivity and well-being of each country.

#### Notes

- (1)- Its intermediate objective was the monetary aggregates control.
- (2)- Mankiw & Summers (1984, p. 23): "The monetary authority can control the short-run interest rate, but the aggregate demand depends primarily on the long-run interest rate. If the before mentioned was true the transmission mechanism of the monetary policy depends on the behaviour of the TSIR...".
- (3)- Restoy (1995, p. 5): "After the crisis of the traditional strategies of monetary policy (...) new strategies based on the stabilisation of direct objectives of inflation has appeared. In this context (...) the analysis of factors that explain the relationship between the short-run and long-run interest rates constitute a central issue for the monetary policy".
- (4)- See Payeras (1994-a and 1996-b) where the main traditional theories of the TSIR are presented.
- (5)- See Alejano and Peñalosa (1995)
- (6)- Argimon (1993) analyses the cointegration relationship between national saving and national investment. She tries to determine which variable causes the other through a test of Granger. Her study is based on the member of the EU except Luxembourg for the period 1960-1990. The author concludes that there is a long-run causality relationship from saving to investment and not in the other way. We have extended the analysis till 1997 getting the same results.
- (7)- Alejano and Peñalosa (1995) estimate the value of the parameter  $\beta$  of 0,64 for Spain during the period 1970-1994.
- (8)- According to Feldstein and Horioka (1980) we can think that an open economy will have a  $\beta$  coefficient near to zero, meanwhile a close economy will show a coefficient near to the unity.
- (9)- See Goldstein and Mussa (1993) and Feldstein (1993).
- (10)- In the Feldstein and Horioka's seminal paper (1980) the value of the  $\beta$  coefficient for 16 OECD countries for the period 1960-74 was 0,887. Later works, as Dean et al (1990) that length the period until 1987 for 23 OECD countries find a lower coefficient value of 0,58. This can be interpreted as a higher interrelation of the financial markets.
- (11)- See Deveraux (1996) where we can find a survey of the different hypothesis to explain the Feldstein and Horioka's results.
- (12)- French and Poterba (1991) show evidence that in the USA 94% of the portfolios are based on financial titles issued in the same country. In Japan the share reaches the 98%. Similar evidence can be found in Mussa and Goldstein (1993-b) and Adler and Dumas (1983).
- (13) See Martínez Estévez (1997) where a wide explanation of this argument can be found.

(14)- See Frankel (1993) where some ways to analyse and study the degree of integration of the financial markets, among which there is covered interest parity, are offered.

(15)- See Isard (1995) where we can find different explanations why the theory of the interest rates parity does not apply in practice.

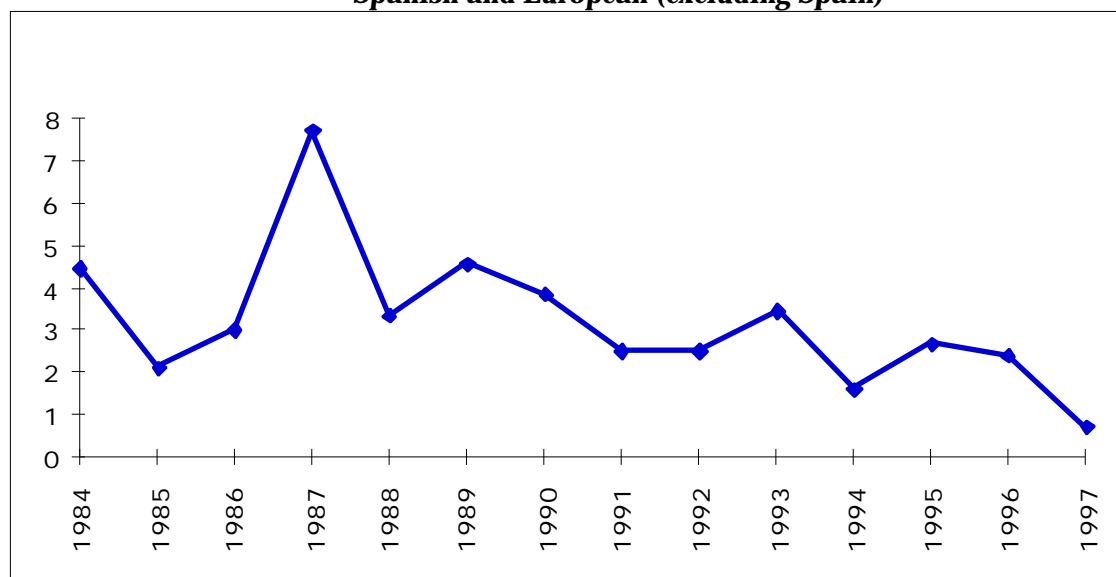
(16)- Nevertheless, according to Goodwin and Grennes (1994): "the existence of non-tradable goods or the existence of transaction costs can be factors that preclude the convergence of the interest rate at the international level.

(17)- The European interest rate is the mean weighted by the GDP relative to the nominal interest rates of the EU countries, excluding Spain, in order to avoid the spurious correlation that otherwise would occur.

(18)- We operate with the European interest rate instead than with the world interest rate because we suppose that the first one is the relevant one for the EU countries.

(19)- Graphic 1-Notes shows the evolution of the standard deviation that measures the degree of dispersion. From it we conclude there is an obvious tendency to reduce the standard deviation from the short-run interest rates. Therefore graphic 1-Notes reinforces the idea that the deeper the globalisation process is, the closer the interest rates tend to be. Only in some years, as in 1992 and 1995, internal factors affected the Spanish degree of convergence.

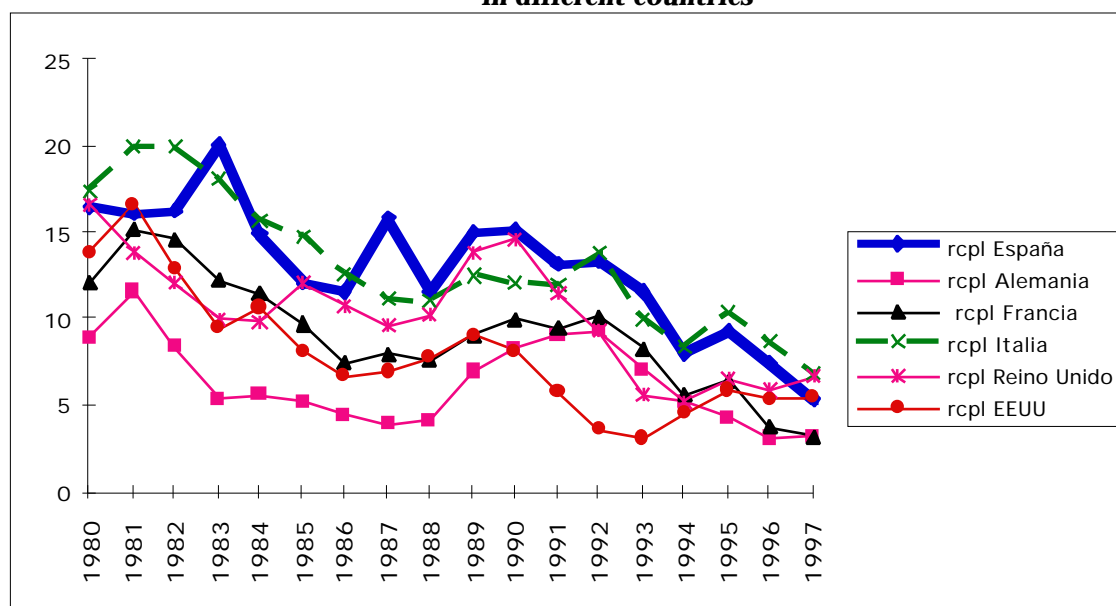
**Graphic 1-Notes**  
**Standard deviation of the short-run interest rates (interbank market at three months)**  
**Spanish and European (excluding Spain)**



Source: Banco de España

(20)- Graphic 2-Notes demonstrates that as long as time passes along the monetary integration process, the interest rates has tended to converge.

**Graphic 2-Notes**  
**Evolution of the short-run interest rate(interbank market at three months)**  
**in different countries**



Source: Banco de España

(21) Afterwards, they have been many the papers that have studied this theory; among them we can enumerate; Bisignano (1983), Krol (1986), Kool and Tatom (1988), Boothe (1991) and for the Spanish case Villareal (1990), Payeras (1994), Pérez de Gracia (1997).

(22)- There are many papers that examine the relationship between the TSIR of different countries; among them we can find Bisignano(1993), Kool and Tatom(1988), Holmes (1995), etc.

(23)- Mauleón and Pérez (1984), Martín and Pérez de Villareal (1989), Payeras (1994, 1996-a) and Pérez de Gracia(1997).

(24)- Raymond and Mauleón (1997) obtain a value of 0,54 for the period 1961-95.

(25)- De Grauwe (1989), Kargais and Mosches (1990), Fratianni and Van Hagen (1990-92), Katsimbris and Miller (1993), Kirschgässner and Walter (1995), Helmes and Pentescot

(1996).

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