AN ATTEMPT TO MODELIZE THE ECB'S MONETARY POLICY

ADOLFO MAZA FERNÁNDEZ*

BLANCA SÁNCHEZ-ROBLES

This paper intends to analyze some issues related to the design and implementation of the monetary policy in the Eurozone since 1999. Our analysis of monthly data from January 1999 to January 2003 by cointegration techniques suggests that the design of the monetary policy by the European Central Bank (ECB) can be characterized by a model that comprises a Taylor rule, in which a higher weight is given to the goal of price stability than to the expansion of output. Next, we try to assess whether the single monetary policy has been similarly beneficial for all the members of EMU. Accordingly, we estimate the optimal interest rates that would correspond to the different members of the Eurozone under the hypothesis that their monetary authorities follow the same Taylor rule as the ECB. We find remarkable differences in these estimated optimal interest rates among countries. In particular, these rates are higher than the ones set in practice by the ECB for the countries that suffer higher rates of inflation (Ireland, Portugal, Netherlands, Greece and Spain). Instead, the interest rates determined in practice by the EBC are more close to those that would be optimal for Germany and France. These are the countries that, according to the evidence employed in the paper, have profited the most from the ECB decisions so far. Instead, the ECB monetary policy has not been so beneficial for the southern countries of the EMU.

Keywords: monetary policy, Taylor's rule, European Central Bank, European Monetary Union.

JEL Codes: E43, E52, F33, F36

* Department of Economics, University of Cantabria, 39005 Santander, Spain

1. INTRODUCTION

The final phase of the European Monetary Union (EMU), together with the physical launching of the Euro in 1999, has changed dramatically the economic scenario for the members of the Eurozone. As the theory of the Optimal Currency Areas (OCA) argues, the single currency entails both benefits and disadvantages for the members of the EMU. Among the benefits we can mention the reduction of transaction costs, the suppression of the uncertainty associated to exchange rate fluctuations, and the higher efficiency brought about by a more dynamic trade among the countries belonging to the area. One of the main drawbacks, on the other hand, is the loss of the monetary policy at the national level as a potential tool to expand or contract the aggregate demand (Emerson, 1992). In effect, since January 1999 the monetary policy is established globally, for the whole Eurozone, by the ECB.

The cost associated to the loss of monetary independence may not be the same for all the countries in the Eurozone. Generally speaking, the larger the economic differences between a member country and the rest of the Eurozone, the higher the potential costs for that member. In more technical terms, if the probability of a country facing an asymmetric shocks rises, the cost of the lack of monetary autonomy will increase (for a discussion on the issue of asymmetric shocks in the Spanish economy see Sánchez-Robles and Cuñado, 1999; and Maza, 2002).

The purpose of this study is twofold. On the one hand, we intend to obtain some insights on the way in which the monetary policy of the BCE is designed. On the other, we want to get a feeling of some of the costs associated to the loss of monetary autonomy for particular countries of EMU.

The structure of the paper is as follows. Section 2 provides a brief survey of the literature. Section 3 estimates a model of the determination of the interest rate by the ECB from January 1999 to January 2003. Section 4 computes the interest rates that, according to the model, would be optimal for each of the 12 countries that made up the EMU, and measures the differences among these interest rates and those determined by the ECB. Section 5 concludes.

2. A BRIEF SURVEY OF THE LITERATURE

There are many papers, both at the theoretical and the empirical level, that have analyzed the way in which central banks design their monetary policy. An approach that has been widely used in the last few years characterizes the implementation of monetary measures through the use of rather simple rules of monetary policy. An important paper in this regard is Taylor (1993). This author establishes a rule in order to capture the behavior of the interest rate of reference of the USA Federal Reserve Bank (FED) over the years 1987-1992. This rule can be expressed formally by the following equation:

$$r_t = (R_t + i_t) + \beta\,(i_t - i^*) + \delta\,(y_t - y^*)$$

In which r_t is the nominal interest rate at time t, R_t is the real interest rate in equilibrium, i_t is the effective rate of inflation, y_t is the actual rate of growth of output, i^* is the targeted inflation rate, y^* is the potential rate of growth of output and β and δ are unknown parameters. Taylor did not estimate these parameters. Instead, he assumed a pre-established weight of $\beta - 1 = \delta = 0{,}5$. He also presupposed a figure of 2% for both the targeted inflation rate and the real interest rate in equilibrium.

Subsequent papers have followed this approach in trying to assess to what extent the monetary policies implemented by the different central banks follow such rules, sometimes using alternative versions of the above equation. For example, Persson and Tabellini (1997) include the credibility of monetary institutions in the equation. Clarida *et al*. (1997a) introduce expectations of the variables considered.

Other studies have entered variables that capture the tendency of central banks to adjust the interest rates gradually, avoiding sharp fluctuations. These kinds of papers (for instance Clarida *et al*., 1999), presume some sort of inertia between the interest rate in time *t* and the lagged interest rate.

Orphanides (2002) estimates another version of the baseline equation, using lead values of the variables. He also replaces the growth rate of GDP by the deviation of the unemployment rate from its target in the long run, arguing that the correlation between these indicators is high. Clarida *et al*., (1997b) have used the rate of growth of the Index of Industrial Production as a substitute to the rate of growth of GDP.

Most results obtained in these pieces of research show that monetary policy in the last decades may indeed be characterized by a Taylor rule, with values of the coefficients that are quite similar to those suggested by Taylor.

Many of these papers focus in the monetary policy implemented by the FED. More recently, though, other papers have turned their attention to the countries belonging to the EMU, especially Germany[1].

One example of this is Faust *et al*. (2001), which compares the monetary policy of the Bundesbank with that implemented by the ECB in its two first years of operation. According to this research, the interest rates in the Eurozone are comparatively lower than those that would hypothetically be determined by the Bundesbank, in turn due to

[1] Among others, see De Grauwe *et. al.* (1999), De Grauwe (2000) and De Grauwe and Piskorski (2001).

the higher weight that the ECB gives to economic growth compared with the Bundesbank.

Galí (1998) analyzes the potential impact of the monetary policy of the ECB on the Spanish economy. The instrument employed is an index of monetary tension that reflects the discrepancies between the interest rate that would be obtained from a Taylor's rule in two different scenarios: the EMU and Spain. His results suggest that the costs associated to the loss of monetary policy are be small provided that the ECB follows a Taylor rule, and the degree of synchronization of the business cycle and the inflation rate in Spain and the rest of the Eurozone is large.

Finally, we can add that there are a number of recent papers that handle the issue from the point of view of game theory (Debrun, 2001; De Grauwe et. al., 2001; Angelini et. al., 2002; Fatum, 2002).

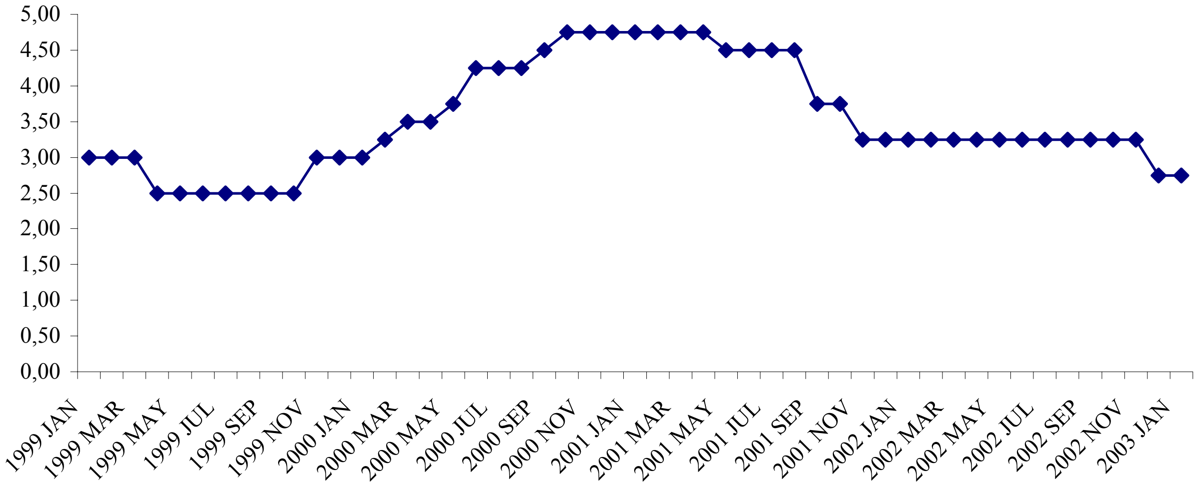
3. The model

As it has been already said, from 1 January 1999 the monetary policy in the Eurozone has been designed and implemented by the ECB. In 1998, the Board of the Bank established an inflation target of less than 2%. In addition, it sketched some guidelines for the monetary policy establishing as the main control variables the quantity of money M3 and a wide set of indicators that are crucial to ascertain the nature of the economic shocks impinging on the countries of the Eurozone: the evolution of production, the exchange rate, the aggregate demand, the situation in the labour market and the fiscal policy.[2]

[2] These guidelines have been revised in May 2003. This reform, however, does not change the spirit underlying the concept and goals of the monetary policy of the ECB. One of the main changes is that the Bank will try to ensure an inflation rate near (instead of less than) 2% in the medium run. Implicitly, this

If we look briefly at the monetary policy implemented by the ECB from January 1999 to January 2003, we can distinguish two periods (Figure 1). In the first one we observe an upward trend on the interest rates, due in turn to inflationary pressures. In the second period, starting at the beginning of 2001, the monetary policy becomes more expansionary in order to foster the economy of the members of the EMU and the interest rates decrease progressively.

Figure 1
The interest rate in the Eurozone
(Jan 99 - Jan 03)



Source:ECB.

3.1. Monetary policy of the ECB

Next we have estimated several models, starting with an initial list of variables, to characterize the monetary policy of the ECB. In order to determine the equation to be estimated we have followed a procedure that goes from the general to the specific: from

modification is tantamount to an implicit recognition of the asymmetries existing between the members of the Eurozone.

a very general specification that comprised a large number of regressors, and a reasonable number of lags, we have discarded those variables that were not significant, to finally arrive to a more parsimonious representation of the data generating process[3]. Since an important pre-requisite in the design of the model is the homogeneity in the data, we have taken these data from the same source as the ECB does, i.e. the Statistical Office of the EU, EUROSTAT.

In the end, we have used as regressors in the final estimation the following: the growth rate of the Harmonised Consumption Price Index (to capture inflation), and the growth rate of the Index of Industrial Production (as a proxy of output). This last variable has turned out to be more adequate than GDP in the final estimations. We have worked with the differential of both variables with respect to an annual growth rate of 2 %. In the case of inflation this figure follows directly from the guidelines of monetary policy established by the ECB. With regard to industrial production, we have tried with alternative growth scenarios, concluding that the outcomes were quite similar.

In addition, we have worked with lagged values of the variables, in order to capture the delay associated to the process of decision making and implementation of the different measures by the ECB. The number of lags that performed the best in the estimation was 4.

The final equation estimated to characterize the monetary policy of the ECB is as follows:

$$TI_t = C + \beta_1 DP_{t-4} + \beta_2 DIPI_{t-4} + \delta\, DU + z_t \qquad (1)$$

Where TI_t is the interest rate at time t, C stands for the intercept, DP is the differential of the growth rate of the Harmonized Price Index with respect to the reference value of

[3] In order to choose the best specification we have employed different criteria, as, for example, the

2%, *DIPI* is the differential of the rate of growth of the index of industrial production with respect to a hypothetical scenario of 2% and *DU* is a dummy variable intended to capture the change in the trend of the monetary policy alluded to above. z is the error term and β_1, β_2, and δ are parameters to be estimated.

From the econometric point of view, the main problem underlying the estimation of equation (1) is the possibility of the data being non stationary. We have performed a set of tests in order to search for the existence of unit roots in the variables we are working with. The main result is that all variables are integrated of first order, I(1)[4].

The next step has been to determine whether the series are cointegrated. Since the residuals obtained from equation (1) are stationary, we can conclude that this seems to be the case. Accordingly, we have estimated an Error Correction Model (ECM) following the Three Steps procedure devised by Engle and Yoo (1991)[5].

First, we estimate equation (1), which represents the long run relationship underlying in the series. Second, we have estimated the following ECM model which captures the short run dynamics and the adjustment towards the equilibrium:

$$\Delta TI_t = \phi_1 + \phi_2 \Delta DP_{t-4} + \phi_3 \Delta DIPI_{t-4} + \phi_4 DU + \gamma \hat{z}_{t-1} + w_t \qquad (2)$$

Finally, we have corrected the parameters obtained in equation (1) in order to obtain an asymptotically efficient estimation of β. The correction procedure has been to estimate the following equation:

Akaike Information Indicator.

[4] Results are not displayed for lack of space but are available under request.

[5] The Two Steps procedure of Engle and Granger (1987) is not appropriate for this case since the *t* statistics it provides are biased and inconsistent when the series have unit roots. The Three Steps procedure allows us to circumvent this problem. In addition, we have also analysed the data with the

$$\hat{w}_t = \delta_1(\hat{\gamma}\, DP_{t-5}) + \delta_2(\hat{\gamma}\, DIPI_{t-5}) + \delta_3(DU) + u_t \qquad (3)$$

Where w are the residuals from equation (2).

The point estimates of δ yielded by this estimate allows us to correct the values of β by means of the equation:

$$\beta^* = \beta + \delta$$

Now we can compute the true *t* statistic and apply traditional inference procedure, taking into account that the standard errors of β and δ are those obtained in the computation of (3).

The results obtained from the equations (1) and (2), that show the long run and short run dynamics, respectively, are displayed in Tables 1 and 2.

Table 1
Long Run dynamics of the interest rate

Dependent variable: interest rate

	Coefficient	t Statistic
Intercept	3,62	40,69***
DP_{t-4}	0,90	2,30**
$DIPI_{t-4}$	0,14	2,33**
DU	0,09	0,57
Adjusted R^2	0,84	

Sources: EUROSTAT, ECB and own elaboration.
***: Significant at 99%; **: Significant at95%; *: Significant at 90%

Table 2
Short run dynamics of the interest rate

Dependent variable: interest rate

	Coefficient	t Statistic

technique of Johansen and Juselius (1990). Results are similar to those yielded by the Three Steps analysis.

Intercept	-0,07	-1,66*
ΔDP_{t-4}	0,23	1,56
$\Delta DIPI_{t-4}$	0,06	2,88***
DU	0,12	2,13**
ECM	-0,18	-1,64*
Adjusted R^2	0,30	

Sources: EUROSTAT, ECB and own elaboration.
***: Significant at 99%; **: Significant at 95%; *: Significant at 90%

As Table 1 shows, an increase in the inflation rate is correlated with increases in the reference interest rate of the Eurozone. The same happens with the differential of industrial production. The point estimates of both variables are positive and significant at 5%. According to our estimates, a 1% change in the inflation differential entails an increase of the interest rate in 0.9, whereas a 1% change in the growth differential pushes the interest rate upwards in around 0.14. These results seem in accord with the own definition of the monetary policy of the ECB, that posits price stability as its main goal.

As regards the short run dynamics (Table 2) the point estimate associated to the ECM suggests that around 18% of the discrepancy between the actual value of the interest rate and its long run equilibrium value is corrected in each period.

3.2. Country differences

Regarding the second question formulated at the beginning of this paper, the discrepancies in the results of the monetary policy when individual countries of the EMU are considered, we have replaced in equation (1) the aggregate data for the Eurozone with the figures corresponding to each of the members. Thus we can compute the optimal interest rate that would result for each country if it could handle the monetary policy in isolation. Of course, we are assuming that this hypothetical Central Banks of the individual countries follows the same Taylor rule as the one obtained for the ECB. This is, perhaps, a strong assumption, but is useful in order to assess the implications of the ECB monetary policy on each of the members.

Table 3 reports the optimal interest rates for each of the members of EMU in the last month considered in this study, January 2003. Annex 1 displays the result for the whole period January 1999- January 2003.

Table 3
Optimal interest rates by countries (January 2003)

Germany	2,48
France	3,00
Italy	3,92
Netherlands	4,98
Belgium	3,19
Luxembourg	3,62
Ireland	7,29
Spain	4,74
Greece	4,87
Portugal	4,99
Austria	3,07
Finland	2,76

Source: EUROSTAT, ECB and own elaboration

Taking into account that the interest rate of reference of the ECB was 2,75% in January 2003, it can be seen that the smallest differentials between the hypothetical optimal interest rate and the official interest rate correspond to Finland, Austria, France and Germany.

The opposite can be said of the Southern European countries together with Netherlands. These were, precisely, the countries exhibiting the highest inflation rates around that time. The case of Ireland is remarkable: the differential is larger that four percentage points. In turn, this can be attributed to the high rates of inflation prevailing in Ireland. Other countries in which the deviations are also noticeable are Portugal (2,24), Netherlands (2,23) and Greece (2,12). In other words, the loss of the monetary autonomy seems to be especially onerous for the countries that suffer higher rates of inflation [6].

Moreover, we can observe the similitude among the monetary policy implemented by the ECB and the one that would have been put in practice by France and Germany (see Annex 1 for a more detailed comparison). In this regard, the hypothesis of the *twin sister* seems to gain support with our analysis, although it should be not restricted to the Bundesbank but to a combination of the French and German Central Banks.

The analysis of the optimal interest rates by countries suggest that only Germany needed reductions in the interest rate at the end of 2002 and at the beginning of 2003, since the optimal interest rate we estimate for the German economy is smaller than 2,75%. Although it exceeds the temporal horizon considered in this paper, it is well known that these reductions of the ECB interest rate have indeed taken place during 2003. The influence of Germany in the design of the monetary policy of the ECB is thus confirmed by these data.

4. CONCLUDING REMARKS

We can summarize the main findings of this paper as follows:

1.- Our analysis of the monetary policy implemented by the ECB since January 1999 suggests that this institution follows a Taylor rule, in which the weight that corresponds to the inflation rate is higher than that attained to economic growth.

[6] For a more detailed analysis of the costs of the EMU for Spain see Maza (2003).

2.- The costs associated to the loss of monetary autonomy vary among countries. In order to have a crude indicator of them we have computed optimal interest rates for each of the members of the EMU, assuming independence in their own design of the monetary policy and a Taylor rule similar to the one we found for the ECB. By and large, costs seem to be higher for countries that exhibit higher inflation rates, especially Ireland but also Portugal, Netherlands, Greece and Spain. In contrast, costs are moderate for core EU countries such as France and Germany.

These results are still tentative, but they already provide some interesting insights. The costs associated to the single monetary policy are not the same for all members of EMU. In particular, the higher the inflation rate in a particular country, the larger the costs entailed by the loss of monetary independence.

REFERENCES

Angelini, P., Giovane, P., Silviero, S. and D. Terlizzese (2002): "Monetary Policy Rules for the Euro Area: What role for national information?", *European Central Bank,* Febrero 2002.

Clarida, R., Galí, J. and M. Gertler (1997a): "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory," *Quarterly Journal of Economics,* 115, 147-180.

Clarida, R., Galí, J. and M. Gertler (1997b): "Monetary Policy Rules in Practice: Some International Evidence," *European Economic Review*, 42, 1033-1068.

Clarida, R., Galí, J. and M. Gertler (1999): "The Science of Monetary Policy: a new Keynesian perspective", *Journal of Economic Literature*, 37, 1661-1707.

Clarida, R., Galí, J. and M. Gertler (2002): "A Simple Framework for International Monetary Policy Analysis", *Journal of Monetary Economics,* 49, 879-904.

De Grauwe, P. (2000): "Monetary Policy in the Presence of Asymmetries", *CEPR Discussion Paper*, nº 2393.

De Grauwe, P., Dewachter H. and Y. Aksoy (1999): "The European Central Bank: Decision rules and macroeconomic performance", *CEPR Discussion Paper*, nº 2067.

De Grauwe, P., Dewachter H. and Y. Aksoy (2001): "Do Asymmetries Matter for European Monetary Policy?", *European Economic Review*, 3, 443-469.

De Grauwe, P. and T. Piskorski (2001): "Union Wide Aggregates Versus National Data Based Monetary Policies: Does it Matter for the Eurosystem", *CEPR Discussion Paper*, nº 3036.

Debrun, X. (2001): "Bargaining over EMU vs. EMS: Why Might the ECB be the Twin Sister of the Bundesbank?", *Economic Journal*, 473, 566-590.

Emerson, M., Gros, D., Italianer, A., Pisani-Ferry, J. and H. Reichenbach (1992) *One Market, one money*, Oxford University Press, Oxford.

Engle, R and C.W. Granger (1987): "Cointegration and error correction: Representation, estimation and testing", *Econometrica*, 55, 251-276.

Engle, R. and B.S. Yoo (1991): "Cointegrating time series: A survey with new results", in *Long run economic relationships: Reading in cointegration*, R. Engle and C.W.J. Granger (eds.), Oxford University Press.

Fatum, R. (2002): "One Monetary Policy and Eighteen Central Bankers: The European monetary Policy as a game of Strategic Delegation", *University of Alberta*, May 2002.

Faust, J., Rogers, J. and J. Wright (2001): "An Empirical Comparison of Bundesbank and ECB Monetary Policy Rules", *International Finance Discussion papers*, 705, August 2001.

Galí, J. (1998): "La política monetaria Europea y sus posibles repercusiones sobre la economía Española", *Department of Economics and Business Universitat Pompeu FAPRa*, December 1998.

Johansen, S. and K. Juselius (1990): "Maximum likelihood estimation and inference on cointegration with applications to the demand for money", *Oxford Bulletin of Economics and Statistics*, 52, 169-210.

Maza, A. (2002): "Regiones españolas y perturbaciones: Un análisis empírico", *Revista Asturiana de Economía*, 24, 109-130.

Maza, A. (2003): "Los costes asociados a la formación de la UME: Un análisis para las regiones españolas", *Cuadernos de Economía,* 26, 105-132.

Orphanides, A. (2002): "Monetary Policy Rules and the Great Inflation", *American Economic Review*, 92, 115-120.

Persson, T. and G. Tabellini (1997): "Monetary Cohabitation in Europe"', *American Economic Review*, 86, 111-116.

Sánchez-Robles, B. and J. Cuñado (1999): "Perturbaciones asimétricas y Unión Monetaria Europea: Las regiones españolas", *Papeles de Economía Española*, 80, 152-170.

Taylor, J. (1993): "Discretion versus Policy Rules in Practice", *Carnegie-Rochester Series on Public Policy*, 39, 195-214.

Annex 1: Detailed Results by countries

Table AX.1
Optimal Interest rates for particular countries

	Germany	France	Italy	Netherl.	Belgium	Luxemb.
1999 JAN	2,55	2,60	3,70	2,96	2,67	3,12
1999 FEB	2,36	2,37	3,10	3,43	2,57	3,40
1999 MAR	2,11	2,43	3,14	3,18	2,27	3,24
1999 APR	1,90	2,03	2,51	2,88	2,05	1,85
1999 MAY	1,92	2,10	2,87	3,58	2,60	-0,13
1999 JUN	1,61	2,03	2,58	3,69	2,13	1,33
1999 JUL	1,87	2,08	2,82	3,69	2,70	2,10
1999 AUG	2,36	2,18	2,41	3,31	2,55	3,19
1999 SEP	2,02	2,20	2,57	3,88	2,16	3,28
1999 OCT	2,15	2,12	2,70	3,81	2,18	2,30
1999 NOV	2,23	2,26	3,05	3,52	2,35	0,93
1999 DEC	2,62	2,35	3,43	4,20	2,65	5,01
2000 JAN	2,78	2,60	3,28	3,79	3,16	4,03
2000 FEB	2,93	2,94	3,56	3,47	3,37	3,33
2000 MAR	3,23	3,19	3,79	3,49	3,86	3,36
2000 APR	3,54	3,48	4,31	4,20	4,12	5,41
2000 MAY	3,77	3,74	3,87	3,14	3,46	6,63
2000 JUN	4,36	3,58	4,48	3,42	4,55	5,80
2000 JUL	4,43	3,82	4,48	3,68	4,72	5,12
2000 AUG	4,04	3,54	4,38	3,80	4,75	5,44
2000 SEP	4,06	3,54	4,99	3,98	4,96	5,02
2000 OCT	4,19	3,82	4,76	4,75	5,00	6,96
2000 NOV	4,51	3,97	4,38	4,57	5,19	6,89
2000 DEC	4,14	3,97	4,49	4,48	5,41	4,87
2001 JAN	4,98	4,09	4,54	4,76	5,58	4,90
2001 FEB	4,60	3,88	4,39	4,77	5,36	5,32
2001 MAR	4,66	3,79	4,55	4,61	5,48	5,96
2001 APR	4,47	3,49	4,83	5,30	5,28	5,95
2001 MAY	3,96	3,22	4,21	5,96	5,06	4,43
2001 JUN	4,06	3,12	3,13	6,27	4,37	4,73
2001 JUL	3,84	3,03	3,73	6,19	3,99	5,75
2001 AUG	3,92	3,50	4,14	6,91	3,88	3,80
2001 SEP	4,41	4,01	3,92	6,27	4,03	5,28
2001 OCT	4,33	3,75	4,07	6,02	4,43	4,71
2001 NOV	3,37	3,70	3,61	5,84	3,70	3,95
2001 DEC	3,71	3,52	3,20	6,12	3,63	3,77
2002 JAN	3,24	3,10	3,14	6,37	3,06	4,24
2002 FEB	2,92	3,03	3,49	5,19	2,91	4,23
2002 MAR	2,61	2,55	2,73	5,47	2,39	3,60
2002 APR	2,10	2,54	2,74	5,76	2,43	1,21
2002 MAY	2,83	3,62	3,14	5,32	2,88	2,90
2002 JUN	2,41	3,35	3,49	5,34	3,49	3,13
2002 JUL	2,79	3,36	3,24	5,16	3,48	2,15
2002 AUG	2,49	3,41	3,39	4,82	3,48	4,18
2002 SEP	2,05	2,76	3,46	5,07	3,16	3,03
2002 OCT	2,02	2,75	3,20	5,13	2,25	2,94
2002 NOV	2,36	2,63	3,61	5,10	3,26	3,34
2002 DEC	2,31	2,95	3,54	4,87	2,97	3,05
2003 JAN	2,48	3,00	3,92	4,98	3,19	3,63

Table AX.1
Optimal Interest rates for particular countries (continued)

	Ireland	Spain	Greece	Portugal	Austria	Finland
1999 JAN	6,97	3,61	6,27	3,70	2,47	2,74
1999 FEB	6,92	3,50	5,85	4,16	2,13	2,95
1999 MAR	5,71	3,48	5,23	3,65	2,01	2,24
1999 APR	6,30	3,55	4,76	4,15	1,93	2,37
1999 MAY	6,68	3,57	4,64	4,30	1,96	2,26
1999 JUN	5,40	3,19	4,54	4,08	1,98	2,57
1999 JUL	4,66	3,80	4,13	4,13	1,92	2,40
1999 AUG	4,92	3,93	4,06	4,20	1,90	3,30
1999 SEP	5,47	3,68	3,69	3,47	2,11	2,79
1999 OCT	5,67	3,81	3,04	3,51	1,94	2,72
1999 NOV	5,58	4,03	3,62	3,49	1,91	3,01
1999 DEC	5,00	4,12	2,97	3,28	2,15	2,44
2000 JAN	6,30	4,42	2,11	2,93	2,43	3,17
2000 FEB	6,59	4,17	3,01	3,64	2,57	2,91
2000 MAR	6,74	4,67	3,47	3,56	2,83	3,36
2000 APR	7,78	4,81	4,20	2,88	2,98	5,19
2000 MAY	5,38	4,69	3,91	3,69	3,02	2,97
2000 JUN	6,65	5,40	4,46	2,43	3,53	3,78
2000 JUL	7,75	5,36	4,12	2,82	3,79	4,63
2000 AUG	9,43	5,09	3,62	3,39	3,40	4,36
2000 SEP	9,07	5,49	3,85	4,02	3,21	4,64
2000 OCT	9,20	5,45	3,47	4,15	3,66	4,06
2000 NOV	8,97	5,42	3,89	4,94	3,35	4,66
2000 DEC	9,27	5,49	4,12	5,26	3,50	4,10
2001 JAN	8,26	5,35	4,40	4,63	3,68	4,99
2001 FEB	9,01	5,46	5,23	5,01	3,67	5,01
2001 MAR	10,15	5,77	5,08	4,56	3,77	4,50
2001 APR	8,93	5,45	5,53	5,51	3,05	4,22
2001 MAY	8,90	4,30	4,29	4,98	3,70	3,86
2001 JUN	10,79	3,77	4,00	6,19	3,02	3,83
2001 JUL	9,04	4,05	4,90	6,37	3,10	3,93
2001 AUG	8,14	4,60	4,93	5,65	3,61	3,09
2001 SEP	5,63	4,79	4,54	5,88	4,09	4,93
2001 OCT	7,49	4,87	6,11	5,84	3,91	4,35
2001 NOV	4,63	3,43	5,40	5,08	4,17	3,76
2001 DEC	6,06	3,62	5,02	5,41	3,85	4,28
2002 JAN	5,79	3,45	5,08	5,51	3,63	3,87
2002 FEB	4,63	3,92	4,65	4,89	3,82	3,52
2002 MAR	3,44	3,21	4,20	5,57	3,01	3,58
2002 APR	5,96	3,11	4,33	4,77	3,28	2,89
2002 MAY	8,01	4,31	6,34	4,75	3,10	3,91
2002 JUN	4,68	4,33	4,83	3,69	3,73	4,50
2002 JUL	8,35	4,32	6,02	4,84	2,97	4,22
2002 AUG	5,37	4,98	5,32	5,04	3,16	4,24
2002 SEP	8,93	4,67	4,68	4,25	2,97	2,97
2002 OCT	6,85	4,38	4,89	4,75	2,95	3,40
2002 NOV	7,43	4,86	4,91	4,87	2,87	3,31
2002 DEC	6,85	4,57	4,67	4,73	3,20	2,84
2003 JAN	7,29	4,74	4,87	4,99	3,07	2,76

Source: EUROSTAT, ECB and own elaboration