European Research Studies
Volume VI, Issue (1-2), 2003, pp. 131-144

Strategy of Monetary Policy: Observations from Germany and Italy

Anna Saiti*
Harokopio University

Abstract

This paper uses a cointegration analysis and a Vector Error Correction (VEC) model to investigate the relationship between interest rates and a set of macroeconomic variables in Italy and Germany, over the period 1989-1999. It has been found that both countries have placed importance on price stability. The discount rate has had a significant impact on prices and output for both countries. Exchange rate was important only for Italy in the discount rate VEC specification. The results further indicate that Italian monetary policy is almost the same as the German one.

Keywords: interest rates; monetary policy

JEL Classification: E52, E58

1. Introduction

This paper aim at an examination of the performance of monetary policy in two selected European countries. Monetary policy has played and is playing a growing role in the stabilization of policies in every country. It is important to make a comparative analysis of monetary policies in these two countries since it will provide us with detailed knowledge on the practical effectiveness of operating instruments and to what extent they are responsible for the health of their economy. Italy is a country where for the last ten years annual consumer price inflation followed the downward path and so managed to be in line with the price stability criterion established by the European Union. The objective for the Italian authorities was to conduct a monetary and an economic policy that was determined by the Monetary Union (Annual Report of Italy, 2000). In 1990 Italy joined the Exchange Rate Mechanism (ERM) and so needed to avoid any inflationary expectations since the country faced a inflation differential with the other European countries around 3% (Gavosto and Pellegrini 1999). Germany, on the other hand, is a country that

* Department of Home Economics and Ecology, Harokopio University, 70 El. Venizelou St, Athens, Greece, tel. 003-210-9549202, fax: 003-210-9577050, e-mail: asaiti@hua.gr

belongs to the main Euro-zone countries. German monetary policy has had important repercussions on Italian economy, as Italy became a more active member of European Union.

An important task of monetary policy, which links the central bank's activities with its goal variables, is to select a target. The role of targets is to link all the Central Bank's activities with its goal variables. The Central Bank often has to decide between interest rates and money supply for its Intermediate Target. The Intermediate Target is more closely linked to output and inflation (Fabozzi, et.al 2002). We frequently observe that the central banks usually adopt money growth targets when there is a danger of inflation getting out of control. Money growth target is used by the central bank for two reasons:

- To stabilize money policy
- To signal their intentions to the public

However, the central bank does not always stick to targets like money growth. Monetary policy rules can be useful in the endeavor of a central bank to keep inflation and other goal variables close to targets. The interesting question arises as to what is the best strategy or the type of monetary rule that monetary authorities should follow and use as guidelines for decision-making. By evaluating monetary policy rules, a central bank can keep inflation close to the target through focusing on interest rate target. This goal can be achieved by deceleration in money growth or by adjusting interest rates in response to inflation and output deviations from their target levels (Taylor 1999). "In most European countries, policymakers follow price indexes for sensitive commodities and make decisions about short-term rates and bank reserves on the basis of actual and expected inflation" (Fabozzi, *et.al.* 2002). A number of studies (Bremnes, and Sattem, 2001; Cushman, 2001; Bernhardsen, 2000; Kim, and Sheen, 2000; Ivanova, *et. al,* 2000; Clarida, et.al, 1998; Bidarkota, 1998; Ball, and Roma, 1994; Evans, *et.al,* 1994; etc.) have attempted to investigate the conduct of monetary policy and more particularly the relationship between macroeconomic variables and interest rates in the US or in other European countries by using the same econometric approach.

The main purpose of this paper is to compare the performance of monetary policy in Germany and Italy and to examine whether interest rates (both short and long-term) are responsive to any developments in the economies of these two countries. To further illustrate the value and the movements of German and Italian interest rates over time we considered the Figures 1a to 1b (Appendix One). This paper is organised as follows: Section 2 provides us with the presentation and interpretation of the empirical results, section 3 provides the concluding remarks.

2. Methodology and Empirical Results

Our econometric approach starts with a VEC that is the starting point for the analysis of cointegrating regressions. This VEC modelling procedure was first recommended by Engle and Granger (1987) among others (Hamilton 1994, Davidson and Mackinnon, 1993). The technique takes into account a linear combination of two or more non-stationary series that may be stationary, therefore if

this is a case then the non-stationary series are cointegrated. The cointegration technique employed is that of Johansen (1991). Johansen's method starts with a Vector Autoregressive model (VAR) model, tests the restrictions imposed by cointegration on the unrestricted VAR involving the series and determines the number of co integrating vectors (Maddala, and In-Moo, 1998). The Johansen and Juselious method is a dynamic approach that has many advantages compared to the Engle and Granger (1987) technique. It is an advantageous method mainly because it treats all the economic time-series variables as endogenous and tests for cointegrating vectors between the variables in a Vector Error Correction Model (VECM) framework. The number of cointegrating vectors (r) are chosen in the procedure by LR test and the test statistic for cointegration are trace test and the maximum eigenvalue test. The existence of this model implies that the variables involved in the analysis are unified. This means that at a macro level those variables are co-variate or appear to have macro-trends with a stable rate of development (Stamatopoulos, 1999:139).

Primarily we test the long run behaviour of the variables and then we proceed to an identification of the short run relationship among the variables. The estimation of Error Correction Term (ECT) corresponds with the long run disequilibrium. If the ECT is statistically significant and has the correct sign then this is referred to as "weak endogeneity". The size of the coefficient determines the speed with which each variable tends to return to its equilibrium[1].

It has been observed (Chang, *et.al.,* 2001; Maddala, and Kim, 1998) that the cointegration tests are sensitive to the number of lag length. The Akaike information criterion, the Schwartz criterion and the Bayesian criterion are responsible for the selection of the lag length.

Prior to the empirical analysis we have to see the expected relationship between the variables. Assuming that the Central Bank expected an increase in the price level it would increase the nominal short-term interest rate or decrease money supply growth. Thus, since an increase in the interest rate as an instrument rule of monetary policy is a tightening of monetary policy, we expect the coefficients of inflation and output to be positive. If this happens then the Central Bank has attained a good monetary performance. The relationship between exchanges rates and domestic interest rates is expected to be negative. For example, other factors being equal, a shift in the US Dollar/DM exchange rate (appreciation of the US Dollar) will change the premium or discount, producing interest rate changes (decline) in the German market, since the German mark will weaken in relation to the US Dollar.

We now proceed to estimate monetary policy VEC specifications for the Bundesbank and the Bank of Italy. Our VEC specification has policy responsive to domestic macroeconomic conditions.

We observed that the central banks of the European Union that are under consideration in this paper have repeatedly announced that their number one priority

[1] Stamatopoulos, (2000, 2001) and Hondroyiannis, et.al, (2002) employ a similar methodology in different topics.

is price stability. The second goal that they pursue is the fostering of output growth; however, they will pursue this goal only if price stability is not threatened.

For each country we use Government bond yield as a long-term interest rate (GBO), Discount rate as a short-term interest rate (DISC), the consumer price index to measure inflation (CPI), industrial production index as a measure of output growth (OUP) and exchange rate (EX). Since the other variables are the same for the three countries we use the symbols (G) for Germany and (I) for Italy. For all the variables a logarithmic form was preferable. In addition, the delta Δ in front of the variables indicates the first differences. All data are not seasonally adjusted. In the procedure we use restricted trend with seasonal dummies.

In order to broaden our work, it was found necessary to estimate again the Italian VEC specification by including German government bond yield and German discount rate. The quarterly data we used is taken from the International Financial Statistics. The exchange rate data for all countries was taken from *Bloomberg*. The sample period in each case is from 1989Q1-1999Q4. This particular sample was chosen for two reasons: *firstly,* at the beginning of 1990's Italy entered the ERM, and *secondly,* in the late 1980's many European countries experienced considerable structural changes. For example "the entry of Spain into the European Union in 1986 marked a period of liberalisation and strongly increased integration with the other European Union countries" (Gerlach, and Smets, 1999:806).

Unit root tests

The present variables have all been tested for stationarity. The test procedure for stationarity adopted is the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) test that gives different profiles of stationarity. Although the ADF test has less serious size distortions than the PP test, it is less powerful (Maddala, and Kim, 1998). However, both tests support the hypothesis that the first difference is adequate to induce stationarity for all variables in the analysis. "We express the relationship in first differences, rather than in levels, accounting for the importance of both hysterisis mechanisms...in the inflation rate." (Dolado, et.al, 2000:271). In addition, Andres, *et.al.*, (1999) and Sarantis and Stewart (2001) present the unit root tests in first differences rather than in levels. Table 1 reports the results for all the variables used in the analysis in first differences, for each individual country.

Table 1: *Unit Roots Tests for each individual country*

	Augmented Dickey-Fuller				Phillips-Perron					
	Germany		Italy		Germany			Italy		
Variables	τ_μ	τ_τ	τ_μ	τ_τ	τ_μ	τ_τ	$\varkappa$	τ_μ	τ_τ	$\varkappa$
ΔLgbond	-3.55^{**}	-3.58^{**}	-3.21^{**}	-3.30^{**}	-4.16^{***}	-4.17^{***}	1	-3.65^{***}	-3.71^{**}	3
ΔLdisc	-3.22^{**}	-3.19^{*}	-4.67^{***}	-4.79^{***}	-5.43^{***}	-5.73^{***}	3	-9.55^{***}	-9.77^{***}	3
ΔLcpi	-3.76^{***}	-5.29^{***}	-2.70^{*}	-5.35^{***}	-5.48^{***}	-6.81^{***}	3	−2.43	-4.71^{***}	3
ΔLoup	-3.11^{**}	-3.19^{*}	-7.44^{***}	-7.36^{***}	-4.88^{***}	-4.82^{***}	3	-18.30^{***}	-18.15^{***}	3
ΔLex	-6.03^{***}	-6.27^{***}	-4.01^{***}	-4.10^{***}	-6.81^{***}	-6.98^{***}	3	-6.34^{***}	-6.40^{***}	3

Note: *The estimating equation of first differences that test the null hypothesis of a unit root, using OLS is:*

$$\Delta y_t = \alpha + \varrho y_{t-1} + \Sigma j_{=1} \beta_j \Delta y_{t-j} + e_t$$

*τ_μ is the t-statistic for testing the significance without time trend in the above equation and τ_τ is the t-statistic for testing the significance with time trend included in the equation. The critical values for N= 44 at 1%, 5% and 10% are –3.58, –2.92 and –2.60 for τ_μ and –4.17,-3.51 and –3.18 for τ_τ respectively. *** Denotes that the variable is stationary at 1% level of significance. ** Denotes that the variable is stationary at 5% level of significance. * Denotes that the variable is stationary at 5% level of significance. The critical values for the PP unit root tests are obtained from MacKinnon whereas k denotes the truncation lag.*

Cointegration Analysis and the Vector Error Correction Model

In the empirical analysis three specifications for Bundesbank are estimated. In the first specification we employ the variables: LGGBO, LGCPI, LGOUP. In the second specification the variable of exchange rate was allowed to enter the equation. In the third we replace the government bond yield with the discount rate (LGDISC). We first estimate if there is any cointegrating vector among the variables. To obtain the results we use no deterministic trend in the data as a test assumption and use 2 lags in levels. The baseline VEC specification for the discount rate use linear deterministic trend in the series and four lags in levels. For Germany, we consider as exchange rate the level US Dollar / DM rate. Table 2 reports the results for the cointegrating vectors.

Table 2: *Cointegration test results of German data in series*

Variables : LGGBO LGCPI LGOUP, VAR = 3				
Null Hypothesis	**Hypothesis 1**	**Likehood Ratio**	**Critical Values**	
			1%	5%
$r = 0$	$r = 1$	37.67*	41.07	34.91
$r < 1$	$r = 2$	13.73	24.60	19.96
$r < 2$	$r = 3$	1.06	12.97	9.24
LGGBO = 7.61 LGCPI – 7.02 LGOUP – 2.69 + Z_1				
Variables : LGGBO LGCPI LGOUP LGEX, VAR = 4				
Null Hypothesis	**Hypothesis 1**	**Likehood Ratio**	**Critical Values**	
			1%	5%
$r = 0$	$r = 1$	62.89**	60.16	53.12
$r < 1$	$r = 2$	27.35	41.07	34.91
$r < 2$	$r = 3$	10.19	24.60	19.96
$r < 3$	$r = 4$	0.38	12.97	9.24
LGGBO = 1.14 LGCPI – 1.87 LGOUP – 0.78 LGEX + 5.09 + Z_1				
Variables : LGDISC LGCPI LGOUP, LGEX, VAR = 4				
Null Hypothesis	**Hypothesis 1**	**Likehood Ratio**	**Critical Values**	
			1%	5%
$r = 0$	$r = 1$	75.13**	60.12	53.12
$r < 1$	$r = 2$	34.69	41.07	34.91
$r < 2$	$r = 3$	13.25	24.60	19.96
$r < 3$	$r = 4$	3.93	12.97	9.24
LGDISC = – 4.40 LGCPI + 2.52 LGOUP + 3.19 LGEX + 8.54 + Z_1				

Note: r denotes cointegrating vectors. To test the null hypothesis of r cointegrating vectors versus the alternative hypothesis is by comparison with the critical values of the Johansen test.
*** Denotes rejection of null hypothesis at 1% significance level. * Denotes rejection of null hypothesis at 5% significance level.*

The results from Table 2 report the determination of the number of cointegrating relation r, subject to assumptions made about the trends in the series. All the tests showed that there are deterministic cointegration relationships among the four variables at 1% and 5% significance level. Thus, the tests show that all variables are moving in the same direction under the effect of a common trend and support the existence of one cointegrating vector at 1% and 5% significance level.

$$\underset{}{\text{LGGBO}} = \underset{(1.14)}{7.61\ \text{LGCPI}} - \underset{(-1.22)}{7.02\ \text{LGOUP}} - \underset{(-0.18)}{2.69} + Z_1 \qquad (1)$$

$$\underset{}{\text{LGGBO}} = \underset{(0.90)}{1.14\ \text{LGCPI}} - \underset{(-1.57)}{1.87\ \text{LGOUP}} - \underset{(-1.80)}{0.78\ \text{LGEX}} + \underset{(1.38)}{5.09} + Z_1 \qquad (2)$$

$$LGDISC = -4.40\ LGCPI + 2.52\ LGOUP + 3.19\ LGEX + 8.54 + Z_1 \quad (3)$$
$$(-4.86) \qquad (2.13) \qquad (4.17) \qquad (1.87)$$

From equations 1 and 2 we noticed that all variables included in the VEC government bond yield model are not significant. It seems long term interest rate cannot affect certain goal variables. The positive impact of long-term interest rate on prices, which is also borne out by economic theory, may indicate an anticipation of expansionary monetary policy response to expected high levels of long-term interest rate. The negative coefficient of output may imply that Bundesbank will not raise long-term interest rate in order to target economic activity variable. The insignificance on all variables suggests that the Bundesbank is not believed to be targeting all the variables. Unification of East and West Germany resulted in an increase in German interest rates, since there was a strong demand for loanable funds to develop East Germany. Consequently, US investors invested their funds into German securities. The increase in demand for German securities caused upward pressures on the Deutsche mark value (Madura, 1998). The negative and expected coefficient of the exchange rate in Government bond yield VEC specification may denote the magnitude of this upward shift on the Deutsche mark.

The discount rate VEC specification is more powerful than the long-term one. The change in the domestic discount rate had an immediate and significant impact on prices and output. The German economy was so strong during the period considered that market participants anticipated that an unexpected rise in the discount rate would have a negative impact on inflation. When the exchange rate enters the equation, the sign of prices changed to an unexpected negative one. Thus, an unexpected fluctuation of the exchange rate would have presaged future inflationary pressures that needed to be acknowledged at a higher discount rate. On the other hand, unexpected changes in the exchange rate raised the variance of output and so increased the discount rate. Lastly, unexpected movements of exchange rate raised the discount rate, due to higher future expectations of depreciation in domestic currency.

Table 3: *Weak exogeneity of German data*

	LGGBO	LGCPI	LGOUP	LGEX
Government Bond Yield VEC	0.02 (1.13)	0.01 (4.65)	–0.01 (–0.94)	
Adding Exchange rate	0.06 (1.28)	0.01 (4.53)	–0.01 (–1.07)	–0.09 (–2.08)
Discount rate VEC model Exchange rate	–0.16 (–4.13)	0.01 (2.63)	–0.01 (–1.37)	–0.04 (–1.24)

Note: *() denotes the t-ratio.*

The results from long-term interest rate VEC indicate that in the equation 1 the ECT has the correct sign and is significant. Thus, only prices can be characterized as a "weak endogenous" variable. This may imply that the top priority for the Bundesbank in short run seems to be again price stability. In all VEC specifications, prices remain statistically significant and thus are a strong endogenous variable.

Prices are determined by both long and short-term interest rates. The positive sign in prices indicated that the long and the short-term responded to inflationary pressures and shifted them up. The German output is more sensitive to discount rate changes than the government bond yield. The negative coefficient of output in the discount rate model indicates the significant effect of discount rate on output.

We now estimate VEC specifications for the Bank of Italy similar to those for the Bundesbank. The tests assume no deterministic trend in the series with an intercept in the cointegration relation and use two lags in levels. Only the baseline VEC model for the government bond yield use four lags in levels.

We replace the US Dollar / DM rate with the Italian Lira / DM rate.

Table 4: *Cointegration test results of Italian data in series*

Variables : LIGBO LICPI LIOUP VAR = 3				
Null Hypothesis	**Hypothesis 1**	**Likehood Ratio**	**Critical Values**	
			1%	5%
$r = 0$	$r = 1$	53.63**	41.07	34.91
$r < 1$	$r = 2$	19.10	24.60	12.96
$r < 2$	$r = 3$	6.10	12.97	9.24
LIGBO = 2.92 LICPI – 3.53 LIOUP + 2.32 + Z_1				
Variables : LIGBO LICPI LIOUP LIEX, VAR = 4				
Null Hypothesis	**Hypothesis 1**	**Likehood Ratio**	**Critical Values**	
			1%	5%
$r = 0$	$r = 1$	69.84**	60.16	53.12
$r < 1$	$r = 2$	34.83	41.07	34.91
$r < 2$	$r = 3$	17.04	24.60	12.96
$r < 3$	$r = 4$	5.97	12.97	9.24
LIGBO = 10.19 LICPI – 5.49 LIOUP – 1.72 LIEX – 12.98 + Z_1				
Variables : LIDISC LICPI LIOUP LIEX, VAR = 4				
Null Hypothesis	**Hypothesis 1**	**Likehood Ratio**	**Critical Values**	
			1%	5%
$r = 0$	$r = 1$	83.31**	60.16	53.12
$r < 1$	$r = 2$	32.40	41.07	34.91
$r < 2$	$r = 3$	15.92	24.60	12.96
$r < 3$	$r = 4$	5.24	12.97	9.24
LIDISC = – 21.78 LICPI – 13.10 LIOUP + 5.54 LIEX + 136.77 + Z_1				

Note: r denotes cointegrating vectors. To test the null hypothesis of r cointegrating vectors versus the alternative hypothesis is by comparison with the critical values of the Johansen test.
*** Denotes rejection of null hypothesis at 1% significance level. * Denotes rejection of null hypothesis at 5% level of significance.*

It follows from table 4 that in Italy there appears to be a strong relationship among the variables. The LR test accepts one cointegration at 1% significance level. Our evidence suggests that Italian inflation, output and the exchange rate have mainly affected the level of government bond yield and the discount rate. The existence of one vector means that although the four variables might have temporary deviations from the long-term relationship, the variables tend to converge in the long run under the effect of systematic forces.

$$\underset{(3.76)}{LIGBO} = \underset{(-3.12)}{2.92\ LICPI} - \underset{(0.38)}{3.53\ LIOUP} + 2.32 + Z_1 \quad (4)$$

$$LIGBO = \underset{(1.65)}{10.19\ LICPI} - \underset{(-1.96)}{5.49\ LIOUP} - \underset{(-0.92)}{1.72\ LIEX} - \underset{(-0.77)}{12.98} + Z_1 \quad (5)$$

$$LIDISC = \underset{(-1.18)}{-21.78\ LICPI} - \underset{(-1.21)}{13.10\ LIOUP} + \underset{(1.06)}{5.54\ LIEX} + \underset{(1.28)}{136.77} + Z_1 \quad (6)$$

For the Bank of Italy, the impact of long-term interest rate is statistically significant on prices and output. The results from equation 4 strongly suggest the above, since both variables are statistically significant. The positive coefficient of prices might signal desirable long-term interest rate adjustment. The results showed (as the estimated coefficients are large in magnitude and statistically significant) that the interest rate responded to inflationary pressures and to output variations in the long run. Thus, the government bonds yield VEC confirmed the aim of Italian monetary policy in targeting price stability and healthy economic activity. Italy is a country with high public deficit and debt. It is sufficiently important for the Italian economy to offset inflationary pressures since the high rate of inflation in a country with high public debt and deficit may lead to an increase in economic instability (productivity is not increasing). By letting the exchange rate enter the equation, there was a reduction in significance in both variables. The signs of both prices and output did not produce any change. Even with unexpected fluctuations in the exchange rate, it was certain that the Bank of Italy would respond but there was a doubt about the intensity of the response.

Table 5: *Weak exogeneity of Italian data*

	LIGBO	LICPI	LIOUP	LIEX
Government Bond Yield VEC	–0.11 (–3.01)	0.01 (3.01)	0.02 (0.71)	
Adding Exchange rate	–0.01 (–0.63)	0.01 (4.65)	0.01 (0.42)	0.01 (1.26)
Discount Rate VEC with Exchange Rate	0.03 (2.34)	–0.02 (–4.79)	–0.01 (–2.04)	–0.01 (–2.20)

Note: () denotes the t-ratio

The stabilization of prices was important for the Bank of Italy. When we allow the exchange rate to enter the VEC specification, prices strengthen its significance. Thus, prices move to restore equilibrium. Exchange rate in the Government bond yield model is not significant (exogenous) and this may suggest that it follows a random walk, that is, it moves without a predictable pattern. Italy experienced political uncertainty for most of the sample period, the exchange rate did not tend to revert to some mean level and Italian monetary policy had to deal with a floating exchange rate. Besides many foreign investors, due to random moves of the exchange rate anticipated appreciation of the Italian lira and this resulted in a strong demand for Italian securities. The flow of funds to Italy exerted upward pressures on long-term interest rate, however, the Italian monetary authorities, despite the difficulties, managed to lower the interest rates ahead of other European countries. The pace of the reduction is attributed to the good market conditions.

In the discount rate specification, all variables are statistically significant. The Bank of Italy focused on a deceleration of inflation and to stabilization of output and exchange rate fluctuations. The unexpected signs in prices and output supported the view that for a given inflation rate and output variation the relationship between them and discount rate often became distorted. The expected negative sign in the exchange rate indicated that an increase in the discount rate affected investment in foreign securities that influences the demand and supply of Italian Lira and therefore produced a depreciation in the domestic currency.

3. Concluding Remarks

In this concluding section we attempt to summarize the empirical results from the VEC models. This paper has been concerned with presenting the state of monetary policy and the testing of the monetary policy rule: interest rates in two countries; Germany and Italy.

Beginning with the Bundesbank, all the variables concerning the VEC specification of government bond yield were statistically insignificant. It seems that even when we let the exchange rate enter the equation, the significance of the variables remained quite unchanged. We found that only the discount rate had a significant impact on prices and output in the long run. The restrictive stance of German monetary policy aimed at fostering disinflation and strengthening production. The positive coefficients of inflation and output in the long run obtained by the discount rate VEC specification may indicate that signals of future monetary and economic conditions affect discount rate and cause clear patterns in the discount rate. The Bundesbank, in the long run, seemed to control the money supply by affecting the volume of discount loans (liquidity of banks) through the price of these loans (the discount rate). The Bundesbank may affect the volume of the discount loans so as to follow the downward spiral of inflation. In the short run, the picture is quite the same. The top priority for the Bundesbank is again price stability. German prices have a positive coefficient and are a strong endogenous variable in the government bond yield VEC specification, which means that the long-term interest rate responded to inflationary pressures. The statistical significance of the variable determines the speed with which inflation tends to return to its equilibrium. Exchange

rate is statistically important only for government bond yield VEC specification for the formulation of monetary policy, so it is an endogenous variable. This result indicates that the Bundesbank was considered as maintaining the exchange rate within narrow bands. The positive, significant and endogenous coefficient of output in the discount rate VEC specification may indicate the significant effect of the price of discount loans on output.

For the Bank of Italy price stability is a top priority. The positive and significant indicator of prices for the government bond yield VEC specification strongly indicates that Italian monetary policy was conducted with the primary objective of maintaining price stability. The variable of prices is a strong endogenous variable, which means that it moves to restore equilibrium. The findings implied that the government bond yield responded to inflationary pressures and to output variations. Exchange rate is an exogenous variable, which may mean that it moves to create unpredictable patterns. For the discount rate specification all variables were statistically significant and so they were weak endogenous. The expected negative sign of exchange rate may indicate that the Bank of Italy gives priority to the exchange rate policy so as to help the Italian market to gain competitiveness. It is also evident that the spread between the German and Italian rates began to narrow. In particular, since 1999 the differential between the yields on the year used to evaluate compliance with the EU convergence criteria has remained between 0.2 and 0.3 percentage points (Annual Report of Italy, 2000). Italian monetary policy is almost the same as the German one.

The monetary authorities in both countries monitored and have placed importance on indicators such as consumer price inflation. Anti-inflationary policy is certainly more effective if applied with credibility and continuity. Both countries had a stable performance in monetary policy so they influenced positively the expectations and the behavior of the public, a factor that facilitated the adjustment procedure.

References

1. Andres, J., Mestre, R. & Valles, J., (1999), "Monetary policy and exchange rate dynamics in the Spanish economy", *Spanish Economic Review,* 1 (1), 55-77.

2. *Annual Report of Italy* (2000)

3. Ball, C. and Roma, A., (1994), "Target zone modelling and estimation for European Monetary System exchange rates", *Journal of Empirical Finance,* 1 (3-4), 385-420.

4. Bernhardsen, T., (2000), "The relationship between interest rate differentials and macroeconomic variables: a panel data study for European countries", *Journal of International Money and Finance,* 19 (2), 289-308.

5. Bidarkota, Pr., (1998), "The comparative forecast performance of univariate and multivariate models: an application to real interest rate forecasting", *International Journal of Forecasting,* 14 (4), 457-468.

6. Bremnes, H. and Sattem, Fr., (2001), "Linkages among interest rates in the United States, Germany and Norway", *The Scandinavian Journal of Economics*, 103 (1), 127-145.

7. Chang, T., Fang, W., Wen, L. and Liu, C., (2001), "Defence spending, economic growth and temporal causality: evidence from Taiwan and Mainland China 1952-1995", *Applied Economics,* 33 (10), 1289-1299.

8. Clarida, R., Gali, J. & Gertler, M., (1998), "Monetary policy rules in practice. Some International Evidence", *European Economic Review,* 42 (6), 1033-1067.

9. Cushman, D. O., (2001), "The failure of the monetary exchange rate model for the Canadian - U.S. dollar", *Canadian Journal of Economics,* 33 (3), 591-603.

10. Davidson, R. and MacKinnon, J. G., (1993), *Estimation and Inference in Econometrics,* Oxford: Oxford University Press.

11. Dolado, J.J., Lopez-Salido, J.D. and Vega, J.L., (2000), "Unemployment and inflation persistence in Spain: Are there Phillips trade-offs?", *Spanish Economic Review,* 2 (3), 267-291.

12. Engle, R. F. and Granger, C.W.J., (1987), "Co-integration and Error correction representation, estimation and testing", *Econometrica,* 55 (2), 251-276.

13. Evans, L.T., Keef, S.P. and Okunev, J., (1994), "Modelling real interest rates", *Journal of Banking & Finance,* 18 (1), 153-165.

14. Fabozzi, F., Modigliani, F., Jones, F. and Ferri, M., (2002), *Foundations of Financial Markets and Institutions*, Third Edition, USA:Prentice Hall.

15. Hamilton, J.D., (1994), *Time series analysis*, Princeton University Press.

16. Hondroyiannis G. and Papapetrou E., (2002), "Demographic transition and economic growth: Empirical evidence from Greece", *Journal of Population Economics,* 15 (2), 221-242.

17. Gavosto, A. and Pellegrini, G., (1999), "Demand and supply shocks in Italy: An application to industrial output", *European Economic Review,* 43 (9),1679-1703.

18. Gerlach, S. and Smets, F., (1999), "Output Gaps and monetary policy in the EMU area", *European Economic Review*, 43 (4-6), 801-812.

19. Johansen, S., (1991), "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models", *Econometrica,* 59, 1551–1580.

20. Ivanova, D., Lahiri, K. and Seitz, F., (2000), "Interest rate spreads as predictors of German inflation and business cycles", *International Journal of Forecasting,* 16 (1), 39-58.

21. Kim, S. and Sheen, J., (2000), "International Linkages and macroeconomic news effects on interest rate volatility – Australia and the US", *Pacific-Basin Finance Journal,* 8 (1), 85-113.

22. Maddala, G.S. and Kim, In – Moo (1998), *Unit Roots, Cointegration and Structural Change.* First Publication, Cambridge:Cambridge University Press.

23. Madura, J., (1998), *International Financial Management,* 5th edition, USA:South Western College Publishing.

24. Sarantis, N. & Stewart, C., (2001), "Unobserved components in an error-correction model of consumption for Southern European countries", *Empirical Economics,* 26 (2), 391-405.

25. Stamatopoulos, T., (1999), *External trade balance of payment – Greek Drachma and European Union.* PhD Dissertation, University of Piraeus, Department of Marine Studies.

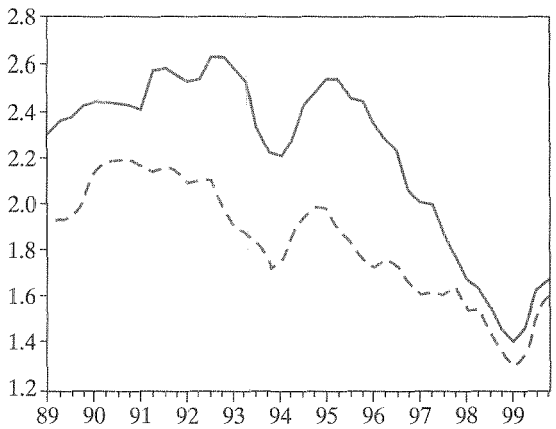
26. Stamatopoulos, T., (2000), "Price and Exchange Rate of Hellenic Drachma (GRD), During 1981-1995: Are they Dependent from those of EU-Partners?", *European Research Studies,* III (1-2), 105-121.

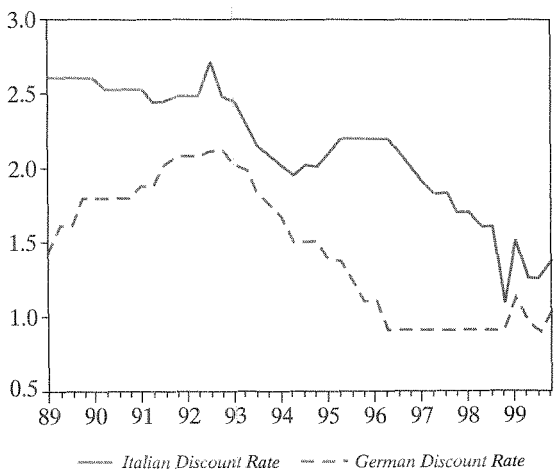
27. Stamatopoulos, T., (2001), "Trade Balance and Exchange Rate for a Small Open Economy During the EMS: The Hellenic Casse 1983:1-1995:12", *European Research Studies,* IV (3-4), 121-139.

28. Taylor, J., (1999), "The robustness and efficiency of monetary policy rules as guidelines for interest rate setting by the European central bank", *Journal of Monetary Economics,* 43 (3), 655 – 679.

APPENDIX ONE

The exhibits show that both German and Italian interest rates move together over time. For most of the sample period there is an interest rate differential and the Italian rates were high relative to German ones. Italian monetary policy kept interest rates high until early 1990s so as to lower inflation. German interest rates did not exceed 2.2% for all sample period whereas Italian interest rates differential narrowed significantly during the late 1990s.


2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
89 90 91 92 93 94 95 96 97 98 99
Italian Government Bond Yield
German Government Bond Yield


3.0
2.5
2.0
1.5
1.0
0.5
89 90 91 92 93 94 95 96 97 98 99
Italian Discount Rate
German Discount Rate