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Abstract

Measured against PPP. the drachma effective exchange rate was overvalued by a significant amount, implying that the devaluation on March 1998 was an adjustment of the exchange rate towards the long-run price differentials. The paper also analyses the links between fiscal policy, interest rates and the real exchange rate in Greece and attempts to empirically measure the forces that push the exchange rate toward real appreciation. The results suggest that positive shocks to government spending lead to an appreciation of the temporary component of the real exchange rate. Empirical findings imply that fiscal adjustment is very important to establishing exchange rate stability. (JEL Classification Number: F41, H30, E62)

1. Introduction

In the 1980s, Greek governments followed policies that were recognized as infeasible in the long-run. Macroeconomic imbalances deteriorated almost continuously, with inflation gradually taking a chronic nature. The budget deficit -to- GDP ratio jumped to 11.5 per cent, while the public debt ratio reached the 83.3 per cent level in the year 1991. In the 1990s, Greek economic policy focuses on gradually meeting the convergence criteria for joining the European Monetary Union (EMU). The present government aims at the participation of Greece in EMU by the year 2001, one year before the single european currency, euro, is

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introduced in physical form. These last years have seen the Greek economy improved. Inflation has fallen from a peak of nearly 25 per cent in 1990 to 4.7 per cent in December 1997. The main contributing factors to this improvement were the rigorous incomes policy, the limited sliding of the drachma ("hard drachma" policy) and the tight monetary policy. The budget deficit ratio has fallen to 3.4 per cent in 1997 and is targeted to fall to 2.4 per cent in 1998, while the public debt ratio was increased to 111.8 per cent in 1996.

However, the reduction in budget deficit ratio had not an important contribution to the downward movement of the inflation rate. This is because, the fiscal weaknesses in Greece established an image of a revenue - seeking government. The agents expect in such an environment that the government will find attractive to acquire resources from the private sector by imposing a tax levy in the form of unanticipated increase in the price level (Demopoulos and Kapopou¬ los, 1996). Although the situation of the public finances has been improved in the past few years, its structure is in need of radical change. More than 50 per cent of the Greek economy is still nationalized and the greater proportion of the state-owned sector is inefficient, and merely survives thanks to continued subsidies.

On the other hand, the exchange rate management was also very inefficient in the 1990s. The fiscal imbalances mentioned earlier led to high interest rates which were consistent with "hard drachma" exchange rate policy. Meanwhile, in the latter years, following the complete liberalization of the capital account, Greece begun to receive substantial capital inflows. Despite their positive contribution to external account balance, these inflows complicated considerably the exchange rate management owing to their volatile nature.

In the context of the openness of the Greek economy, the financial crisis in Southeastern Asia in late October 1997 brought a remarkable pressure on the exchange rate of drachma, forcing the Bank of Greece to increase the overnight interbank interest rate to levels higher than 80% in order to avoid speculative currency outflows. The cost of defending the exchange rate of drachma was very high.

Meanwhile, the Greek government did not more fast to clear its policy on privatization, etc. to offset markets' negative expectations on the course of the Greek economy to the developments towards EMU on May 2, 1998, and given the existing overvaluation of drachma, the pressure on its exchange rate continued. The government "surprised" of what it was expected to be taken place: On March 14, the drachma entered the Exchange Rate Mechanism (ERM) of the

European Monetary System with a "voluntary devaluation". The government along with the Monetary Committee of the European Union (EU) agreed to a new central rate of 357 drachmas to the ECU, a 13,8 per cent drop.

To reinforce credibility of the aim of entering EMU by 2001, the Greek government announced cuts in public spending and a speed-up of privatization in a reform package tied to the drachma's entry to Exchange Rate Mechanism.

The next two years will be quite challenging for the government due to its continued efforts to adjust the fiscal imbalances, the inflation and the interest rates to levels that would be comparable to those of the economies of the European Union. The capital markets will closely monitor the policy makers' efforts and could easily penalize it for inconsistency *vis-a-vis* the announced timetable for the fiscal adjustment and structural changes.

The paper analyses the links between fiscal policy, interest rates and the real exchange rate in Greece and attempts to empirically measure the forces that push the exchange rate toward real appreciation. The results suggest that positive shocks to government spending lead to an appreciation of the temporary component of the real exchange rate. That is, the empirical findings imply that fiscal adjustment is very important to establishing exchange rate stability.

The rest of the paper proceeds as follows: Section 2 studies whether the drachma effective exchange rate was overvalued according to the purchasing power parity (PPP). Section 3 presents an empirical analysis of the links between government spending, interest rates and the real exchange rate based on vector autoregression (VAR) methodology. Finally, Section 4 concludes the paper.

2. Exchange Rate Management and Relative Prices: The Overvaluation of the Drachma

The main purpose of the analysis of competitiveness is to assess how exchange rate changes affect the external position of the Greek economy by examining their relationship to the incentives faced by economic agents in their consumption and investment decisions. What methodology could be usefully employed to decide whether the drachma should be considered overvalued? The literature on competitiveness and real equilibrium exchange rates suggests a variety of approaches:

First, competitiveness in a given year is sometimes assessed by comparing

the value of real effective exchange rate index (REER) in that year with its value in some reference year in which the economy is regarded as being in external and internal equilibrium. Several measures of real exchange rates have been used as useful indicators of competitiveness. Figure 1 shows the intertemporal path of real effective exchange rate of drachma (based on unit labour costs) *vis-a-vis* (i) 23 industrial countries, (ii) 15 E.U. countries, and (iii) ERM participants. Figure 2 shows the intertemporal path of competitive position of Greece realtive to 23 industrial countries based on three different deflators: (i) the price deflator of exports of goods and services, (ii) the GDP deflator, and (iii) the nominal unit labour cost in total economy. As the Figures show, the cumulative appreciation of the drachma real effective rate against the currencies of other European countries and ERM participants (2% and 1% respectively) was very small in the period 1989-1995. In the period 1995-1997, however, the real effective exchange rate of drachma appreciated by 11 % against the currencies of ERM participants. This development is largely explained by the rapid increase in industrial production and labour productivity in most OECD countries which resulted in the decrease in unit labour cost. In contrast, the increase of employment in Greece was not followed by a considerable increase in labour productivity. This fact, in conjunction with the high wage increases during the same period led to an increase in unit labour cost (Maroulis, 1997). Based on our REER measure we conclude that the drachma was significantly overvalued during the last years.

Second, the most common approach to the analysis of competitiveness involves also a comparison of trends in exchange rates and prices, based on the concept of purchasing power parity (PPP)[1].

The hypothesis of purchasing power parity is useful, in a normative way, as a benchmark for determining what the long-run exchange rate should be. Thus, the policy makers can judge whether the exchange rate policy exhibits excessive fluctuations, causing large changes in international competitiveness of the country. The exchange rate should adjust smoothly in line with the changes in inflation differentials to prevent overvaluation or undervaluation of the domestic currency. If this fails to happen, market forces will cause wild adjustments.

The absolute version of PPP hypothesis states that, in the long horizon, the exchange rate between the currencies of two countries should be equal to the ratio of their price levels. We apply the test of the PPP on the nominal effective exchange rate of the Greek drachma in order to examine whether the drachma effective exchange rate is closely linked to long-run equilibrium price differentials. Specifically, we consider the following relation between the nominal

exchange rate St, (domestic price of foreign currency) and the domestic and foreign price levels, P_t^d and R_t^r, respectively:

where u_t is a zero mean stochastic error term representing the deviation from PPP in period t. Denoting logs by lower case letters, we have the following linear relationship

$$s_t = p_t^d - p_t^f + u_t, \quad t = 1, 2, ..., n \tag{2}$$

One popular testing procedure is to define the "real" exchange rate in period t as

$$q_t = s_t - p_t^d + p_t^f \tag{3}$$

Long-run PPP is said to hold if the $\{q_t\}$ sequence is stationary . Equivalently, we can say that the variables $s_t + p_t^f$ and p_t^d must be cointegrated[3]. If we denote $y_t = s_t + p_t^f$ then the long-run PPP theory implies that there is a linear relationship

$$y_t = \alpha_0 + \alpha_1 p_t^d + u_t \tag{4}$$

such that the u_t to be stationary and the cointegrated vector to be such that $a_1 = 1$.

Equation (4) is the cointegrating regression. All data are indices (1988 = 100), covering the period 1974/I - 1997/III[4]. S_t is the nominal effective exchange rate and Q_t is the real effective exchange rate (source: Eurostat). The domestic price level, P_t^d, is measured by the Wholesale Price Index, and the foreign price level, P_t^f, is measured by the ratio of Wholesale Imports Index (source: National Statistical Service of Greece). The application of Augmented Dickey-Fuller test[5] for levels and first differences (the results of which are reported in Table 1) indicate that all the series in levels are I (1), i.e., the unit root hypothesis can not be rejected for levels but has to be rejected for first differences. In Table 1 we also report that u_t, is not stationary which means there is no cointegrated relationship between y_t and p_t^d. In this table we also can see that $q_t \sim$ I (1). This implies that PPP does not hold in the long-run.

The relative version of PPP hypothesis states that the rate of depreciation of the domestic currency should be equal to the differential between domestic and foreign inflation. The relative version of PPP in empirical form is

$$s_t = b_o + b_1 p_t + \varepsilon_t \tag{5}$$

where $p_t = \ln\left(\frac{P_t^d}{P_t^f}\right)$.

Equation (5) is the cointegrating regression for the relative version of the PPP theory. It captures the long-run relationship between exchange rate and the price ratio if $s_t \sim I(1)$, $p_t \sim I(1)$ and $\varepsilon_t \sim I(0)$. So we tested for a unit root in the nominal exchange rate and the relative price series, the results of which are reported in Table 2. As can be seen, the null hypothesis of a I (1) series for the s_t and p_t can not be rejected. Then we ran the cointegrating regression, normalising alternately on the nominal exchange rate and relative prices. So we have[6]

$$s_t = -0.08 + 1.00p_t, \quad DW = 0.08$$

$$p_t = 0.13 + 0.99s_t, \quad DW = 0.08$$

As we can see the Durbin-Watson statistic is not large enough to reject the null hypothesis for the residuals. This impression is confirmed by examining the A.D.F. test statistics for a unit root in the residuals from the cointegrating regression, which are reported in the Table 3.

The null hypothesis of a unit root in the residuals is not rejected. Testing also the real exchange rate, $q_t = s_t - p_t$ we find that the $\{q_t\}$ sequence is non-stationary. So the results are not supportive of a long-run PPP. However, this is not a strong evidence against PPP because of the bias of the unit root tests[7].

Following, however, MacDonald and Moore (1994), we may rewrite (5) as

$$s, = \beta, + b_1 p_t + \qquad v_t \qquad (6)$$

where $b_t = b_0 + x_t$, x_t is a random walk and v_t is a stationary term. Under these conditions we find that PPP theory holds in the long-run. The results are reported here

$$s_t = 1.00 + 1.01p_t, \quad DW = 2.08$$

The null hypothesis that the intercept term in (5) is not following a random walk is rejected. The A.D.F. test statistic for the residuals, v_t, is -4.87 so $v_t \sim I(0)$.

The time paths of s_t and p_t of equation (6) covering the period 1974I -1997III are reported in Figure 3. They reveal the length of the period for which the exchange rate of the drachma was overvalued. Using different base years for the variables involved we can see the overvaluation period. Measured against

PPP, we conclude that the drachma effective exchange rate was overvalued by a significant amount, implying that the devaluation on March 1998 was an adjustment of the exchange rate towards its long-run price differentials[8].

3. The "soft drachma" Fiscal Policy and "hard drachma" Exchange Rate Policy

The main feature of economic policy in the first half of 1990s was that it placed emphasis on the exchange rate policy with the purpose of reducing inflation though keeping fiscal policy loose. At the same period, public sector borrowing requirement kept increasing and the incomes policy kept being inconsistent with the decline in the economy's productivity. In other words, the exchange rate policy aimed at disinflation but in a completely inflationary environment[9]. Figure 4 shows that the government spending as percent of GDP does not follow the decline in inflation differential of the Greek and German economies in the 1990s, that was the result of the limited sliding of the drachma and the tight monetary policy pursued by the Greek authorities. In the long run, such a situation in public finances is not consistent with a hard drachma exchange rate management, since private agents become aware of the policymakers' incentives to use domestic inflation as an instrument of debt management. This keeps inflationary expectations high and hence the exchange rate management is unsustainable.

3.1. Fiscal Shocks and Real Exchange Rate

A budget deficit can be considered as a real demand shock in the domestic goods market[10]. The equilibrium condition in the market of goods could be formulated as

$$y = A(r) + b(A, e)$$

where y is the supply of domestic goods, i.e., the gross domestic product, A is the demand of residents for domestic and foreign goods (absorption), b is the trade balance, r is the real interest rate and e is the real exchange rate. This equation could be presented in an IS-schedule in Figure 5 (Claassen, 1996) illustrating the equilibrium in the market for domestic goods[11]. The initial equilibrium in the market for domestic goods is at point E. A positive shock in budget deficit shifts the IS schedule towards IS_1. We assume that the additional government expenditure is used for the purchase of domestic goods. Depending on the degree of

capital mobility, there are two alternative equilibrium situations; point B with capital immobility and point C with perfect capital mobility.

Under the institutional framework of the previous decade (capital immobility) equilibrium in the market for domestic goods is restored by the crowding out effect of the interest rate mechanism at point B. When there is complete capital immobility the domestic economy works like a closed economy since the balance of payments coincides with the trade balance; in this case any bond financed budget is fully financed by domestic savings through a rise in the domestic real interest rate. The fall in private consumption and investment is exactly equal to the rise in public expenditure.

In the first half of 1990s, Greece underwent a process towards financial liberalization; and since August 1997, perfect capital mobility has been prevailing in the Greek economy. In this case, equilibrium in the market for domestic goods for a small open economy is brought about by the crowding-out effect of the real exchange rate mechanism at point C. The budget deficit is jointly financed by domestic and foreign savings. According to the framework of perfect capital mobility for a small open economy the budget deficit could be totally financed by external savings.

3.2. Vector Autoregression Analysis

The discussion presented above calls for a formal testing of the links between fiscal imbalances, high interest rates and real exchange rate movements. In this section we provide an analysis along these lines, by estimating an unrestricted vector autoregression (VAR) model. We focus on the analysis of the short-run dynamic interactions among these variables by using the standard techniques of impulse response functions and variance decompositions. We are mainly interested in the response of the real exchange rate to shocks to government spending and uncovered interest rate differentials.

Annual data covering the period 1960-1997 were used to estimate the parameters of the VAR model. All series were obtained from the OECD Historical Data, except for the nominal effective exchange rate which were obtained from the European Economy, No 64, 1997. The variables were constructed as follows. The fiscal variable is defined as $g_t = G_t / Y_t$, where G_t is the government spending at current prices and Y_t is the gross domestic product at current prices. The interest rate differential, it, is the difference between the domestic rate of return on Greek bonds adjusted for domestic inflation and the rate of return on Germany's bonds adjusted for the German inflation. Finally, q_t, is the inverse of real effective exchange rate index.

In line with standard procedures, we checked for stationarity, prior to estimating the VAR, using the augmented Dickey - Fuller (ADF) test and the Phillips - Perron (PP) test. Table 4 shows that the logarithm of the inverse of real effective exchange rate lq_t, the government spending as percent of GDP, g,, and the interest rate differential, i_t, is nonstationary in levels. In order to use the standard VAR techniques, we use the temporary component of the real effective exchange rate and the government spending — to — GDP ratio. These components, HP(lq_t) and HP(g_t), are calculated by decomposing the original series into trend and cyclical parts using the Hondrick-Prescott (1980) filter.

We estimated the VAR model using g_t, lq_t and i_t. Table 5 presents the variance decomposition. Although the percentage contribution of each variable to itself is very high, some of the results are noteworthy. The contribution of the variance of the temporary component of government spending — to — GDP ratio to the variance of the temporary component of the real exchange rate is about 20% after one year and declines to 13.3% after three years (see Table 5). This implies that positive fiscal shocks, like the increase in government spending on home goods leads to an increase in the relative price of non traded goods. It reduces private demand and maintains market equilibrium. The effects of shocks of g_t to lq_t are presented in the second chart of Figure 6. The dotted lines shown around the impulse response functions are the two standard deviations bands, which are the measures of statistical significance of the dynamic effects.

The contribution of the variance of the interest rate differential to the variance of the temporary component of the inverse of real exchange rate is about 12% in one year, and reaches 26.5% in the second year. This result reflects (a) the impact of changes in domestic interest rates on private absorption and hence the relative price of non-traded goods, and (b) the impact of an increase (decrease) in interest rate differential which leads to a capital inflow (outflow) and hence an appreciation (depreciation) of the real exchange rate. The impulse response function of lq_t to the interest rate differential is presented in the third chart of Figure 6.

4. Concluding Remarks

We started this paper by asking whether the drachma effective exchange rate was overvalued according to the purchasing power parity (PPP) hypothesis. Given that international competitiveness is an important factor in conducting the exchange rate management, PPP has found a place in normative economics as a quantitative framework that can help policy makers to assess the appropri-

ateness of exchange rate movements. We have learned that the real exchange rate of the drachma was overvalued by a significant amount in the last years, implying that the devaluation on March 1998 was an adjustment of exchange rate towards the long-run price differentials. In addition, the paper examined the links between fiscal imbalances, interest rate differentials relative to Germany and real effective exchange rate. The formal testing of this links suggests that positive shocks to government spending and interest rates lead to an appreciation of the real exchange rate. This interpreted to mean that a fiscal consolidation is very crucial to establishing exchange rate stability in the Greek economy.

In the 1990s, Greece pursued a non-accommodating exchange rate policy (hard drachma) to curb inflationary pressures and achieve monetary stability. This policy was undermined by the maintaining of large fiscal imbalances. The achieved fiscal adjustment in the context of the Convergence Plan 1994-99 was inadequate. Moreover, the non-accommodating exchange rate policy was not accompanied by the holding back of the growth of nominal wages and by higher productivity gains in order to avoid losses in competitiveness. Consequently, the existing fiscal imbalances were inconsistent with the exchange rate management pursued. That policy mix became more unsustainable after the perfect liberalization of capital movements. Fiscal imbalances led to higher interest rates and Greece begun to receive substantial capital inflows. This development increased domestic liquidity and complicated further the exchange rate management.

After the devaluation on March 1998, which was accompanied by an announcement of a program of structural reforms, the agents in capital and money markets reacted enthusiastically to the drachma's entry into Europe's Exchange Rate Mechanism (ERM). This is due to the elimination of uncertainty over the drachma value (a major risk factor) and to the expected decrease in interest rates. But, as we have seen in the previous section, a further decrease in interest rates depends, to a great extent, on the degree of fiscal adjustment.

In the next two years, Greece will be on the track of EMU. The international markets will closely monitor the policy making and could easily penalize it for inconsistency between the exercise of fiscal policy and the ERM participation of the drachma.

Table 1
A.D.F. test statistics

Series	A.D.F. (levels)	A.D.F. (first differences)	Remarks
q_t	-0.12	-9.47	I(1)
s_t	-1.03	-8.90	I(1)
p_t^d	-2.14	-6.71	I(1)
p_t^f	-1.65	-8.44	I(1)
y_t	-1.90	-7.40	I(1)
u_t	-0.29	-9.45	I(1)

Table 2
A.D.F. test statistics

Series	A.D.F. (levels)	A.D.F. (first differences)	Remarks
s_t	-1.03	-8.90	I(1)
p_t	-1.34	-9.32	I(1)

Table 3
A.D.F. test statistics

	Normalized on s_t	Normalized on p_t	$q_t = s_t - p_t$
A.D.F. (levels)	-0.15	-0.32	-0.12
A.D.F. (first differences)	-9.47	-9.47	-9.47
Remarks	I(1)	I(1)	I(1)

Table 4

Order of integration: Unit root test statistics

Series	A.D.F. (levels)	A.D.F. (first differences)	P.P. (levels)	P.P. (first differences)	Remarks
lq_t	-0.29	-4.67	-0.02	-4.67	I(1)
g_t	-0.74	-6.35	-0.55	-6.35	I(1)
i_t	-1.51	-5.70	-1.58	-5.70	I(1)
HP(lq_t)	-3.02		-3.08		I(0)
HP(g_t)	-4.28		-4.40		I(0)

Note: Each regression includes a constant.

Table 5

Variance Decomposition

Variance Decomposition of lq_t:

Period	lq_t	g_t	i_t
1	68.70	19.33	11.96
2	59.19	14.28	26.53
3	61.18	13.28	25.53
4	61.17	13.15	25.68

Variance Decomposition of g_t:

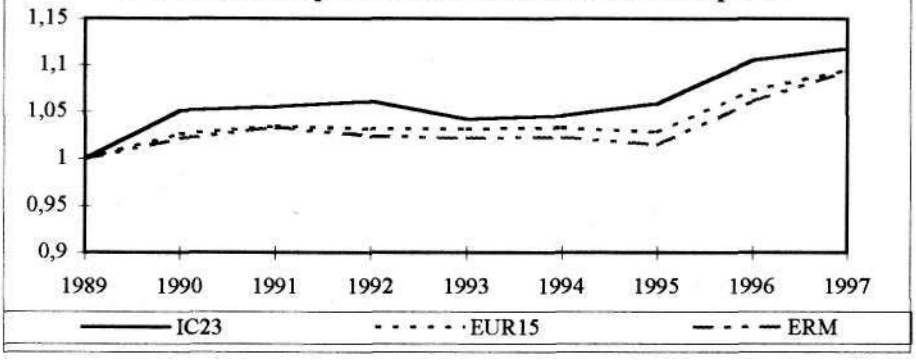
Period	lq_t	g_t	i_t
1	0.00	100.00	0.00
2	1.61	96.64	1.75
3	2.23	95.98	1.79
4	4.40	91.17	4.43

Variance Decomposition of i_t:

Period	lq_t	g_t	i_t
1	0.00	8.91	91.09
2	0.93	8.87	90.20
3	0.83	11.63	87.54
4	0.83	11.76	87.41

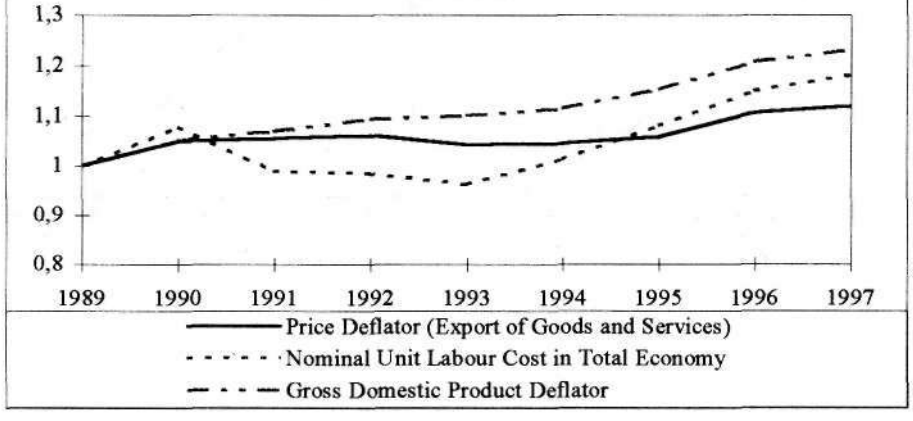
Note: The numbers in the table indicate the proportion of the variance of the logarithm of the temporary component of the inverse of real effective exchange rate, the first-difference of real interest rate differential and the temporary component of the government spending, attributable to each of the variables in the system, after the number of quarters specified in the first column.

Figure 1: Indicators of Competitiveness
The real effective exchange rate against 23 Industrial Countries, European Union 15 and ERM Participants



Source: Eurostat.

Figure 2: The Competitive Position of Greece relative to 23 Industrial Countries based on three different deflators



Source: Eurostat

Figure 3: The Overvaluation of the Drachma according to the Long-run PPP

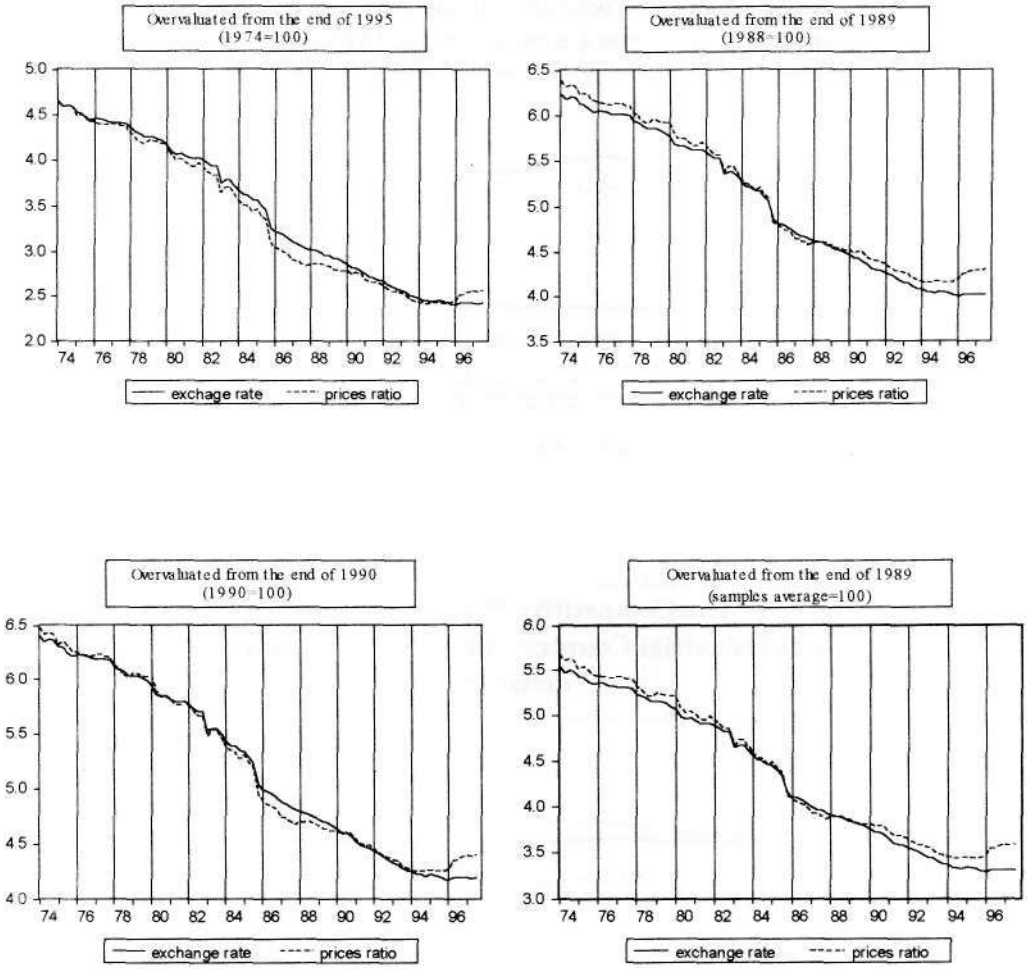


Figure 4: Fiscal Imbalances and Inflation Differential

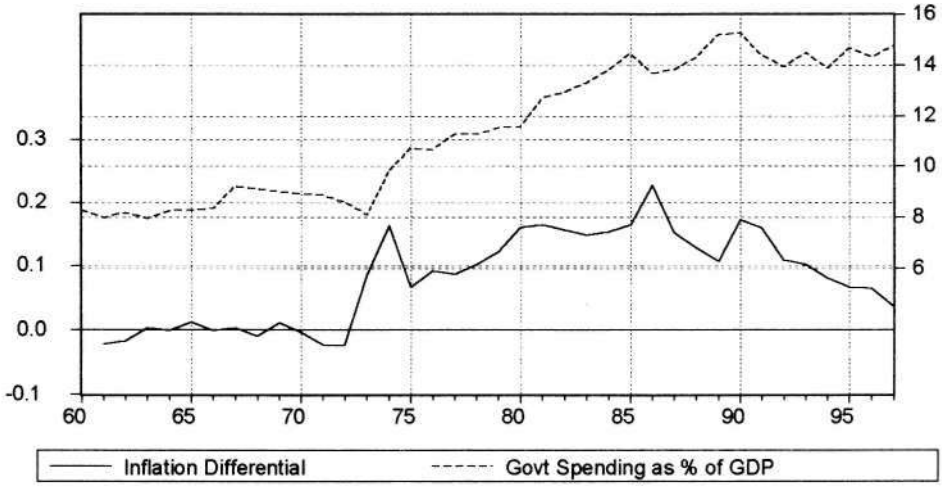


Figure 5: Fiscal Shocks, Crowding-Out and Real Exchange Rate

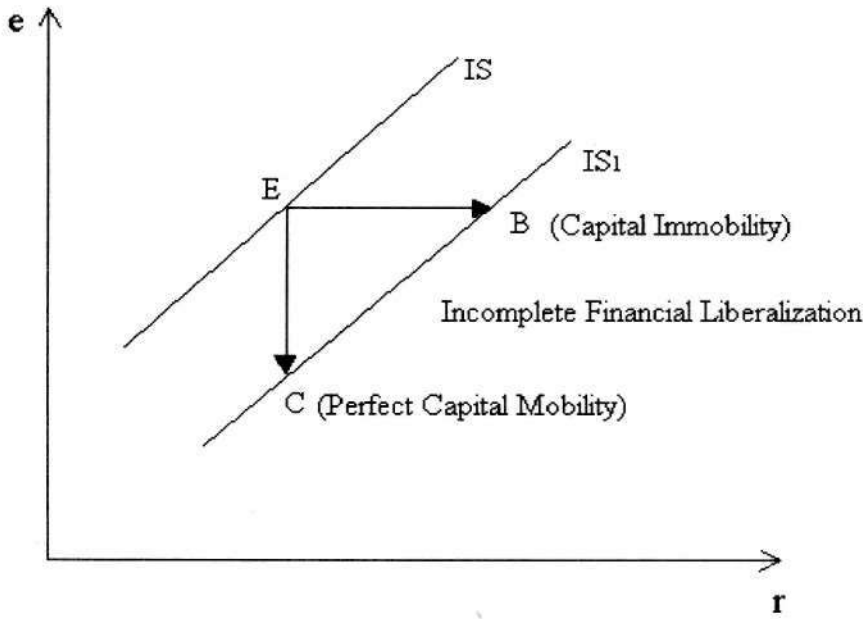
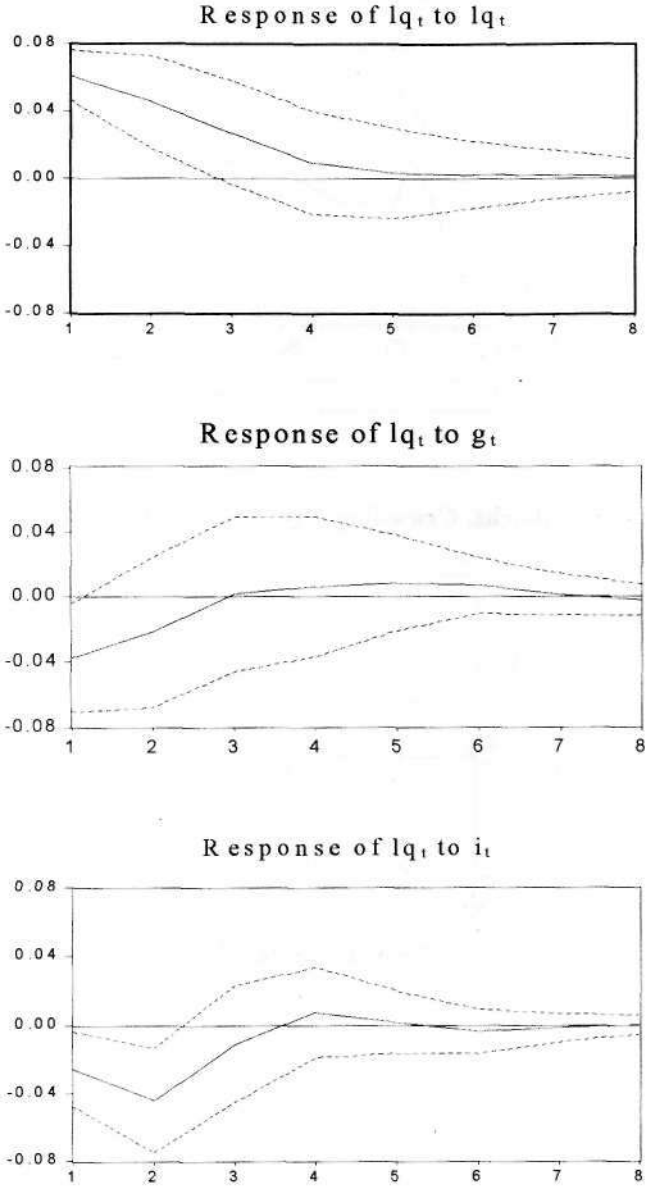


Figure 6

Response to One S.D. Innovations



Notes

1. Applications of this test for the Greek economy appear in a number of recent studies. See, Georgoutsos and Kouretas (1994), Dockery and Georgellis (1994), and Hardouvelis and Malliaropoulos (1998).

2. Another test of long-run PPP is to determine whether u_t, in (2) is stationary. If the deviations from PPP are non-stationary, we can reject the theory. PPP does allow for persistent deviations. Also, the autocorrelations of the $\{u_t\}$ sequence need not be zero.

3. See Engel and Granger (1987).

4. There is no deterministic seasonality.

5. See Dickey and Fuller (1979).

6. Note that the slope coefficient in the cointegrating regressions is close to unity.

7. See also Hardouvelis and Malliaropoulos (1998).

8. It may be noted that, the PPP hypothesis has confronted several types of counter-arguments. These arguments imply that PPP is not valid in the short run, but do not necessarily reject its validity over the long run. The PPP hypothesis would be valid if each tradable good obeyed the "law of one price" exhibited identical prices in each country. However, the prices of manufactured from different countries show large and persistent divergences when translated into a common currency. Thus, most manufactured goods face finite elasticities of demand and are priced under conditions of imperfect competition. Transportation costs, trade restrictions and taxes may contribute to reducing demand elasticities. In addition, the presence of medium-term labour contracts keeps wages and unit production costs sticky.

9. For a more detailed analysis of this argument, see Maroulis (1997).

10. Under a Ricardian world, a budget deficit may have no impact at all on real variables, regardless of whether we are in a closed or open economy. Public debt would not represent net wealth if taxpayers are fully discounting their future tax liabilities so that their permanent income falls. Thus, a bond financed budget deficit is equivalent to a tax financed budget deficit (Barro, 1974). Other economists argue for a net wealth aspect of bond financed budget deficit (Buiter, 1985 for example). Indeed, the life is finite and its duration is uncertain. Thus, there may be divergent discount rates for the evaluation of bonds and taxes. Frenkel and Razin (1987) assume only a certain degree of public debt uncertainty for an open economy.

11. Its positive slope is explained by the fact that a rise in the interest rate decreases the demand for domestic goods while a real depreciation increases it via a higher demand for import substitutes and via higher exports. Any point on the left side of the IS-schedule is a situation of excess demand of domestic goods.

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