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Abstract: In most intertemporal models of the current account, country specific productivity has ambiguous effects on the current account depending on whether consumption effect or investment effect dominates. The objective of this paper is to investigate the role of productivity shocks, in combination with investment behavior, as a source for current account dynamics for some European countries during the period 1960-2000. We decompose total productivity shocks between global and specific shocks and we examine the role of global and country specific productivity shocks for the current account and investment dynamics.

Keywords: current account, productivity shocks, investment

JEL classification: C32, F41, F47

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The intertemporal approach to the current account is becoming increasingly standard in international macroeconomics. This intertemporal model has been extended in many directions in the theoretical literature, to include investment, government spending, variable interest rates, non-traded goods, productivity shocks, and monetary policy.[1]

According to Obstfeld and Rogoff (2000), the Feldstein-Horioka puzzle is one of the six major puzzles in international macroeconomics. Feldstein and Horioka (1980) found a high correlation between long term saving and investment of OECD countries and the coefficient of a regression of investment on saving is close to unity. This result is surprising because it seems at odds with large and persistent external imbalances that have been observed in OECD economies, as well as indications of large gross and net capital flows in these economies since the 1970s.

In this paper we study the relationship between productivity shocks and the current account. The response predicted by economic theory of a given country's current account to a particular type of "shock" depends on the specific way in which the economic interactions between countries are modeled. Suppose a relatively simple dynamic two country world economy with one comsumption good. In this model, the effect of a temporary increase in productivity in one country on that country's current account is ambiguous. On the one hand, the shock temporarily increases that country´s income causing it to lend to the rest of the world in order to smooth consumption over time. On the other hand, to the extend that the shock is persistent it will induce that country to borrow from the rest of the world to finance a temporary investment boom. The first effect pushes the country's current account toward surplus while the second pushes it toward deficit. The overall response of the current account then depends on the magnitudes of these two conflicting effects with the key issue being the persistence of the shock. Of course, this discussion has focused on the effects of a country-specific shock. In this model, assuming countries are symmetric a common

[1] The intertemporal approach to the current account has many contributions that includes Buiter (1981), Sachs (1981,1982), Obstfeld (1982), Dornbusch (1983), Svensson and Razin (1983), Persson and Svensson (1985), and Frenkel and Razin (1987) among others. These contributions are surveyed in Obstfeld and Rogoff (1995, 1996) and Lane (1999).

productivity shock will raise investment in both countries but will not lead to a change in either country´s current account.[2] Several approximations have been proposed to study the incidence of productivity shocks on the current account in an open economy (Glick and Rogoff (1995), Hoffman (1999), Nason and Rogers (1999), Gregory and Head (1999), Iscan (2000)).

The objective of this paper is to investigate the role of productivity shocks, in combination with investment behavior, as a source for current account dynamics. We decompose total productivity shocks between global and specific shocks and we examine the role of global and country specific productivity shocks for the current account dynamics using a structural econometric model derived from the theory. This distinction between global and specific shocks is essential. If a shock hits all countries in the world symmetrically, the current account effect will be much smaller than if it hits just one small country.

The paper is organized in the following way. Section 1 summarizes the economic literature about shocks to productivity and the current account - investment behavior while Section 2 presents the basic features of the intertemporal current account model. Section 3 uses this model to study how investment and the current account respond to different productivity shocks. Finally, Section 4 provides some concluding remarks.

1. Productivity versus current account – investment dynamics

In an influential study, Feldstein and Horioka (1980) tested the intuitively appealing proposition that in fully integrated world capital markets, there is no correlation between a nation´s saving rate and its rate of investment.[3] Feldstein and Horioka (1980) found a high correlation between long term saving and investment of OECD countries and the coefficient of a regression of investment on saving is close to unity. This result, which holds in both cross-section and time series data, is surprising because it seems at odds with large and persistent external imbalances that have been

[2] This model is described in Section 2.

[3] If capital is perfectly immobile across countries, the current account is always zero and thus saving always equals investment. On the other hand, if capital mobility is perfect, investment changes can be independent of saving changes.

observed in OECD economies, as well as indications of large gross and net capital flows in these economies since the 1970s.[4]

However, subsequent theoretical work using explicit models has demostrated that such findings potentially can be consistent with the intertemporal theory and capital mobility (see Finn (1990) and Baxter and Crucini (1993)). Following Baxter and Crucini if a country experiences a positive technology shock at the same time as the rest of the world, it will be unable to borrow abroad to augment its capital stock, given that the rest of the world wishes to do the same. Despite perfect capital mobility, any rise in investment in this case must be financed by a rise in saving, as households smooth consumption over the temporary rise in output. Such models can explain the saving-investment correlations and the current account investment correlations typically observed in the data.

Because the effects of shocks on the current account may be ambiguous, empirical analysis has often focused on the relationship between investment fluctuations and the current account. Additionally, several approximations have been proposed recently to study the incidence of productivity shocks on the current account and investment in an open economy (Glick and Rogoff (1995), Hoffman (1999), Nason and Rogers (1999), Gregory and Head (1999), Iscan (2000)).

Glick and Rogoff (1995) have introduced an innovative approach to study macroeconomics relationships in an open economy. Their approach involved deriving analytically tractable current account and investment equations when there are global and country-specific productivity shocks. In a nutshell their model makes two predictions. First, country-specific productivity shocks affect the current account more than investment, because both consumption and investment respond to

[4] A variety of explanations have been offered to reconcile Feldstein - Horioka´s findings of a high coefficient with a high degree of capital mobility. One explanation is that estimates are contaminated by simultaneous equation bias, because of the endogeneity of both investment and saving. Another explanation is that the Feldstein–Horioka sample was too short to capture increases in capital mobility. A third explanation is that reggresions of investment and saving are being interpreted incorrectly. Obstfeld (1986) points out that a high coefficient in investment-saving regressions may reflect the influence of a common factor, such as economic growth, on both saving and investment. In this spirit Baxter and Crucini (1993) proposed that productivity shocks relate saving to investment. They also show that saving-investment correlations will be larger in larger

changes in productivity inducing a larger response by the current account.[5] Second, global productivity shocks have no impact on the current account because, in the face of the global shocks, countries with similar endowments and technologies adjust their consumption and investment symmetrically.

Nason and Rogers (1999) extend the approach to a structural VAR of first differences in the current account and investment. They list a set of six restrictions implied by intertemporal models; some of these restrictions are used to achieve identification of the model, and the model is tested using the remaining overidentifying restrictions. Under certain identifications, their results support the implications of the intertemporal, small open economy. However, these results are sensitive to perturbations of the identifications.

Gregory and Head (1999) estimate country-specific components in productivity and investment so that they can evaluate their effects on their countries' current accounts. Specifically, they use dynamic factor analysis and kalman filtering techniques to estimate common and country-specific components in total factor productivity, investment, and the current account for the G7 countries. Their empirical analysis finds that for the G7 countries there are significant common movements in both productivity and invesment. These common movements are associated with current account fluctuations only for the US and France. In contrast, country-specific increases in investment are associated with significant deteriorations of the current account for all countries except the US.

Finally, Iscan (2000) extends the analytical framework laid out by Glick and Rogoff (1995) to an economy with traded and nontraded goods and he analizes the impact of country-specific and global productivity shocks on the current account and the investment. He finds that the current account

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countries. Althought these arguments explain how a coefficient of close to unity may arise in investmen-saving regressions, they also imply that saving and investment contain no information about capital mobility.

[5] Note that only country-specific productivity shocks exert a sizable impact on the current account. The reason is that if an increase in productivity is generalized to all the countries, then all consumers will simultaneously try to dissave. This entails an increase in the real interest rate that restores equilibrium between saving and investment, with no effect each country´s current account. Such a result holds precisely when all countries are symmetric. When this is not the case, a global productivity shock will affect each country's current account. However, the result that country-specific shocks should have a larger impact on the current account than

responds more than investment to country-specific traded productivity growth. Additionally, he suggests that global traded productivity and country specific nontraded productivity growth have no effect on the current account, but they have a significant impact on investment. He shows that the global component of nontraded productivity is negligible and has no significant impact on either the current account or invesment.

2. The small open economy model

In this Section we summarizes the Glick and Rogoff (1995) model. Glick and Rogoff (1995) use a one-good, small country model with adjustment cost to investment and quadratic utility. The representative agent maximizes

$$E_t \sum_{i=0}^{\infty} \beta^i U(C_{t+i}) \tag{1}$$

where

$$U = C - \frac{h}{2} C^2 \tag{2}$$

subject to the intertemporal budget constraint

$$F_{t+1} = rF_t + y_t - C_t \tag{3}$$

where F_t denotes foreign assets enterig period t, y_t is the net output defined as the difference between GDP and investment, y_t=Y_t-I_t and C_t is consumption. For simplicity, we assume β=1/r. The current accout is then given by the change in the net foreign asset position, CA_t=F_t. Equivalently, defining saving as S=Y-C+rF we get the conventional definition of the current account, CA=S-I.

The production side of the economy is described by Cobb-Douglas type production function given by

$$Y_t = A_t^C A_t^W K_t^{\gamma} \left[1 - \frac{g}{2} \left(\frac{I_t^2}{K_t} \right) \right] \tag{4}$$

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global shocks still holds true on the grounds that the latter tend to move the world real interest rate in such a way as to restore equality between national savings and investment.

where K_t is the capital stock at time t, γ is the capital share of the economy, A^C_t and A^W_t are the time-t country-specific productivity shock and global productivity shock respectively. The term (I^2_t /K_t) captures adjustment costs in changing the capital stock and g is a positive constant. The investment is defined

$$I_t = K_{t+1} - K_t \tag{5}$$

Taking a linear approximation to the first order condition yields a system of equations of the following form

$$Y_t = \alpha_I I_t + \alpha_K K_t + \alpha_A A_t^C \tag{6}$$

$$I_t = \beta_1 I_{t-1} + \eta \sum_{i=1}^{\infty} \lambda^i \left(E_t A_{t+i}^C - E_{t-1} A_{t+i-1}^C \right) \tag{7}$$

$$C_t = \frac{r-1}{r} \left(F_t + E_t \sum_{i=0}^{\infty} \frac{y_{t+i}}{r^i} \right) \tag{8}$$

Following Glick and Rogoff (1995), it is assumed that A = (A^C_t, A^W_t) is a vector of country – specific ang global total factor productivities which follows an AR(1)-process

$$A_t = \begin{bmatrix} A_t^C \\ A_t^W \end{bmatrix} = \begin{bmatrix} \rho_{GR} & 0 \\ 0 & 1 \end{bmatrix} A_{t-1} + \begin{bmatrix} \varepsilon_t^C \\ \varepsilon_t^W \end{bmatrix} \tag{9}$$

where ε^C_t and ε^W_t are uncorrelated. From equations (6), (7), (8) and ρ_{GR}=1, it is the possible to derive the estimable equations

$$I_t = (\beta_1 - 1) I_{t-1} + \beta_2 \Delta A_t^C + \beta_3 \Delta A_t^W \tag{10}$$

$$\Delta CA_t = \gamma_1 I_{t-1} + \gamma_2 \Delta A_t^C + \gamma_3 \Delta A_t^W \tag{11}$$

3. Empirical Analysis

In this Section, we examine the effect of productivity shocks on both current account and investment for 15 European countries for the period 1960-2000. With this purpose, we define the current account as the difference between real saving and investment rates in percent of GDP, and the total factor productivity from a Cobb-Douglas production function. The global productivity measure is formed by taking a GDP-weighted average of the 15 individual European country measures, and the country-specific component is formed as the deviation from the global weighted average.[6] First we plot all the variables in our analysis. As a second step of the empirical analysis, unit root tests have been carried out. Finally, we study the role of productivity shocks in the current account and investment dynamics.

3.1. A first look at the data

Before turning to the estimates of structural equations for the current account and investment, it is helpful to look at the data. Figure 1 shows the evolution of the current account for each of the analyzed countries during the period 1960-2000. As far as the current account behavior is concerned, we observe that the numerous current accounts reversals (i.e. episodes of persistent change in the dynamics of the current-account balance) documented in some empirical papers are also evident in the case of the European countries (see, for example, Belgium, France or Ireland in 1981, Finland or Sweden in 1991 among others).

(Insert Figure 1)

Figures 2 and 3 display the total factor productivity in levels (Ai) and the country-specific productivity levels (A^C) in the 15 countries in our sample, respectively. Looking at the Figure 2 it seems that there are two distinct periods for most of the countries, the first from the beginning of 1960 to aproximately 1980 and the later from 1980 to the end of 2000. The initial upward trend reversed in mid 1970 and dessacelerated during 80s. As can be seen in Figure 3 there are different patterns in country-specific productivity levels. For example, the country-specific productivity increases in the cases of Belgium, Spain, France, Ireland, Italy, Luxembourg, Austria, Portugal and Finland, suggesting that the productivity growth in these countries is higher than the global productivity growth, and decreases for Denmark, Germany, Netherlands, Sweden and United Kingdom.

(Insert Figures 2 and 3)

[6] See Data Appendix for a more detailed definition of the variables.

Figure 4 plots growth rates for country-specific productivity and Figure 5 highlights the evolution of investment as a percentage of GDP over the past 40 years. It is remarkable that most of the countries experienced two sharp reductions in investment rates in mids 80s and 90s.

(Insert Figures 4 and 5)

3.2. Unit root and reversals

In this Section we study the stationarity of all the relevant variables in our analysis. The stationarity of the current account (CA_t) is important to the validity of the intertemporal model of the current account. Theoretically, the intertemporal model of the current account determination combines the assumptions of perfect capital mobility and consumption smoothing behavior to predict that current account acts as a buffer to smooth consumption in the face of shocks. This approach implies that the current account will typically be a stationary serie.[7] Empirically, a large volume of literature test the stationarity of the current account, but this characteristic is not an evident result, specially when traditional unit root tests are conducted (evidence on CA_t being generated by I(1) processes has been provided among others by Gundlach and Sinn (1992), Glick and Rogoff (1995), Bagnai and Manzocchi (1996), Hoffman (1999) and Bergin (2000) among others). However, the stationarity of this variable is assumed in several papers, such as Sheffrin and Woo (1990), Otto (1992), Milbourne and Otto (1992), Piersanti (2000), Bergin and Sheffrin (2000), Wu (2000). In this paper, we will assume the stationarity of the current account variables based on both the implications of the intertemporal current account model and the results of applying unit root tests allowing for structural breaks or reversals, common episodes in these variables as documented in the previous Section and other empirical studies.

[7] If investment and savings can be characterized by I(1) processes, then the intertemporal approach imposes a cointegrating relationship on the data: the current account will have to be stationary as it can be represented as the discounted sum of changes in net output. As net output is itself assumed to be an I(1) process, its differences will be I(0) and so will be the current account. As investment and savings are I(1), there is a cointegrating relationship between them.

That is, in this Section we use a testing procedure for structural break in univariate time series with unknown change point,[8] based on Bagnai and Manzocchi (1996) and as illustrated by the following equation:

$$CA_t = \mu + \beta t + \alpha CA_{t-1} + \delta 1(t>T_B) + \zeta(t-T_B)1(t>T_B) + e_t \qquad (12)$$

Where α, β, δ, ζ and μ are constant parameters, 1(.) is the indicator function that takes value one if the event in brackets occurs and zero otherwise, T_B is the break date (unknown a priori), and e_t and i.i.d. noise. The δ and ζ parameters measure the shifts occurring in the period T_B in the intercept and slope of the process respectively (see Table 1).

(Insert Table 1)

We apply the statistics of Zivot and Andrews (1992), which test the null of a unit root conditional on the presence of a structural break in the deterministic trend. We test against a break in the intercept ($\delta \neq 0$), and slope ($\zeta \neq 0$). The results of the unit root and structural break test are listed in Table 2. According to this table, when traditional unit root tests are applied, we reject the null hypothesis of unit root for only seven of the 15 countries, while when we allow for a structural break, the results suggest that these variables follow stationary processes.

(Insert Table 2)

As regards the structural breaks are concerned, we can compare our chronology of current account reversals with the results of previous studies. Take for example the findings provided by Freund (2000). She found the following reversals episodes: Austria 1980, Belgium 1981, Denmark 1986,

[8] This problem has been addressed with event-study methodoloy or *ad hoc* empirical criteria and these approaches do not lead to a correct discrimination between transitory and permanent phenomena. The methodology of event study uses a priori information concerning only known episodes of external crisis (Corbo and Hernandez, 1996). Other economists suggest *ad hoc* criteria for reversal identification based on data analysis. For example, Milesi-Ferrretti and Razin (1997) argue that a current account reversal occurs at time T if the sample average from T+1 to T+3 of CA_t exceeds the sample average from T-3 to T-1 by 3 to 5 percent points.

Finland 1991, Greece 1985, Ireland 1981, Italy 1981 and 1982, Portugal 1981, Spain 1981, Sweden 1982 and 1992 and the United Kingdom 1989.[9]

As far as the investment rates and productivity levels are concerned, we cannot reject the null hypotehsis of unit root in any of the cases. However, when country specific productivity levels are analyzed, we again have mixed results using Phillips-Perron unit root tests, so that Zivot-Andrews tests are also applied. In this case, we will also assume that these variables follow a stationary process.

3.3. Explaining the current account and investment dynamics

In this Section we first estimate the relationship betweeen productivity shocks and current accounts and then, the productivity shocks – investment relationship. According to the previous results, we specify the following equations:

$$CA_t^i = \alpha_0^i + \alpha_1 CA_{t-1}^i + \alpha_2 A_t^{C,i} + \alpha_3 \Delta A_t^{W,i} + \alpha_4 D_t + \alpha_5 D_t * A_t^{C,i} + \alpha_6 D_t * \Delta A_t^{W,i} \qquad (13)$$

$$\Delta I_t^i = \alpha_0^i + \alpha_1 \Delta I_{t-1}^i + \alpha_2 A_t^{C,i} + \alpha_3 \Delta A_t^{W,i} + \alpha_4 D_t + \alpha_5 D_t * A_t^{C,i} + \alpha_6 D_t * \Delta A_t^{W,i} \qquad (14)$$

were i represents the country, t represents the observation year, CA is the current account as percentage of GDP, I is investment as percentage of GDP, A^C is country – specific productivity and A^W is global productivity. As we have seen in Table 2, many reversals took place in the last two decades. In oder to capture the impact of the reversals in our analysis we introduce three additional variables: D_t is a dummy variable that takes value 1 after the break (usually, 1980), A^C*D_t and A^W*D_t are multiplicative dummy variables.

The estimated coefficients of A^C which are shown in Table 3, column 3 are significantly different from cero and negative for Germany, Ireland, Netherlands and significantly different from cero and positive for Finland. Corresponding coefficients of A^C*D80 which are in column 6 are statistically

[9] According to Freund (2000) four criteria must be met to have an episode that qualifies as a reversals. They are: the current account deficit exceeded 2% of GDP before reversal, the average deficit was reduced by at least 2% of GDP over 3 years (from the minimum to the three year average), the maximum deficit in the 5 years after reversal was not larger than the minimum deficit in the 3 years before the reversal, the current account was reduced by by at least one third.

significant for Belgium, Denmark, France, Ireland, Luxembourg and Portugal. As we can see, the impact of this component is not statistically significant for all countries. According to Gregory and Head (1999) the estimates of this parameter may vary substantially across countries in both sign and magnitude. They interpreted insignificant estimates of α_2 as suggesting that saving/consumption smoothing effect is not very pronounced. This is in accordance with the finding of Backus and Kehoe (1992) and Bakus et al. (1992) that for most developed countries the trade balance is counter-cyclical. If the saving/consumption smoothing effect were large, then it would constitute a pro-cyclical force in the current account. The above results suggest that saving/consumption smoothing effect in Belgium, Denmark, Germany, France, Ireland, Luxembourg, Netherlands and Portugal are not are not very pronounced and their current accounts are thus counter – cyclical.

(Insert Table 3)

Additionally, the estimated coefficient of country – specific productivity in equation (14) (A^C or D_t*A^C) are statistically significant only for Belgium, Denmark, Ireland, Italy, Luxembourg, Portugal, Finland, Sweden and the UK (see columns 3 and 6 in Table 4), which suggests that country specific productivity shocks affect the current account more than investment, a result which is in accordance with the literature (see Glick and Rogoff (1995)).

(Insert Table 4)

4. Conclusions

The intertemporal approach to current account is becoming increasingly stamdard in international macroeconomics. In this paper we have addressed the question of whether exogenous productivity shocks are associated with current account and investment dynamic for some European countries during the period 1960-2000. The main results are the following. First, we find evidence of reversals or structural breaks in the behaviour of current account variables for the European countries, occurring in most of the cases around 1980. Allowing for these breaks, we obtain that these variables follow stationary processes, as suggested by the intertemporal current account model. Second, we find a negative relationship between specific productivity levels and current accounts in the cases of Belgium, Denmark, Germany, France, Ireland, Luxembourg, Netherlands and Portugal, which suggests that the current accounts of these countries are counter-cyclical. According to the literature, this suggests that the saving/consumption smoothing effect (it induces the country to lend to the rest of the world in order to smooth consumption over time) is less pronounced than the investment effect (it induces the country to borrow from the rest of the world to finance an investment boom). In contrast, the current accounts of some countries such as Greece, Spain, Italy and Austria do not respond at specific productivity changes. Third, the results indicate that country-specific productivity shocks affect the current account more than investment. According to the literature, this implies that both consumption and investment respond to changes in productivity inducing a larger response by the current account. Finally, the response of current account variables to changes in specific productivity is higher after 1980 for many of the countries, a period of important shifts in the current account of many of the countries (Belgium, Denmark, France, Ireland or Netherlands, for example, suffer permanent improvements of their current account balance to GDP ratio). The analysis of why these reversals occur and their relationship with productivity shocks constitutes one of the objectives of future research.

References

Backus, D.K. and P.J. Kehoe (1992): “International evidence on the historical properties of business cycles”, *American Economic Review* 82, pp. 864-888.

Backus, D.K., Kehoe, P.J. and F.E. Kydland (1995): “International real business cycles”, *Journal of Political Economy* 101, pp. 745-775.

Bagnai, A. and S. Manzocchi (1996): “Unit root tests of capital mobility in the less developed countries”, *Weltwirtschaftliches Archiv* 132, pp. 544-557.

Bagnai, A. and S. Manzocchi (1999): “Current account reversals in developing countries: the role of fundamentals”, *Open Economies Review* 10, pp. 143-163.

Baxter, M. and M.J. Crucini (1993): “Explaining savings-investment correlations”, *American Economic Review* 83, pp. 416-436.

Bergin, P.R. (2000): “How well can we explain the current account in terms of optimizing behavior?”, *UCD-mimeo.*

Bergin P.R. and S.M. Sheffrin (2000): “Interest rates, exchange rates and present value models of the current account”, *Economic Journal* 110, pp. 535-558.

Buiter, W.H. (1981): “Time preference and international lending and borrowing in an overlapping generations model”, *Journal of Political Economy* 89, pp. 769-797.

Corbo, V. and L. Hernandez (1996): “Macroeconomic adjustment to capital inflows: lessons from recent Latin American and East Asian experience”, *World Bank Economic Review* 11, pp. 61-85.

Dornbusch, R. (1983): “Real interest rates, home goods and optimal external borrowing”, *Journal of Political Economy* 91, pp. 141-153.

Feldstein, M. and C. Horioka (1980): “Domestic saving and international capital flows”, *Economic Journal* 105, pp. 314-329.

Finn, M. (1990): “On savings and investment dynamics in a small open economy”, *Journal of International Economics* 29, pp. 1-21.

Frenkel, J.A. and A. Razin (1987): “Fiscal policies and the world economy: an intertemporal approach, Cambridge, MA: MIT Press.

Freund, C.L. (2000): “Current account adjustment in industrialized countries”, *Board of Governors of the Federal Reserve System, International Finance Discussion Papers*, n. 692.

Ghosh, A.R. (1995): “International capital mobility among the major industrial countries: too little or too much?”, *Economic Journal* 105, pp. 107-128.

Glick, R. and K. Rogoff (1995): “Global versus country-specific productivity shocks and the current account”, *Journal of Monetary Economics*. 35, pp. 159-192.

Gregory, A.W. and A.C. Head (1999): “Common and country-specific fluctuations in productivity, investment, and the current account”, *Journal of Monetary Economics* 44, pp. 423-451.

Gundlach, E. and S.Sinn (1992): “Unit root tests of the current account balance: implications for international capital mobility”, *Applied Economics* 24, pp. 617-625.

Hoffmann, M. (1999): “Current account and the persistence of global and country-specific shocks: is investment really too volatile?”, *European University Institute,* WP 99-25.

Iscan, T.B. (2000): “The terms of trade, productivity growth and the current account”, *Journal of Monetary Economics* 45, pp. 587-612.

Lane, P.R. (1999): “The new open economy macroeconomics: a survey”, *CEPR Discussion Paper* n. 2115.

Milbourne, R. and G. Otto (1992): “Consumption smoothing and the current account”, *Australian Economic Papers* 31, pp.369-384.

Milesi-Ferreri, G.M. and A.Razin (1997): “Sharp reductions in current account deficits: an empirical analysis”, *NBER working paper* n. 6310.

Nason, J.M. and J.H. Rogers (1999): "Investment and the current account in the short and the long run", *mimeo, University of British Columbia*.
Obstfled, M. (1982): "Aggregate spending and the terms of trade: is there a Laursen Metzler effect?", *Quaterly Journal of Economics* 97, pp. 251-270.
Obstfled, M. (1986): "Capital mobility in the world economy: theory and measurement", *Carnegie Rochester Conference Series on Public Polic*y 24, pp. 55-103.
Obstfeld, M. and K. Rogoff (1995): "The intertemporal approach to the current account", in *Handbook of International Economics*, Grossman, G.M. and K.Rogoff, eds., North-Holland Publishing, New York.
Obstfeld, M. and K. Rogoff (1996): *Foundations of International Macroeconomics*, Cambridge, MA: the MIT Press.
Obstfeld, M. and K. Rogoff (2000): "The six major puzzles in international macroeconomics: is there a common cause?", *NBER working paper*, 7777.
Otto, G. (1992): "Testing a present value model of the current account: evidence from US and Canadian time series", *Journal of International Money and Finance* 11, pp. 414-430.
Perron, P. (1989): "The great crash, the oil price shock, and the unit root hypothesis", *Econometrica* 57, pp. 1361-1401.
Persson, T. and L. Svensson (1985): "Current account dynamics and the terms of trade: Harberger-Laursen-Metzler two generations later", *Journal of Political Economy* XCIII, pp. 43-65.
Piersanti, G. (2000): "Current account dynamics and expected future budget deficits: some international evidence", *Journal of International Money and Finance* 19, pp. 255-271.
Sachs, J.D. (1981): "The current account and macroeconomic adjustment in the 1970s", *Brookings Papers in Economic Activity*, pp. 201-268.
Sachs, J.D. (1982): "The current account in the macroeconomic adjustment process", *Scandinavian Journal of Economics* 84, pp. 147-159.
Sheffrin, S.M. and W.T. Woo (1990): "Present value tests of an intertemporal model of the current account, *Journal of International Economy* 29, pp.237-253.
Shibata, A. and M. Shintani (1998): "Capital mobility in the world economy: an alternative test", *Journal of International Money and Finance* 17, pp. 741-756.
Stock, J.H. (1994): "Unit roots, structural breaks and trends", in R.F. Engle and D.L. McFadden (eds.) *Handbook of Econometrics*, Amsterdam: Elsevier, pp. 2740-2841.
Svensson, L. and A. Razin (1983): "The terms of trade and the current account: the Harberger-Laursen-Meztler effect", *Journal of Political Economy* XCI, pp. 97-125.
Zivot, E. and D.W.K. Andrews (1992): "Further evidence on the great crash, the oil price shock and the unit root hypothesis", *Journal of Business and Economic Statistics* 10, pp. 251-270.
Wu, J.-L. (2000): "Mean reversion of the current account: evidence from the panel data unit root test", *Economic Letters* 66, pp. 215-222.

Data Appendix

The data used in this study are obtained from Annual Macro Economic Data Base (AMECO). The countries includes in the study are Germany, Belgium, Austria, Spain, Finland, France, Ireland, Italy, Luxembourg, Portugal, United Kingdom, Netherlands, Denmark, Greece and Sweden. The data are annual from 1960 to 2000. The variables are:

- Total factor productivity, calculated from a Cobb-Douglas production function:

$$Y = AK^{\alpha} L^{1-\alpha} \tag{A.1}$$

where Y is the production, proxied by the index of GDP at 1995 market prices (1960=1), K is the index of net capital stock at 1995 market prices (1960=1), L is the index of total employment (full time equivalents or persons) and (1-α) is proxied by the average of the real unit labour cost over the statistical period.

From the equation (A.1), we obtain the total factor productivity (A) as:

$$A = \frac{Y}{\exp[\alpha \ln K + (1-\alpha) \ln L]} \tag{A.2}$$

- Current account data are constructed by subtracting gross fixed capital formation from gross saving. Both variables were deflated using the gross fixed capital formation price deflator.

$$CA_t = S_t - I_t \tag{A.3}$$

In order to avoid heteroscedasticity problems, the current account in percent of GDP is obtained dividing (A.3) by GDP at constant prices.

- The global productivity measure is formed by taking a GDP-weighted average of the 15 individual European country measures (A.2), and the country-specific component is formed as the deviation from the global weighted average. The weights were constructed from each country's share of total GDP (measured in PPS) in year 1975, as in Glick and Rogoff (1995).

- The country-specific productivity is calculated by substracting the GDP-weighted average of the 15 individual-country measures from the individual-country TFP growth rate as did Glick and Rogoff (1995) and Iscam (2000).

- **TABLE 1.**

Five DGP structures considered by the testing procedure

	Description	Parameterization
(a)	I(0) without structural break	$\lvert\alpha\rvert < 1; \beta = \delta = \zeta = 0$
(b)	I(0) with structural break	$\lvert\alpha\rvert < 1; \beta = \zeta = 0$
(c)	Trend stationary without structural break	$\lvert\alpha\rvert < 1; \delta = \zeta = 0$
(d)	Trend stationary with structural break (segmented trend process)	$\lvert\alpha\rvert < 1$
(e)	I(1)	$\alpha = 1; \beta = \delta = \zeta = 0$

TABLE 2.
Unit root tests: Phillips Perron (PP) and Zivot and Andrews (ZA)

	Current Account			Investment	
	PP	ZA#	T_B	I(1) vs I(0)	I(2) vs I(1)
Belgium	-1.34[a]	-4.32**	(1981)	0.02	-5.05**
Denmark	-3.41*[c]	-3.90*	(1989)	-0.04	-5.08**
Germany	-2.45**[a]	-4.14**	(1985)	-0.76	-3.97**
Greece	-3.99**[c]	-4.23**	(1980)	-0.50	-7.05**
Spain	-3.07**[b]	-5.81**	(1980)	-2.18	-3.26**
France	-1.77*[a]	-5.03**	(1982)	-2.61*	-3.46**
Ireland	-1.42[a]	-4.06**	(1984)	-2.35	-5.74**
Italy	-3.09[c]	-4.61**	(1992)	-1.37	-3.61**
Luxembourg	-2.96[c]	--	--	-2.56	-7.46**
Netherlands	-2.88[c]	-4.32**	(1994)	-0.44	-6.00**
Austria	-3.01[c]	-5.32**	(1992)	-2.33	-5.77**
Portugal	-1.55	-4.43**	(1984)	-1.91	-4.95**
Finland	-1.86*[a]	-5.76**	(1987)	-1.23	-3.71**
Sweden	-1.52[a]	-6.22**	(1991)	-0.54	-4.17**
UK	-2.44**[a]	-5.07**	(1992)	0.88	-4.64**
Global					

TABLE 2 (Cont.)
Unit root tests: Phillips Perron (PP) and Zivot and Andrews (ZA)

	Productivity levels		Specific productivity		
	I(1) vs I(0)	I(2) vs I(1)	I(1) vs I(0)		
	PP	PP	PP	ZA	T_B
Belgium	-2.57	-5.73**	-2.37	-6.27**	(1980)
Denmark	-3.20*	-7.07**	-1.96**	-4.09**	(1980)
Germany	-1.84	-5.05**	-2.47	-5.43**	(1974)
Greece	-3.02	-4.85**	-2.79	-4.25**	(1982)
Spain	-3.07	-3.28**	-6.71**	-3.47*	(1973)
France	-4.50**	-3.23**	-4.32**	-4.32**	(1970)
Ireland	-0.61	-5.26**	-0.30	-4.57**	(1982)
Italy	-2.80	-3.36**	-4.27**	-7.70**	(1973)
Luxembourg	-2.58	-5.92**	-2.04	-4.65**	(1976)
Netherlands	-1.47	-4.95**	-3.44**	-3.45*	(1974)
Austria	-1.98	-4.80**	-2.32	-5.54**	(1983)
Portugal	-1.83	-4.32**	-3.46**	-4.66**	(1974)
Finland	-1.89	-4.46**	-1.00	-4.37**	(1987)
Sweden	-2.29	-4.33**	-0.75	-4.63**	(1983)
UK	-3.06	-5.35**	-2.85*	-4.33**	(1982)
Global	-2.41	-4.39**	--	---	--

PP without trend and intercept, except for Luxembourg (with trend and intercept). Productivity levels, with trend and intercept. Productivity growth rates with interecept. Critical values:

(a) without trend or intercept: -1.62, -1.95
(b) with intercept: -2.60, -2.93
(c) with trend and intercept: -3.19, -3.52

Critical values for ZA test: For λ=0.1,0.2,0.3,0.4,0.5,0.6,0.7,0.8,0.9, the 5% critical values are –3.65, -3.80, -3.87, -3.94, -3.96, -3.95, -3.85, -3.82, -3.68, respectively. The breakpoint (T_B) is calculated multiplying λ by the number of observations (T) and is presented in brackets.

TABLE 3.
Parameter estimates, 1960-2000

	INT.	CA_{t-1}	A^C	ΔA^W	D80	A^C*D80	ΔA^W*D80	R^2aj.
Belgium	-0.01**	0.73**	--	0.38**	0.24**	-0.54**	--	0.92
	(-4.18)	(10.59)		(3.56)	(2.85)	(-2.71)		
Denmark	-0.01**	0.68**	--	--	0.14**	-0.31**	--	0.75
	(-3.20)	(7.55)			(2.72)	(-2.54)		
Germany	0.20**	0.69**	-0.48**	0.61**	-0.01*	--	--	0.77
	(4.48)	(8.88)	(-4.68)	(4.60)	(-1.72)			
Greece	--	0.54**	--	--	-0.02**	--	--	0.54
		(4.76)			(-2.37)			
Spain	-0.01**	0.65**	--	--	--	--	--	0.40
	(-2.33)	(5.24)						
France	-0.01**	0.80**	--	0.25**	0.19**	-0.42**	--	0.83
	(-2.57)	(8.78)		(2.97)	(3.18)	(-3.08)		
Ireland	--	0.86**	-0.15*	--	--	0.11**	--	0.77
		(9.42)	(-1.82)			(2.41)		
Italy	--	0.79**	--	--	--	--	--	0.63
		(8.24)						
Luxembourg	0.03**	0.62**	--	--	0.18**	-0.35*	--	0.80
	(2.08)	(5.13)			(2.71)	(-1.98)		
Netherlands	0.17*	0.84**	-0.38*	--	--	--	--	0.72
	(1.91)	(9.48)	(-1.91)					
Austria	-0.005*	0.83**	--	0.35**	--	--	--	0.70
	(-1.73)	(8.73)		(2.64)				
Portugal	-0.03**	0.89**	--	1.17**	0.11*	-0.26*	--	0.73
	(-2.81)	(9.13)		(3.64)	(1.89)	(-1.72)		
Finland	-0.07**	0.68**	0.17**	0.55*	--	--	--	0.71
	(-2.35)	(4.75)	(2.24)	(1.99)				
Sweden	--	0.93**	--	--	--	--	0.59**	0.79
		(11.97)					(2.15)	
UK	--	0.66**	--	0.50**	--	--	--	0.63
		(6.38)		(3.62)				

$$CA_t^i = \alpha_0^i + \alpha_1 CA_{t-1}^i + \alpha_2 A_t^{C,i} + \alpha_3 \Delta A_t^{W,i} + \alpha_4 D_t + \alpha_5 D_t * A_t^{C,i} + \alpha_6 D_t * \Delta A_t^{W,i}$$

*, **and -- indicate significant at 10 and 5% and non-significant, respectively.

TABLE 6.
Estimation parameters, 1960-2000

	INT	ΔI_{t-1}	A^C	ΔA^W	D80	A^C*D80	ΔA^W*D80	R^2aj.
Belgium	--	0.27*	--	--	--	-0.02*	0.63**	0.12
		(1.86)				(-1.77)	(2.12)	
Denmark	-0.02**	--	--	0.81**	-0.12**	0.30**	--	0.57
	(-5.61)			(6.72)	(-2.67)	(2.90)		
Germany	--	0.40**	--	--	--	--	--	0.14
		(2.67)						
Greece	-0.01*	--	--	0.66**	--	--	--	0.10
	(-1.98)			(2.30)				
Spain		0.55**	--	0.27**	--	--	--	0.36
		(4.29)		(2.35)				
France	-0.01**	0.53**	--	0.18**	--	--	--	0.42
	(-2.33)	(4.34)		(3.15)				
Ireland	-0.03**	--	0.07**	0.96**	--	--	-1.19**	0.22
	(-3.81)		(3.54)	(5.20)			(-3.79)	
Italy	-0.04*	0.38**	0.10*	--	--	--	--	0.22
	(-1.95)	(2.63)	(1.90)					
Luxembourg	--	--	--	--	--	0.05*	-1.53**	0.05
						(1.69)	(-2.05)	
Netherlands	--	--	--	--	--	--	0.63**	0.03
							(1.72)	
Austria	--	--	--	--	--	--	0.47*	0.01
							(1.74)	
Portugal	--	--	--	--	-0.08**	0.21**	--	0.09
					(-2.24)	(2.33)		
Finland	-0.04**	0.36**	0.12**	--	--	-0.03*	--	0.23
	(-2.22)	(2.44)	(2.13)			(-1.72)		
Sweden	--	0.28*	--	--	-0.09**	0.19**	0.63**	0.30
		(1.97)			(-2.97)	(2.77)	(2.47)	
UK	-0.04**	--	0.11**	--	--	--	--	0.25
	(-3.67)		(3.78)					

$$\Delta I_t^i = \alpha_0^i + \alpha_1 \Delta I_{t-1}^i + \alpha_2 A_t^{C,i} + \alpha_3 \Delta A_t^{W,i} + \alpha_4 D_t + \alpha_5 D_t * A_t^{C,i} + \alpha_6 D_t * \Delta A_t^{W,i}$$

*, **and -- indicate significant at 10 and 5% and non-significant, respectively.

FIGURE 1.
Current account (S-I), in percentage of GDP

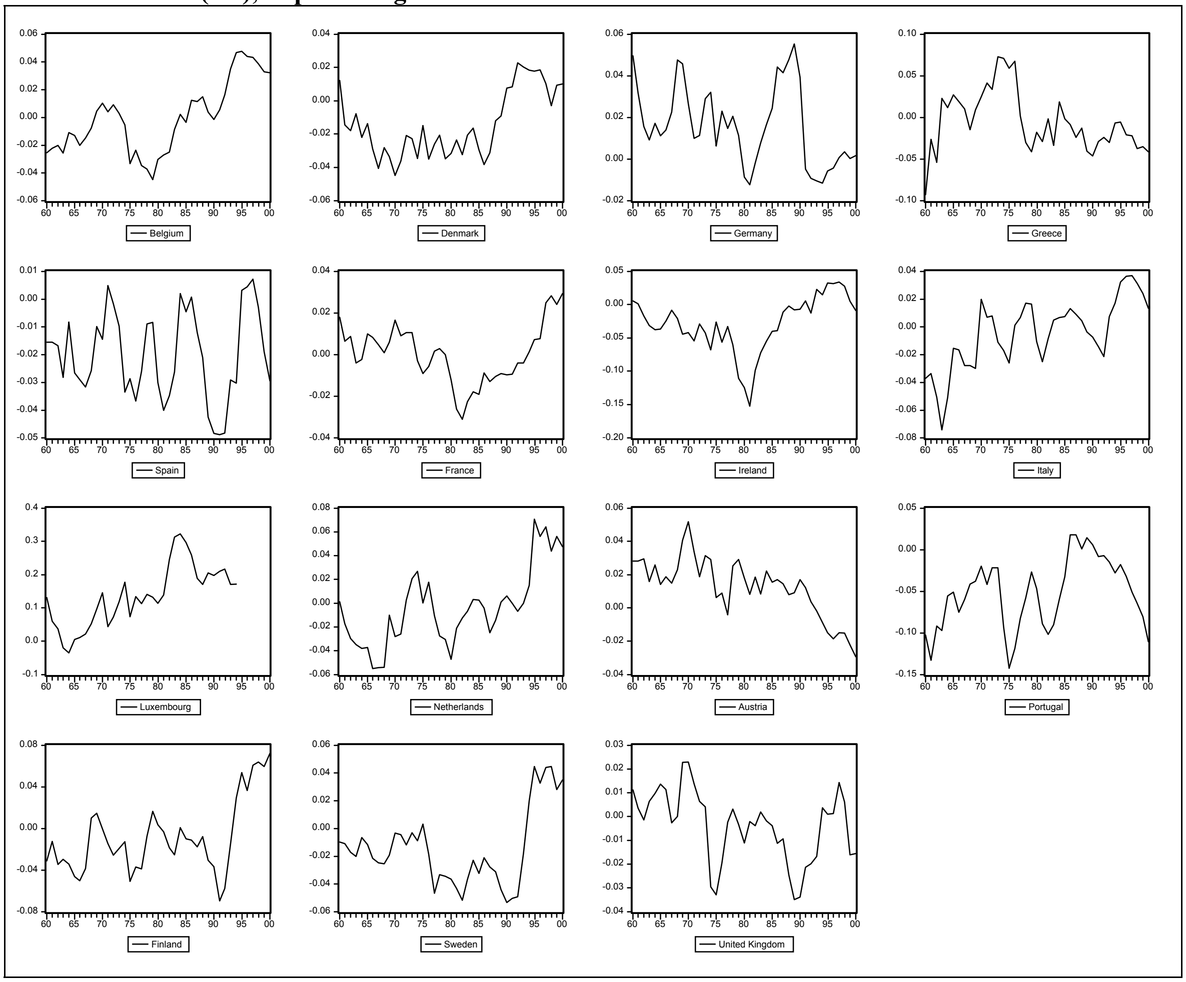

FIGURE 2.
Total factor productivity levels (A_i), in logs

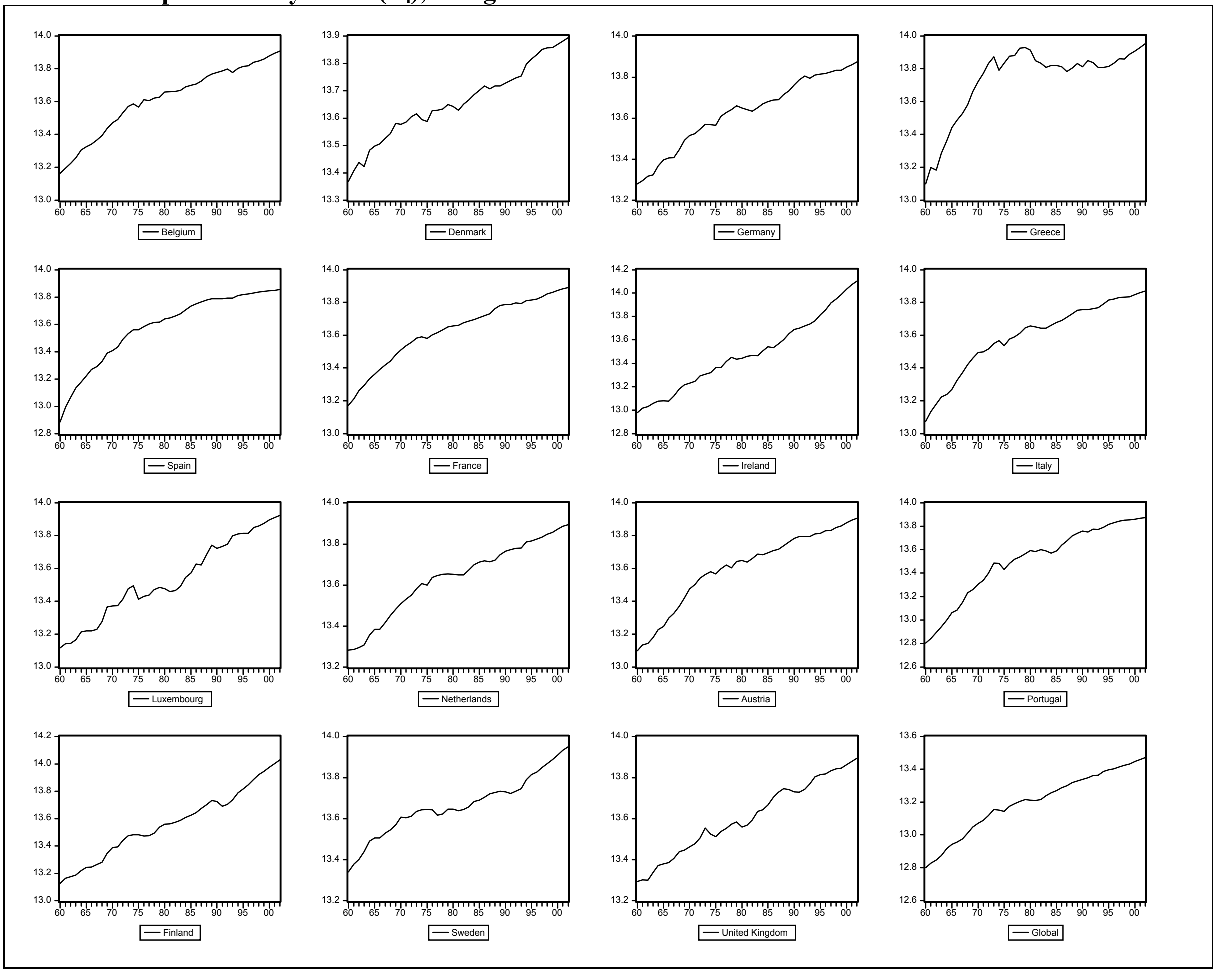

FIGURE 3.
Country-specific productivity levels A^C

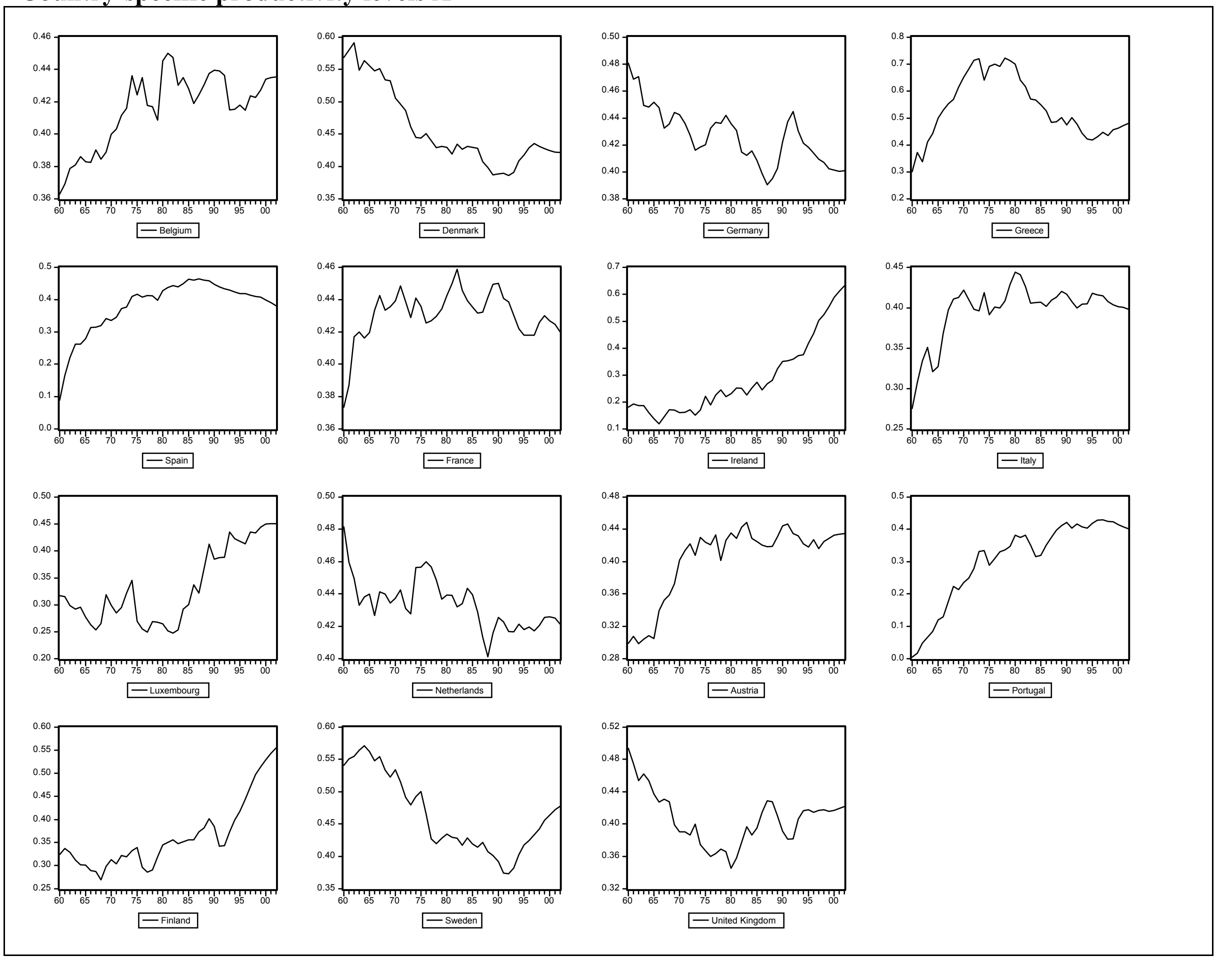

FIGURE 4.
Country-specific productivity growth rates

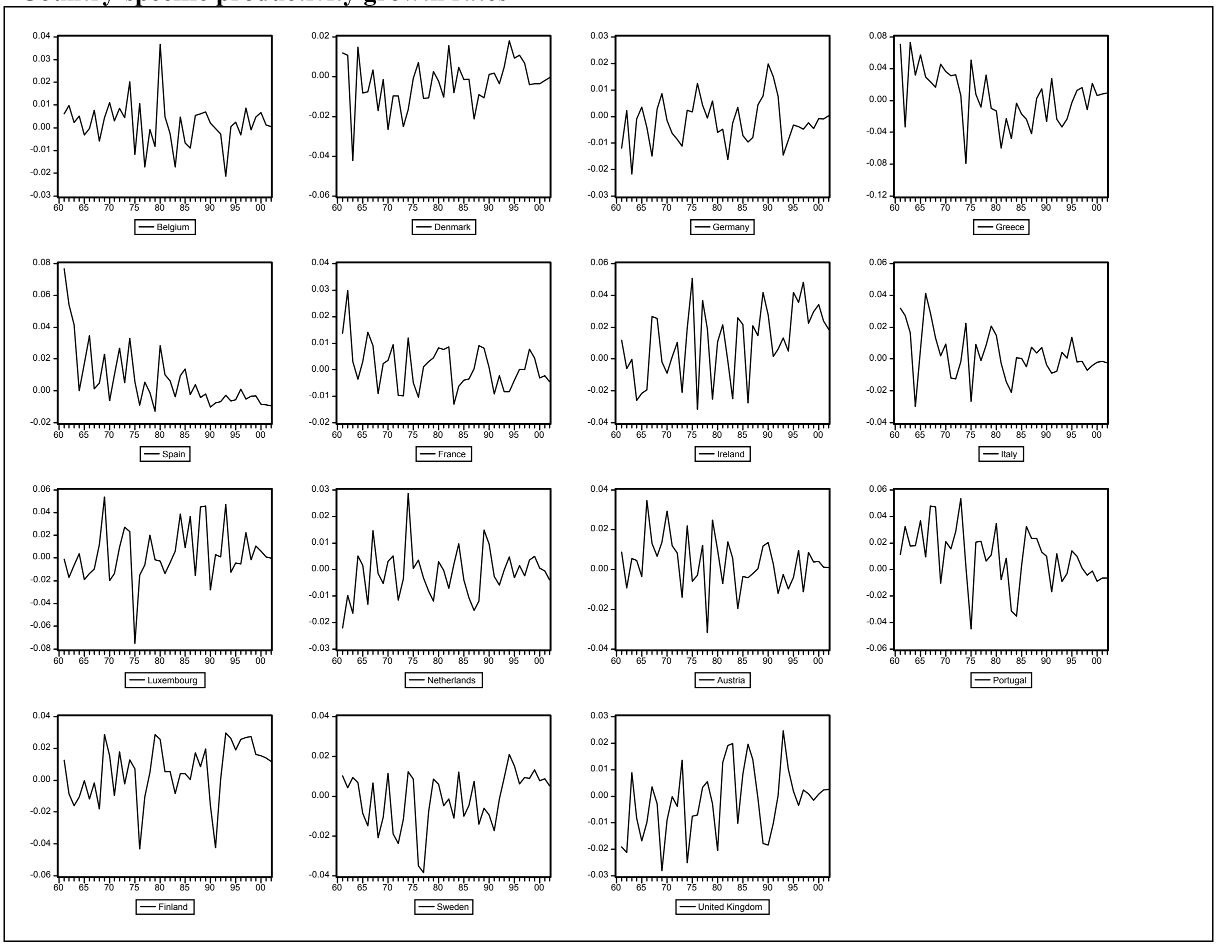

FIGURE 5.
Investment rates, in percentage of GDP