Current Account Balances of Selected Members of the Euro Area: Determinants and Policy Implications

by
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Abstract

This paper investigates the fundamental determinants of the current account balance for countries of the euro area that have the largest current account surpluses and deficits, respectively. The analysis is based on a broad class of intertemporal models of the current account, involving the "twin deficit" hypothesis, the stage-of-development hypothesis, the demographic structure, financial integration and intermediation. Based on time series cointegration methodology, this paper finds a long-run equilibrium relationship between the current account balance and its fundamental determinants for Germany. Structural current account balances are calculated. No "overshooting" phenomena are in evidence for Germany.

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1. Introduction

The divergence of current account balances of euro area Member States has gained attention by the bail-out of the European Monetary Union to prevent Greece's and Ireland's national bankruptcy. Moreover, high public deficits in Portugal and Spain give rise to concern about the need for a further bail-out. The permanently high current account deficits of the southern Member States are accompanied by high current account surpluses of Germany, Austria, the Netherlands and Finland. By now, Germany is blamed for increasing its competitiveness by wage moderation at the expense of its neighbours (Handelsblatt 2010).

A glance at the relation of savings and investment shows that the diverged price competitiveness of Spain, Portugal and Greece on the one hand and of Germany, Austria, the Netherlands and Finland on the other hand is not the only explanation for the widening of the current account balances.[1] In the intertemporal approach to the current account, the current account balance is the outcome of planned national savings minus investment. Indeed, the saving and investment ratios of the considered countries have diverged steadily. Surplus countries save more than they invest, and deficit countries invest more than they save (European Commission 2006, pp. 29-30).

In the course of this paper, the fundamental determinants of the current account balance will be investigated for countries of the euro area that have the largest current account surpluses and deficits, respectively. Following the studies of Chinn and Prasad (2000), Debelle and Faruqee (1996) and Bussière, Fratzscher et al. (2004), the analysis is based on a broad class of intertemporal models of the current account. The intertemporal models involve the "twin deficit" hypothesis that states a positive relationship between public deficits and current account balances if increased public deficits are not compensated by a rise in

[1] That the price competitiveness has moved apart in the European Monetary Union is shown by Deutsche Bundesbank (2007), which assesses the competitiveness on the basis of the relative purchasing power parity.

private savings (failure of Ricardian equivalence). Additionally, due to the stage-of-development hypothesis, the lower the current relative income is and the higher the expected future income is the more the current account balance deteriorates. This is because of real convergence. Higher financial integration and intermediation will strengthen this relationship. Finally, the demographic structure of a country will influence the households' propensity to save if individuals seek for consumption smoothing due to the life-cycle hypothesis.

Particularly the determinants of the current account balance of Germany are empirically investigated, since the aim is to find economic justifications for its high current account surpluses and to determine the structural current account balance. The current account balance of Germany vis-à-vis the rest of the world is in interest of this paper. The period under review starts from the first quarter of 1975 and ends by the fourth quarter of 2009. The sample consists of data of quarterly frequency. Based on the time series cointegration methodology of Johansen and Juselius (1990), this paper attempts to find a long-run equilibrium relationship between the current account balance (as ratio to the gross domestic product (GDP)), the real exchange rate, the public balance (as ratio to GDP), the domestic national income and the foreign national income. Also, a demographic variable is included in the analysis. Moreover, tests on the effect of real interest rates and financial intermediation, measured by claims on private sector by deposit money banks, are performed.

The cointegration methodology allows to identify relevant long-run relationships as well as to model simultaneously the adjustment dynamics back to the long-run relationships. Hence, it is possible to derive the speed of adjustment of the current account balance in presence of deviations from the long-run equilibrium. A further advantage is that the direction of causality among the variables is not predefined. Moreover, the cointegration methodology of Johansen and Juselius (1990) allows to model short-run dynamics. Finally, the actual current account balance is compared to the structural current account

balance, where the structural current account balance is defined as the balance predicted by the long-run equilibrium. Deviations from the predicted values can be interpreted as "overshooting" phenomena.[1]

Moreover, this paper discusses the need to facilitate current account adjustment if there are market rigidities and briefly considers some economic policy implications. Since there might be different kinds of distortions in deficit countries and surplus countries, policy implications are differentiated with respect to the current account balance.

This paper is organised as follows. Section 2 briefly provides the theoretical framework by presenting the intertemporal approach to the current account balance. Section 3 shows some stylised facts of the current account development in the euro area. It proceeds with a review of the empirical literature and the empirical exploration of the determinants of the current account balance. Finally, structural current account positions are presented. In Section 4, the paper considers some policy implication for deficit countries and for surplus countries. Section 5 summarizes the main findings.

[1] The European Commission (2006, pp. 36-37) warns about the risk of "overshooting" because of anticipation of overoptimistic income gains, particularly in the southern euro area Member States.

2. The intertemporal approach to the current account

2.1. Temporary effects on the current account balance

Since the early 1980s, intertemporal optimizing models have gained widespread appeal in analysing external balances. The microeconomic founded intertemporal approach views the current account as the outcome of rational forward-looking decisions about saving and investment. The intertemporal approach defines the current account balance as the change in the value of the economy's net claims on the rest of the world over a period, i.e. the change in its net foreign assets. This approach emphasizes that the current account represents trade over time, whereas the usual concept of trade balance, i.e. exports minus imports, represents trade pattern within one period (Obstfeld/Rogoff 1998, pp. 5-6).

Within the intertemporal approach, a country can optimally modify the time path of its consumption relative to its production. In a deterministic model with one representative consumer, as derived by Sachs (1982), and Obstfeld and Rogoff (1997, pp. 1731-1746), temporary deviations from permanent levels induce current account deficits or surpluses, respectively:

$$CA_t = B_{t+1} - B_t = (Y_t - \tilde{Y}_t) - (G_t - \tilde{G}_t) - (I_t - \tilde{I}_t)\,. \qquad (2.1)$$

CA_t denotes the current account balance, B_t the stock of net foreign assets, Y_t the output, G_t the government spending, and I_t the investment in period *t*; $\tilde{Y}_t$, $\tilde{G}_t$, and $\tilde{I}_t$ denote their permanent levels. A temporary decline in output induces a current account deterioration because individuals choose to borrow from abroad, i.e. to reduce net foreign assets in order to maintain their consumption level. The same way, a current account deterioration is induced by temporary high government spending and temporary high investment needs. This prediction is once again the outcome of intertemporal consumption smoothing.

Moreover, a temporary high real interest rate causes a current account deterioration or current account improvement depending on whether the economy is a net foreign debtor or a net foreign creditor, respectively. In the first case, the

individuals will not spend the temporary high foreign interest income, as it does not influence the determinants of the consumption path. The effect is reversed for net foreign debtors (Sachs 1982, p. 150; Obstfeld/Rogoff 1997, p. 1746).

2.2. Structural determinants of the current account balance

The intertemporal approach to the current account makes further predictions on the current account balance. In fast-growing economies, the current account balance can remain in deficit because of high investment opportunities for a long time, so that the economy accumulates high negative net foreign assets, i.e. net foreign debt (Obstfeld/Rogoff 1998, p. 116-120). Therefore, neither current account balances need to revert quickly to balance, nor net foreign debt to be non-optimal.

Moreover, appreciating real exchange rates due to the Balassa-Samuelson effect[1] have long-run implications on the current account balance. Depending on the size of the intertemporal substitution elasticity of total consumption and the intratemporal substitution elasticity between tradables and nontradables, the economy's initial current account is in surplus and deteriorating over time, or in deficit and improving over time (Dornbusch 1983, pp. 142-146; Obstfeld/Rogoff 1997, p. 1752-1754; Bergin/Sheffrin 2000, pp. 537-539). Since the relative domestic national income to foreign national income is usually a measure for an economy's stage-of-development, and emerging countries are regarded to have higher positive productivity growth differentials than developed countries, economies with relatively low income tend to have current account deficits associated with appreciating real exchange rates.

[1] As Balassa (1964) and Samuelson (1964) have firstly shown, a productivity driven wage increase in the tradables sector leads to a higher relative price of nontradables if the productivity growth is higher in the tradable sector than in the nontradable sector. This results in an overall price level rise and appreciating real exchange rate if the productivity growth differential is higher in the home (or emerging) country than in the foreign (or developed) country.

Furthermore, acceleration of demographic change implies higher steady-state net foreign assets to output ratios due to the life-cycle theory of consumption and saving introduced by Modigliani and Brumberg (1980, pp. 81-88). Individuals desire to smooth consumption over their lifetime which requires phases of saving and dissaving if income fluctuates. More specifically, individuals in a phase of high income relative to their lifetime income, i.e. in the earning span, will tend to save more, and dissave when income is relatively low, for example in the retirement span. Therefore, individual saving rates vary across the lifetime. In the course of the acceleration of demographic change, higher steady-state net foreign assets to output ratios are accumulated by improving current account balances (Obstfeld/Rogoff 1998, pp. 156-161).

The hypothesis that public budget balances are irrelevant to recourse allocation is called Ricardian equivalence of debt and taxes. If fiscal policy, that induces public deficits, contributes to a deterioration of the current account balance, Ricardian equivalence does not hold. Diamond (1965) and Obstfeld and Rogoff (1998, pp. 133-141) have shown that in the course of repayment, the current account balance improves as individuals need to restrain consumption.

Two aspects of financial development highlight the role of financial markets. The first one is financial intermediation or financial sector quality as the ability to convert domestic savings and capital imports into high-quality assets and thus investment. A low level of financial intermediation might create a shortage in domestic assets which can result in capital exports from emerging to developed markets where funds can be invested in a stronger institutional framework offering higher returns. Therefore, financial deepening would raise domestic investment and thereby deteriorate the current account (Herrmann/Winkler 2008, p. 16; Mendoza/Quadrini/Rios-Rull 2007, p. 36).[1]

[1] Financial intermediation is usually approximated by aggregated money supply M2/GDP or claims on private sector by deposit money banks to GDP ratio, see for example Herrmann and Winkler (2008, pp. 24-32) and Chinn and Prasad (2000).

The second aspect is financial integration. Underdeveloped financial markets restrain borrowing abroad and thus weaken the link between income convergence in a growing economy and the current account balance. A higher degree of financial integration allows catching-up economies to run sizeable current account deficits (Blanchard/Giavazzi 2002, pp. 152-155; Herrmann/Winkler 2008, p. 17).

Financial market integration can be improved by elimination of capital controls, harmonization of financial market rules, harmonization of firms' reporting requirement and decrease in risk of expropriation of foreign lenders and investors. These measures were undertaken by the European Union, and have led to lower uncertainty and transaction costs, and therefore, a diminished risk premium that lenders and investors require (Blanchard/Giavazzi 2002, p. 153).

Further improvement can be reached by reducing the currency risk, either by fixed exchange rates, or even more by entering a currency union (Blanchard/ Giavazzi 2002, p. 154). The European countries considered in this paper participated in the Exchange Rate Mechanism since the early 1990s, and became members of the European Monetary Union in 1999 and Greece in 2001. Therefore, the currency risk vanished by the late 1990s.

Increasing financial integration and financial intermediation are likely to contribute to a further widening of current account balances, as it becomes increasingly easy and cheap to borrow and lend abroad, so that the above mentioned fundamental determinants can work entirely on the current account balance.

3. Empirical analysis

3.1. Stylised facts of the current account developments in the euro area

In this section, this paper takes a look at the development of current account balances and their domestic counterparts, the saving-investment ratios, deriving a few stylised facts that set the stage for the further empirical analysis.

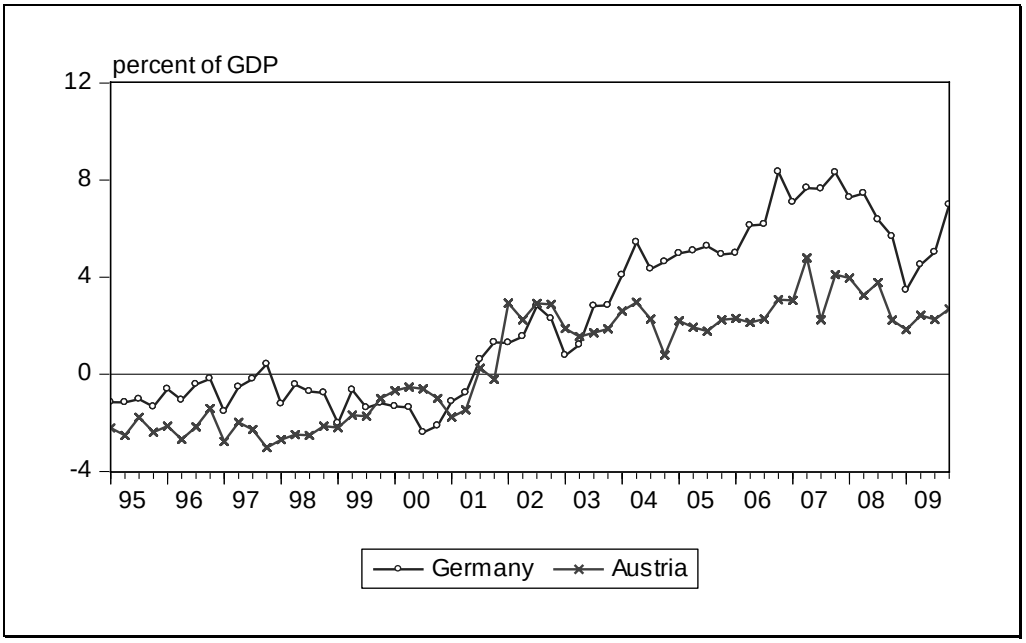
For this purpose, seven members of the euro area are selected due to their comparably large and persistent current account surpluses and deficits, respectively. Large current account surpluses are present in Germany, Austria, the Netherlands and Finland, whereas most of the southern euro area Member States, as Spain, Portugal and Greece, report large current account deficits.

Figure 3.1 to Figure 3.3 show the seasonal adjusted, quarterly current account balances of the selected euro area Member States from 1995Q1 to 2009Q4.[1] Three groups of countries emerge whose current accounts balances have specific developments. The first group (Figure 3.1), Austria and Germany, had run current account deficits during the 1990s until 2001. Since then, their current accounts have improved strongly, peeking to 8% in Germany and 5% in Austria before the financial crisis started. The current accounts have remained in high surplus during the recession.

The second group (Figure 3.2), the Netherlands and Finland, is characterised by persistent current account surpluses. Although their current accounts balances have been far more volatile in comparison to Austria and Germany, surpluses have remained mostly within the band of 4% to 10%. Exceptions are the deteriorated current account of the Netherlands around the turn of the millennium, and decreasing current account balances in Finland since 2008.

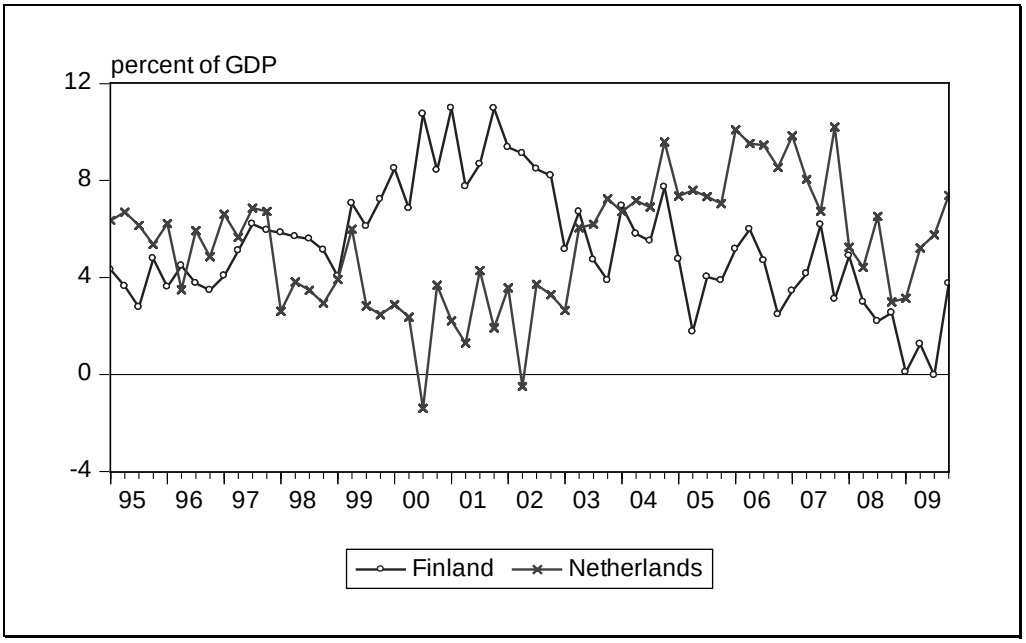
[1] For Greece, data at annual frequency is used because of data availability.

Figure 3.1 Current account balances (% of GDP): Improving surplus countries



Data source: IMF, International Financial Statistics.

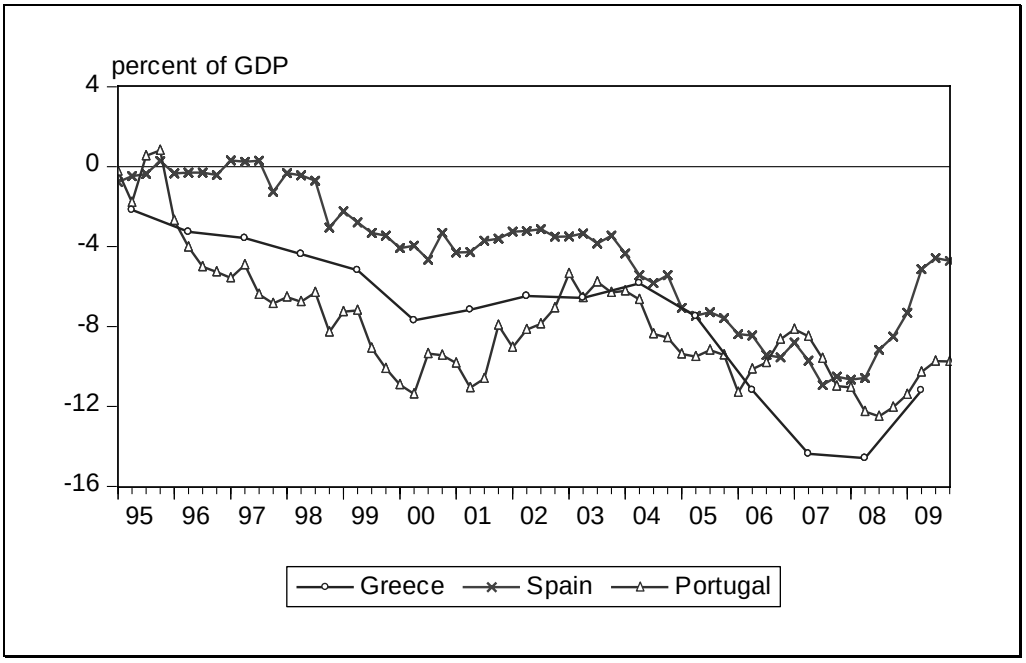
Figure 3.2 Current account balances (% of GDP): High surplus countries



Data source: IMF, International Financial Statistics.

Finally, the third group (Figure 3.3), consisting of Spain, Greece and Portugal, shows sharply deteriorating current accounts since the mid 1990s, although Spain's current account worsened somewhat later, at the start of the EMU. They have been running severe current account deficits ranging from 4% to 15% throughout the last decade, of which Greece shows the highest deficits during the financial crisis.

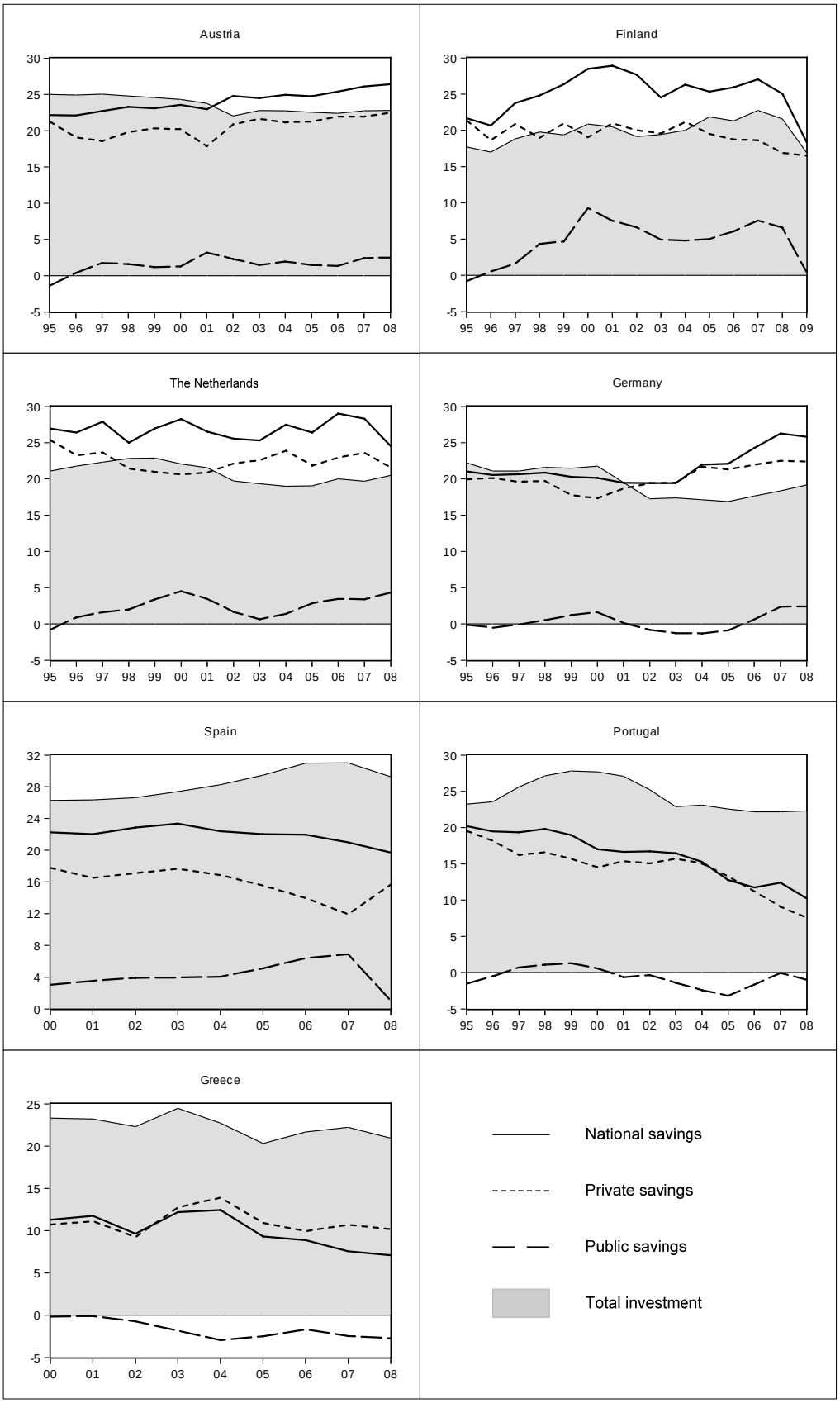
Figure 3.3 Current account balances (% of GDP): High deficit countries



Data source: IMF, International Financial Statistics.

In order to give some additional information about the underlying saving-investment decisions, Figure 3.4 displays national savings and total investment in percent of GDP. Moreover, national savings are disaggregated in public and private savings, where private savings include household and corporate savings.

Figure 3.4 Saving and investment (% of GDP)



Notes: Data on hand are at annual frequency. For Spain and Greece, data is only available since 2000.
Data source: Eurostat, NewCronos.

Stylised fact 1: In the first group, the improving of current account balances traces back to decreasing investment ratios and increasing saving ratios. Deficit countries rather suffer from falling saving ratios, most notably Portugal. High surplus countries experience fluctuating saving and investment ratios.

Austria has recorded a steadily decreasing investment ratio and an increasing private saving ratio. At the same time, the public saving ratio has remained quite stable. In Germany's case, high investment were necessary in the aftermath of the reunification. Since 2002, the investment ratio has returned to its original trend and private savings have risen considerably.[1] The case is different for Finland whose current account surpluses can be traced back to sizeable public budget surpluses, whereas the investment and the private saving ratio have remained stable on equal level. In the Netherlands, the private saving ration and the investment ratio show no trend, but slightly increasing public savings. Among the group of high deficit countries, Spain has recorded an increasing public saving ratio accompanied by a decreasing private saving ratio and an overall decreasing saving ratio, while the investment ratio has increased at the same time. Greece rather suffers from falling public savings, although the investment ratio has fallen as well. An interesting case is Portugal whose increasing current account deficits can almost entirely be traced back to a falling private saving ratio, whereas the investment ration and the public saving ratio show no trend.[2]

Stylised fact 2: Average investment ratios tend to be higher in deficit than in surplus countries. Average saving ratios tend to be lower in deficit than in surplus countries.

[1] For a comprehensive analysis of the current account balance development in Germany in the 1970s and 1980s from a saving-investment perspective, see Dluhosch, Freytag, Krüger (1992, pp. 180-234).

[2] Blanchard and Giavazzi (2002, pp. 168-172) show that current account deficits in Portugal can be largely traced back to a falling private saving ratio from 1985 on. Especially household savings have been accounting for the decrease in savings. For Greece, they work out that the entire current account deterioration can be traced back to a decrease in private savings from 1981 to 2001, whereas public savings improved somehow.

Table 3.1 shows the average saving and investment ratio for each country of the sample at hand, and the group average saving and investment ratio for surplus and deficit countries. Finland's, Germany's and the Netherlands' investment ratios are on average lower than the investment ratios of the deficit countries. Only Austria reaches an investment ratio comparable to Portugal. The pattern is the other way around for saving ratios. Portugal and Greece save almost half as much as the surplus countries do. A remarkable exception is Spain whose average saving ratio is near to the level of surplus countries. Nevertheless, it is running a high current account deficit, since the investment ratio is the highest of the sample.

Table 3.1 Average saving and investment ratios

	Average investment ratio	Group average investment ratio	Average saving ratio	Group average saving ratio
Finland	0.20		0.25	
The Netherlands	0.21	0.21	0.27	0.24
Austria	0.24		0.24	
Germany	0.19		0.22	
Spain	0.28		0.22	
Portugal	0.24	0.25	0.16	0.16
Greece	0.22		0.10	

Data source: Eurostat, NewCronos. Own calculations.

Stylised fact 3: Private and public savings tend to countermove, indicating that Ricardian equivalence holds for most countries.

For almost all countries, the opposing effect of public savings on private savings is visible in Figure 3.4. In Spain and the Netherlands and to less extend in the other countries, an increase in public savings, i.e. public budget consolidation, is attended by a decrease in private savings. Table 3.2 displays the correlation coefficient between the private and public saving ratio for each country. First, the ratios were first-differenced because of time series properties to ensure stationarity. All correlation coefficients have the expected negative sign and most are significantly different from zero at the 5% level, indicating Ricardian equivalence. The correlation coefficients of Austria and Spain are even close to one. In the case of Greece, the coefficient is significant at the 10%

level. Only Germany and Finland show no significant correlation between private and public savings.[1]

Table 3.2 Correlation of first-differenced private and public saving ratios

	Correlation coefficient	Prob.
Austria	-0.8527	0.0002
Germany	-0.2976	0.3234
The Netherlands	-0.5574	0.0478
Finland	-0.2474	0.3939
Portugal	-0.5615	0.0458
Spain	-0.9028	0.0021
Greece	-0.6834	0.0617

Notes: Ordinary Pearson covariances with degrees-of-freedom correction. Prob. denotes the *p*-value. Own calculations.

3.2. Literature overview

Comprehensive literature exists on the empirical exploration of the determinants of the current account balances based on the broad class of intertemporal models. The empirical research can be classified by applied econometric methods, countries of interest and hypothesis tests. The latter focuses either on long-run determinants of the current account balance, or permanent versus transitory effects on the current account balance. Thereby, hypothesis tests are closely connected to econometric methods. Most of the empirical studies apply cross-section and panel data analysis assuming stationarity, for example Chinn and Prasad (2000), and Bussière, Fratzscher et al. (2004). Just few have focused on time series analysis in assessing long-run determinants of the current account balance. Concerning the countries of interest, most empirical studies focus on some set of industrialized countries. In this section, the paper provides a literature overview reporting the results of empirical research based on time series analysis.

[1] Using annual data from 1995-2008 and 2000-2008, respectively, there are just few degrees-of-freedom. For this reason, the performed analysis of saving and investment ratios is not to be interpreted as strong empirical evidence, but as indication for Ricardian equivalence.

Debelle and Faruqee (1996) use two approaches to estimate the determinants of the current account balance. Besides the first cross-sectional approach where each country's average current account balance is assumed to approximately reflect a long-run equilibrium outcome, the second approach distinguishes explicitly between long-run and short-run impacts on the current account balance. Using panel data, they estimate a partial adjustment model of the current account balance and an error-correction model for net foreign assets. The underlying assumption of the partial adjustment model is that the current account balance and its determinants are stationary variables; hence, the explanatory variables are expressed in relative or first-differenced form. In estimating an error-correction specification, they allow for the possibility that the net foreign assets to GDP ratio and the current account balance to GDP ratio are nonstationary variables.

Using the cross-sectional approach, Debelle and Faruqee (1996) find evidence for significant impact of the stage-of-development and demographics on the current account balance. Moreover, the effect of the stage-of-development appears to be nonlinear, so that countries at lower stages of development tend to run smaller current account deficits that deteriorate as the country develops, up to a point where the current account balance reverse and the country runs surpluses. An aging society tends to have a negative influence on the current account balance in industrial countries.

In the dynamic approach of the partial adjustment and error-correction model, Debelle and Faruqee (1996) find a large negative impact of fiscal policy on the current account in the long- and short-run. The impact of public debt varies across countries with high and low public debt, where high debt countries tend to behave more Ricardian. There also exists some evidence in favour of a negative short-run impact of real exchange rate changes and a positive short-run impact of terms of trade changes. Moreover, they find that the stage of the cycle influences the current account balance.

Arghyrou and Chortareas (2008) apply the Johansen and Juselius time series cointegration methodology in assessing the role of real exchange rates after

controlling for the income catching-up process. For ten members of the euro area in 2008[1], they find that current account balances are determined by shifts in relative income as well as shifts in real exchange rates. The real exchange rate is found to be negatively related to the current account balance; domestic and foreign national income is negatively and positively, respectively, connected to the current account balance. On the other hand, differences in the significance of the three variables real exchange rate, domestic and foreign national income exist. For one subset of the countries, just domestic and foreign national income are significant determinants in the long-run relationship. For the second subset, only real exchange rates are significant, whereas for the third subset all three variables are significant. Moreover, current account adjustment toward its equilibrium is gradual, with the disequilibrium term being the main determinant of short-run current account dynamics. For the majority of the members of the euro area, current account adjustment is a nonlinear process, with the speed of adjustment depending on the sign of the disequilibrium term.[2]

Hossain (1999) attempts to distinguish between transitory and permanent disturbances in relative income and real exchange rate. By applying the Johansen and Juselius time series cointegration methodology on the decomposed series, he derives the long-run and short-run impact on the current account balance. He conducts his study for the United States of America and Japan, and concludes that permanent changes in real exchange rate have significant positive effects on the current account balance, when controlling for government consumption. The results concerning transitory effects of real exchange rate changes, and permanent and transitory effects of relative income changes are mixed, thereby providing limited support for the intertemporal models.

[1] The ten members of the euro area are Austria, Belgium, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal and Spain.

[2] Arghyrou and Chortareas (2008) report that the speed of adjust is nonlinear in countries where they failed to detect linear speed of adjustment of the current account: a point that may be relevant for the empirical analysis in Section 3.3.3.

3.3. Cointegration analysis

3.3.1. Data and estimation methodology

This paper attempts to account for idiosyncratic country factors by individual time series analysis. A priori, it cannot be taken for granted that slope coefficients are equal for all countries, so that changes in fundamental determinants of the current account balance affect all countries the same way, as it is usually assumed by applying panel data analysis (Arghyrou/Chortareas 2008, p. 750; Herwartz/Siedenburg 2007). Particularly, the current account balance of Germany vis-à-vis the rest of the world is in interest of this paper.

Quarterly data is used to perform the time series analysis. The availability of data restricts the sample period to 1975Q1-2009Q4. To calculate the current account balance to GDP ratio (*ca*), the seasonally-adjusted current account balance series expressed in current US dollar is converted by the average national currency per US dollar series prior the introduction of the euro and by the average euro per US dollar series thereafter. The converted current account balance series is divided by the seasonally-adjusted GDP in current prices series.

To account for nontradables, the real effective exchange rate (q) is based on relative consumer prices (CPI). Later, the real exchange rate (q) based on unit labour costs (ULC)[1] is also considered in the estimations. The domestic national income (y) and the foreign national income (y^*) are approximated by the seasonally-adjusted GDP volume index series of Germany and of the G-7 countries, respectively. The real interest rate (r) is deduced from the long-term interest rate on government bonds, and corrected for inflation using the consumer price inflation series.[2] The public balance to GDP ratio (g) is constructed from data of annual frequency before 1999, and quarterly data series

[1] The real exchange rate is actually based on relative normalized unit labour costs, but is called the real exchange rate based on unit labour costs henceforward, to simplify matters.

[2] The real interest rate is derived from the equation $(1+i)=(1+r)(1+\pi)$, where i is the nominal interest rate and π the inflation rate, see for example Belke and Polleit (2009, p. 121).

thereafter. The quarterly data series is only available since the introduction of the euro,[1] so that annual data is converted to quarterly frequency by constant method.[2]

Frequency conversion is also necessary for the demographic variable (n) because only annual data exists. The crude rate of natural population change is selected and converted to quarterly frequency by constant method. The crude rate of natural population change relates the difference between the number of live births and the number of deaths over a period to the average population during that period. The value is expressed per 1000 inhabitants.[3] Finally, the claims on private sector to GDP ratio (f) are calculated as defined by the national residential criteria, and the resulting series seasonally adjusted.[4] The graphs of the computed time series for the variables ca, q, y, y^*, r, f, g and n are displayed in the statistical appendix (Figure A.1).[5]

The two main data sources are the IMF's International Financial Statistics (IFS) databank and the OECD's Main Economic Indicators databank. Additionally, data have been drawn from the OECD's Economic Outlook Statistics and Projections, and the Eurostat's NewCronos databank. More detailed explanatory notes on the data are available in the data appendix.

The analysis of time series properties is performed by unit root tests and graphical examination. Additionally, stationarity tests are performed in unclear cases. The results suggest that the series are integrated of order 1 (denoted

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[1] The series exhibits strong seasonality, so that seasonal adjustment is performed by X12, additive method.
[2] The constant method assigns the same value to all observations in the quarterly frequency series associated with a particular annual frequency period. Herrmann and Jochem (2005) apply basically the same approach by dividing annual data of public balance by four for periods which lack of quarterly data, and relating it to quarterly GDP series thereafter.
[3] Since the crude rate of natural population change is a flow figure, data is converted by constant method, so that the sum of quarterly data matches the annual data.
[4] Seasonal adjustment is performed by X12, multiplicative method.
[5] Also the graphs of the time series for Austria, Spain, Portugal, the Netherlands, Finland and Greece are displayed in Figure A.2 to Figure A.7. For Greece, the lack of quarterly data forces the use of data at annual frequency. It is interestingly to note that Finland is the only country whose public balances have not almost permanently been in deficit.

I(1)).[1] In cases where the unit root and stationarity tests report conflicting results, the series are treated as I(1) due to graphical examination and theoretical considerations.

Since all series are accepted to be integrated of order 1, and the main interest is to find a long-run relationship between the variables, the Johansen (1988; 1995), and Johansen and Juselius (1990) time series cointegration methodology is applied. The cointegration methodology involves the estimation of an unrestricted vector autoregressive model (VAR) defined by

$$X_t = \pi + \Pi_1 X_{t-1} + ... + \Pi_k X_{t-k} + \Phi D_t + u_t,\ t = 1,...,T, \qquad (3.1)$$

where X_t is a (8×1) vector $X_t = [ca_t, q_t, y_t, y_t^*, r_t, g_t, f_t, n_t]$; Π_i is a (8×8) matrix of parameters with $i = (1,...,k)$, where k is the lag order; π is a constant term; and u_t a (8×1) vector of independent identically and normally distributed errors. The deterministic term D_t contains impulse intervention dummies[2], and Φ is its corresponding matrix of parameters.

The VAR (3.1) can be reformulated as a linear vector error-correction model (VECM). The VECM is expressed by

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + ... + \Gamma_{k-1} \Delta X_{t-k+1} + \Pi X_{t-1} + \Phi D_t + \pi + u_t, \qquad (3.2)$$

where Δ is the first-difference operator, $\Pi = -(I - \Pi_1 - ... - \Pi_k)$ is the lagged levels matrix, I is the identity matrix, and $\Gamma_i = -(\Pi_{i+1} + ... + \Pi_k)$. If X_t consists of p terms integrated of order 1, where p is the number of variables in X_t, and if Π includes r linearly independent columns, where $r < p$, i.e. $0 < \text{rank}(\Pi) = r < p$, eq. (3.2) converges to a long-run equilibrium. Then, the long-run equilibrium can be written as

$$\Pi = \alpha\beta', \qquad (3.3)$$

where α and β are both $(8\times r)$ matrices. The matrix β includes the long-run equilibrium coefficients, and the matrix α contains the coefficients of the

[1] The results of the unit root and stationarity tests are available from the author on request.
[2] The list of impulse intervention dummies included in the VAR is available from the author on request.

speed of adjustment towards the long-run equilibrium. The coefficients of the matrices Γ_i describe short-run changes resulting from previous changes (Granger's representation theorem (Johansen 1995, pp. 48-49)). Therefore, eq. (3.2) can be written as

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + ... + \Gamma_{k-1} \Delta X_{t-k+1} + \alpha(\beta' X_{t-1}) + \Phi D_t + \pi + u_t . \qquad (3.4)$$

Since the series presumably have non-zero means and deterministic trends (especially in *n*) as well as stochastic trends, a constant term π is included in eq. (3.2), so that there are linear trends in the data, but the cointegrating equations only have intercepts.[1]

By the graphical examination of the variables in levels and first-differences, and of their residuals of the first tentatively estimated VAR, various "outlier" observations are detected, which are accounted for by impulse dummy variables. To ensure that the estimated VAR is a statistical adequate description of the data generating process, misspecification tests on the multivariate normality assumption, independence between u_t and u_{t-h} for lags $h = 1, 2, ...$, and homoscedasticity of errors are performed. The results indicate that the model does not violate the assumptions.[2]

3.3.2. Long-run determinants of the current account balance

Table 3.3 presents the cointegration tests for the VAR (3.1). For Germany, both the maximal eigenvalue and the trace statistic indicate one cointegrating vector at the 5% level. Examining the graphs of the unrestricted cointegrating relations (Figure A.8 in the appendix), the graphs show stationary behaviour confirming the results of the Johansen-Juselius cointegration tests.[3]

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[1] This corresponds to the third deterministic trend case considered by Johansen (1995, p. 81): $H_1(r): \mu_t = \alpha\rho_0 + \alpha_\perp\gamma_0$.

[2] The results of the residual serial correlation LM test, multivariate Jarque-Bera residual normality test and White heteroskedasticity test are available from the author on request.

[3] The VAR (3.1) is also estimated for Austria, Spain, Portugal, the Netherlands and Finland. The trace and maximal eigenvalue tests report three cointegrating relations for most of the countries, two for the Netherlands, and one for Austria. The results are available from the author on request. Because of the multiple cointegrating vectors, the estimated long-run relationships are not identified, and their analysis is not continued in this paper. Further research can be done on identifying relevant cointegrating vectors and

determining structural current account balances for these euro area Member States. For Greece, the number of observations is insufficient to perform a cointegration test.

Normalizing with respect to *ca*, the estimated cointegrating vector for Germany is

$$\beta' = \begin{bmatrix} 1 & -0.041 & 0.595 & -0.759 & -0.678 & -0.131 & 0.048 & 0.020 & -0.078 \end{bmatrix},$$

where the variables are ordered as $ca, q, y, y^*, r, g, f, n$ and constant. Hence, the estimated long-run relationship may be written as

$$ca = 0.078 + 0.041q - 0.595y + 0.759y^* + 0.678r + 0.131g - 0.048f - 0.020n .$$

Since there is only one cointegrating vector, the coefficients are identified and can be interpreted as the long-run effects on the normalizing variable.

Table 3.3 Johansen-Juselius cointegration tests: Germany (*q* based on CPI)

	Null (H_0)	Alternative (H_1)	Trace statistic	95% critical value	
Trace test	r = 0	r ≥ 1	180.3379	159.5297	***
	r ≤ 1	r ≥ 2	105.1103	125.6154	
	r ≤ 2	r ≥ 3	67.04244	95.75366	
	r ≤ 3	r ≥ 4	40.83137	69.81889	
	r ≤ 4	r ≥ 5	24.31330	47.85613	
	r ≤ 5	r ≥ 6	12.40165	29.79707	
	r ≤ 6	r ≥ 7	4.485726	15.49471	
	r ≤ 7	r ≥ 8	0.039497	3.841466	
	Null (H_0)	Alternative (H_1)	Maximal eigenvalue statistic	95% critical value	
Maximal eigenvalue test	r = 0	r = 1	75.22765	52.36261	***
	r ≤ 1	r = 2	38.06784	46.23142	
	r ≤ 2	r = 3	26.21107	40.07757	
	r ≤ 3	r = 4	16.51807	33.87687	
	r ≤ 4	r = 5	11.91165	27.58434	
	r ≤ 5	r = 6	7.915924	21.13162	
	r ≤ 6	r = 7	4.446229	14.26460	
	r ≤ 7	r = 8	0.039497	3.841466	

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively; r denotes the number of cointegrating vectors.

The coefficients of q, y, y^*, r, g, f and n have signs in line with the intertemporal approach to the current account. The relationship between the current account balance and the real exchange rate depends on the size of the intertemporal substitution elasticity of total consumption and the intratemporal substitution elasticity between tradables and nontradables. The estimated coefficient of q indicates a positive relationship, although the coefficient is not significantly different from zero, as presented in Table 3.4. Therefore, the estimates indicate that rising real exchange rates due to productivity growth are connected with improving current account balances. Since the estimated coefficient is positive,

the intertemporal substitution effect might dominate in Germany, so that firstly the consumption of tradables is relatively high and then falling over time. Finally, the lack of significance of the coefficient of q in comparison to the significance of y, y^*, r and f suggests that the real exchange rate has been playing a less important role in the long-run current account determination than domestic and foreign national income, financial integration and financial intermediation.

The coefficients of y and y^* have a negative and positive sign, respectively, and are significantly different from zero. Thus, a fast-growing economy will tend to have lower current account balances, whereas current account balances of countries surrounded by fast-growing foreign economies will improve.

Since the effect of real interest rates on the current account balance depends on the net foreign assets position, a positive sign of the coefficient of r is expected for Germany. The positive and significant effect of real interest rates on the current account balance confirms the hypothesis for temporary changes of real interest rates because Germany has been net creditor throughout the sample. The intertemporal approach to the current account states that a net creditor will not spend temporarily high interest income due to consumption smoothing. Therefore, the current account balance will improve. Although, the empirical analysis does not distinguish between permanent and temporary real interest rates, the results can be interpreted as indication that temporary changes in real interest rates have been playing a prominent role in determining the current account balance. The decomposition of permanent and temporary components of the real interest rates and their impact on the current account balance can be an interesting topic for further studies.

Improvement in financial intermediation, measured by f, should raise domestic investment and thereby deteriorate the current account. This effect can be confirmed by the negative sign of the coefficient, which is significant at the 1% level. That the ability to convert domestic savings in high-quality assets has a deteriorating effect on the current account can be confirmed for Germany.

Turning the attention to the long-run relationship between the current account balance and public balance, Ricardian equivalence is rejected at the 10% level. As predicted by the intertemporal approach to the current account, the public balance is positively related to the current account balance. For this reason, deteriorating public balances, i.e. lower public savings, will not be completely offset by private savings. This empirical result is in line with the descriptive analysis of private and public saving ratios in Section 3.1. There, Germany's coefficient of the correlation between the private and public saving ratio is shown not to be significantly different from zero. The empirical result of a medium- to long-run positive relation between *ca* and *g* confirms the theoretical prediction of the necessity for future generations to repay debt by restraining their consumption.

The coefficient of the demographic variable *n* is negatively related to the current account balance as predicted by the theory and significant at the 10% level. Because *n* tends to fall since 1988 in Germany, the current account is expected to improve at the same time.

Table 3.4 Test of long-run exclusion restriction: Germany (*q* based on CPI)

Null (H_0)	Estimate test statistic	Distribution	0.95% critical value	Prob.
ca has no effect	36.62	Chi-square(1)	3.84	0.000
q has no effect	0.03	Chi-square(1)	3.84	0.856
y has no effect	26.82	Chi-square(1)	3.84	0.000
y^* has no effect	30.08	Chi-square(1)	3.84	0.000
r has no effect	22.81	Chi-square(1)	3.84	0.000
g has no effect	2.91	Chi-square(1)	3.84	0.088
f has no effect	23.79	Chi-square(1)	3.84	0.000
n has no effect	2.96	Chi-square(1)	3.84	0.086

Notes: Zero restrictions imposed on the cointegrating vector, i.e. elements of the beta vector. Prob. denotes the *p*-value.

3.3.3. Short-run current account adjustment

Examining the number of cointegrating vectors between the variables *ca*, *q*, *y*, y^*, *r*, *g* and *f* and their estimated coefficients, it is evident that they influence each other in the long-run. An analysis whether they adjust to the equilibrium

relation is presented in Table 3.5. The tables contain the coefficients of the α vectors, their standard errors and the *p*-values of the chi-square test for the statistical significance imposing zero restrictions on coefficients of the α vector. The α coefficients measure the proportion of the last period's equilibrium error that is corrected for and therefore should have a negative sign. Not rejecting the null hypothesis means that the corresponding variable does not adjust in response to deviations from the long-run equilibrium, so that the variable is called to be weakly exogenous.

Table 3.5 shows that the adjustment parameters of *ca*, *y*, y^* and *n* have the expected negative sign, whereas the adjustment parameters of *q*, *r*, *g* and *f* have positive signs. The expectation is that the variables y^* and *n* do not adjust to deviations from long-run equilibrium because they are supposed to be determined by other (economic) drivers than the current account balance. Thus, the coefficients should be insignificant and the chi-square tests confirm the theoretical considerations for y^*, whereas *n* seems to adjust to the long-run equilibrium.[1] Since the test reports the α coefficient of *ca* to be negative and significant at the 1% level, the current account balance corrects for current deviation from the long-run equilibrium. The value of the coefficient of 0.309 indicates that the current account balance adjusts the equilibrium quite quickly. Moreover, the coefficients of *g* and *r* are significant at the 1% level, albeit with positive sign. It is worth stressing that the real exchange rate seems not to adjust to the long-run relationship. To conclude, the current account balance does adjust to the common long-run relationship in contrast to public deficits, real interest rates, claims on private sector, domestic and foreign national income and real exchange rates.[2]

[1] The fact that major outlier observations in the demographic variable series appear in the aftermath of economic crises and α is significant at the 5% level could indicate that birth rates react sensitive to economic uncertainty and hence, "adjust" to *y*.

[2] That *g* is not weakly exogenous as assumed by the intertemporal approach to the current account is probably due to the cyclical component of tax revenues that are not incorporated in the intertemporal approach.

Table 3.5 Coefficients of the error-correction term: Germany (*q* based on CPI)

	Δca	Δq	Δy	Δy^*	Δr	Δg	Δf	Δn
α' vector	-0.309	0.266	-0.049	-0.020	0.187	0.214	0.028	-0.877
Standard error	0.087	0.192	0.066	0.033	0.056	0.059	0.462	0.412
Prob. of chi-square test imposing zero restrictions on α coefficients	0.000	0.146	0.426	0.506	0.001	0.000	0.955	0.035

Notes: Alpha vector and test for zero restrictions imposed on the adjustment coefficients, i.e. elements of the alpha vector. Prob. denotes the *p*-value.

The short-run coefficients of the Δca equation and their statistical significance are reported in Table 3.6. The coefficients describe the short-run relationships between changes in ca_t and changes in X_t to X_{t-k+1}. The only short-run dynamics significantly influencing the changes in current account balance are the lagged changes of domestic national income and claims on private sector. As most short-run coefficients of the lagged values are not significant, the major driver of current account balance changes in the short-run is the adjustment to the equilibrium.[1] Assessing the robustness of the estimates, the short-run coefficients for the estimations of the next section are not reported because there is not much economic content in the interpretation of the short-run dynamics.

[1] This is consistent with the findings of Arghyrou and Chortareas (2008, p. 756).

Table 3.6 Short-run coefficients of the Δca equation: Germany (q based on CPI)

	Germany		
	Short-run coefficient γ_{1i}	Standard error	
Δca_{-1}	-0.113	0.116	
Δca_{-2}	0.139	0.095	
Δca_{-5}			
Δq_{-1}	-0.015	0.024	
Δq_{-2}	-0.007	0.024	
Δq_{-5}			
Δy_{-1}	-0.132	0.134	
Δy_{-2}	-0.401	0.130	***
Δy_{-5}			
Δy^*_{-1}	-0.197	0.295	
Δy^*_{-2}	0.232	0.233	
Δy^*_{-5}			
Δr_{-1}	0.115	0.128	
Δr_{-2}	-0.044	0.135	
Δr_{-5}			
Δg_{-1}	-0.056	0.054	
Δg_{-2}	0.006	0.051	
Δg_{-5}			
Δf_{-1}	-0.035	0.017	**
Δf_{-2}	-0.050	0.018	***
Δf_{-5}			
Δn_{-1}	0.029	0.020	
Δn_{-2}	-0.030	0.019	
Δn_{-5}			
π	0.004	0.002	**

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

3.3.4. Assessing robustness

The validity of the results could be affected by the selected time period and the choice of measurement for the variables. In light of the turmoil during the financial crisis, the first robustness test assesses whether restricting the sample to a period prior to the financial crisis alters the estimation results. Therefore, the sample is shortened to 1975Q1-2007Q4 and the estimates of the β and α vector and the zero restriction tests are displayed in Table 3.7 and Table 3.8.

Table 3.7 Beta vector and test of long-run exclusion restriction: Germany (*q* based on CPI, short sample)

	ca	*q*	*y*	y^*	*r*	*g*	*f*	n
β' vector	1.000	-0.003	0.618	-0.789	-0.692	-0.124	0.050	0.019
Standard error		0.022	0.042	0.046	0.125	0.077	0.006	0.012
Prob. of chi-square test imposing zero restrictions on β coefficients	0.000	0.885	0.000	0.000	0.000	0.104	0.000	0.126

Notes: Beta vector and test for zero restrictions imposed on the cointegrating vector, i.e. elements of the beta vector. Prob. denotes the *p*-value.

The signs and absolute values of the β coefficients of all variables confirm the results of the previous estimates. Moreover, the chi-square tests report basically the same statistical significance for the coefficients, albeit the coefficients of *g* and *n* are not significant at the 10% level anymore.

Table 3.8 Coefficients of the error-correction term: Germany (*q* based on CPI, short sample)

	Δca	Δq	Δy	Δy^*	Δr	Δg	Δf	Δn
α' vector	-0.260	0.400	-0.066	0.021	0.205	0.208	-0.130	-0.855
Standard error	0.095	0.212	0.071	0.034	0.062	0.067	0.503	0.456
Prob. of chi-square test imposing zero restrictions on α coefficients	0.005	0.055	0.348	0.513	0.003	0.006	0.827	0.070

Notes: Alpha vector and test for zero restrictions imposed on the adjustment coefficients, i.e. elements of the alpha vector. Prob. denotes the *p*-value.

The estimates and tests on the α vector for the shorter sample are in line with the results of the full sample, except for two differences. Firstly, for the shorter sample, the α coefficient of *q* is significant at the 10% level, but with positive sign. Hence, the real exchange rate does not adjust to the long-run equilibrium. Secondly, the α coefficient of *n* is not significant at the 5% level anymore, which is consistent with the theoretical expectations.

The second way to assess robustness is to substitute the variable real exchange rate based on consumer prices by the real exchange rate based on unit labour costs (ULC). Since these two variables have been experiencing a distinctly

different development during the last 30 years in Germany, economical implications could differ.[1]

The Johansen-Juselius cointegration tests are presented in Table A.1. Both the maximal eigenvalue statistic and the trace statistic indicate one cointegrating vector at the 1% level, but the trace statistic reports three cointegrating vectors at the 5% level. Examining the graphs of the cointegrating relations (Figure A.9 and Figure A.10), the graphs of the second cointegrating relation reveal non-stationary behaviour, whereas the graph of the first cointegrating vector appears to be stationary. It should be taken into account that overestimating *r*, i.e. the number of cointegrating relations, the distributions of some statistics will be non-standard, so that incorrect inferences may result from using conventional critical test values (based on t, F and chi-square distributions) (Juselius/Hendry 2001, p. 101). Moreover, the primary interested is in the long-run relation between *ca* and the other variables. Hence, this paper accepts the existence of one cointegrating vector for Germany.

Table 3.9 displays the estimates of the β vector and the zero restriction tests on the β coefficients, where the real exchange rate series is based on unit labour costs. They confirm the results concerning all variables except *n*, which is not significant at any conventional level, albeit with correct sign. The coefficient of the variable *g* becomes significant even at the 1% level, indicating the failure of Ricardian equivalence in Germany.

Table 3.10 displays the corresponding estimates of the α vector and the zero restriction tests on the α coefficients. The α coefficients of q, y, y^*, r and g are comparable to the original estimation. In contrast, *f* adjusts to the long-run equilibrium quite fast, and *n* does not adjust. More striking is the feature that the test reports the current account balance not to adjust as well, although it has

[1] It is interestingly to note that the real exchange rate development based on consumer prices and based on unit labour costs is quite similar in Spain and Portugal for the whole sample and in the Netherlands since approximately 1980. On the contrary, both measurements show a distinctly different development of the real exchange rate in Germany, Austria and Finland for the whole sample.

the correct sign. Consequently, claims on private sector do adjust to the common long-run relationship in contrast to the current account balance, domestic and foreign national income, real interest rates, public deficits and the demographic variable.

Table 3.9 Beta vector and test of long-run exclusion restriction: Germany (*q* based on ULC)

	ca	*q*	*y*	y^*	*r*	*g*	*f*	n
β' vector	1.000	-0.042	0.481	-0.637	-0.491	-0.422	0.061	0.008
Standard error		0.026	0.078	0.067	0.190	0.115	0.008	0.017
Prob. of chi-square test imposing zero restrictions on β coefficients	0.001	0.213	0.031	0.013	0.040	0.003	0.000	0.704

Notes: Beta vector and test for zero restrictions imposed on the cointegrating vector, i.e. elements of the beta vector. Prob. denotes the *p*-value.

Table 3.10 Coefficients of the error-correction term: Germany (*q* based on ULC)

	Δca	Δq	Δy	Δy^*	Δr	Δg	Δf	Δn
α' vector	-0.045	-0.055	-0.031	0.020	0.079	0.135	-1.018	-0.069
Standard error	0.057	0.133	0.044	0.020	0.040	0.037	0.289	0.263
Prob. of chi-square test imposing zero restrictions on α coefficients	0.526	0.708	0.505	0.332	0.091	0.001	0.005	0.814

Notes: Alpha vector and test for zero restrictions imposed on the adjustment coefficients, i.e. elements of the alpha vector. Prob. denotes the *p*-value.

To sum up the second robustness test, zero restriction tests on α coefficient of the error-correction term report that, on the one hand, the current account balance does not adjust to deviations from long-run equilibrium with the real exchange rate based on unit labour costs and, on the other hand, adjust to deviations from long-run equilibrium where the real exchange rate is based on consumer prices. Thus, there are two possible explanations for this observation. Either the zero restriction test has not enough power to reject the hypothesis in the former estimation, or the estimations have found two distinctly different economical relationships. In the second case, the result could be interpreted as an indication that the current account balance reacts more sensitively to relative consumer prices than it does to relative unit labour costs, where the term relative corresponds to home versus foreign values. For further studies, it could be

analysed whether the current account balance adjusts more through imports or through exports, which can be an interesting contribution to the discussion of competitiveness. In any case, the real exchange rate is probably not part of the long-run relationship of interest in Germany.

3.4. Structural current account positions

On the basis of the estimated VECM for the current account balance, real exchange rate, domestic and foreign national income, real interest rate, public balance, claims on private sector and the demographic change, the structural current account balance can be defined as the balance predicted by the long-run equilibrium term. If the parameters of the equilibrium term, i.e. the coefficients in the β vector, are identified, and if the current account balance is part of the long-run equilibrium relation and adjusting to it, then, the fitted values for the current account balance can be calculated as defined by the equation[1]

$$\widehat{ca} = \hat{\mu} + \hat{\beta}_{21} q + \hat{\beta}_{31} y + \hat{\beta}_{41} y^* + \hat{\beta}_{51} r + \hat{\beta}_{61} g + \hat{\beta}_{71} f + \hat{\beta}_{81} n \,.$$

Deviations of the actual current account balance from its fitted values, i.e. the residuals of the long-run equilibrium equation, can be interpreted as "overshooting" phenomena.

For Germany, where the real exchange rate is based on consumer prices, the structural current account balance is defined by

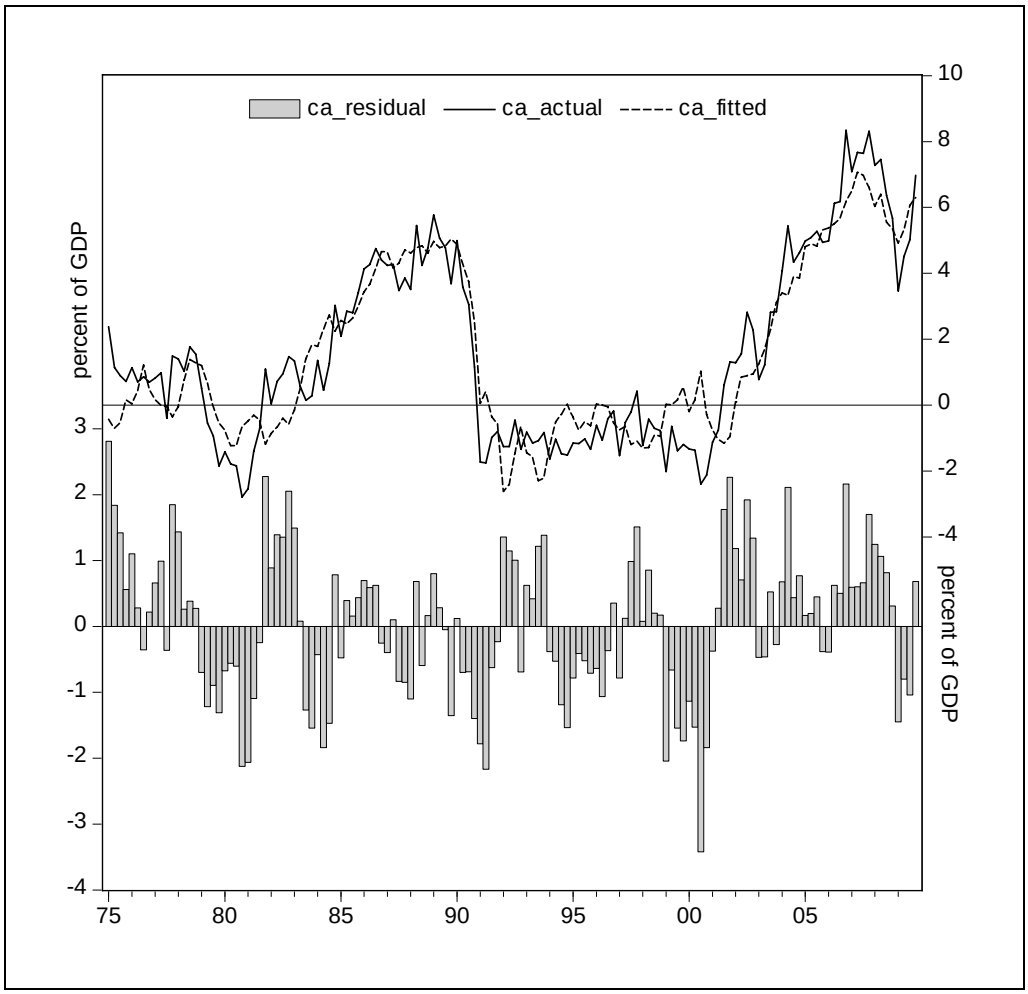
$$\widehat{ca} = 0.078 + 0.041 q - 0.595 y + 0.759 y^* + 0.678 r + 0.131 g - 0.048 f - 0.020 n \,.$$

Figure 3.5 shows the actual and fitted values of the current account balance in percent of GDP with their observation scale on the right hand side. The bars show the current account balance residuals with their observation scale on the left hand side. It is evident that the long-run equilibrium relation predicts the current account balance quite well. Nevertheless, deviations from the long-run

[1] The "Marco-Balance" methodology of the International Monetary Fund Consultative Group on Exchange Rate Issues (IMF CGER) defines the equilibrium current account balance as the predicted value of a current account regression including fundamental determinants of saving and investment, see Jaumotte and Sodsriwiboon (2010, p. 15), who use the same definition.

equilibrium can persist for several years. For example, from 2001 to 2008 the German current account balance had been almost all quarters above its long-run equilibrium. During this period, the current account balance had been on average approximately 0.7% points above its structural balance. In the aftermath of the German reunification from 1991 to 2001, where the actual current account balance had been in deficit, the current account balance had been on average approximately 0.3% points below its structural balance. Therefore, deviations from the structural current account balance can persist for several years, although on moderate scale in comparison to the actual current account balance.

Figure 3.5 Structural current account position: Germany (*q* based on CPI)



4. Economic policy implications

4.1. Does the current account adjustment need to be facilitated?

According to the intertemporal approach to the current account, current account balances are the outcome of private saving and investment decisions in the intertemporal optimization process. Hence, if the model assumptions hold, the outcome is first best, which implicates that there is no need for policy intervention. For example, as relative low income economies are catching-up with high income economies, they are expected to have higher productivity gains in the tradable goods sector in comparison to high income economies, associated with current account deficits and appreciating real exchange rates. This prediction describes the development of Spain, Portugal and Greece quite well, so that the conclusion might be that no policy intervention is necessary.

Nevertheless, when the assumptions of the intertemporal approach to the current account are not appropriate to describe real economies, for example because of distortions on labour or financial markets, government interventions could be necessary. Distortions can exist on labour markets in terms of wage rigidity, especially downward wage rigidity, and thereby cause price rigidity. A second source of distortions are financial constraints when firms may not, after a period of low profits, have the funds needed to invest and increase production later on. These kinds of distortions gain relevance for deficit countries if there is a probability of "sudden stops". During "sudden stops", countries find themselves suddenly cut from world financial markets, or less severe, foreign investors suddenly ask for a much higher real interest rate (Blanchard 2007b, p. 27), an experience that Spain, Portugal and especially Greece share in refinancing their public debt.

When "sudden stops" occur, countries with large current account deficits are forced to deleverage intensively, which causes a sharp contraction in domestic demand. If previous rapid credit growth was associated with lower average loan quality, contraction of the economy increases nonperforming loans thereby raising the vulnerability of the banking sector (Jaumotte/Sodsriwiboon 2010, p. 18). In Spain, Portugal and Greece, the ongoing cuts in public expen-

diture to promote public budget consolidation will probably dampen the domestic demand. This could lead to high costs of adjustment in terms of growth and employment, and increase the credit risks for the banking sector. Moreover, it could result in credit rationing and increase the need for a banking bail-out, which in turn will further strain public balances. Consequently, to prevent "sudden stops" and subsequent financial crises, gradual adjustment of the current account should be facilitated.

4.2. Policy implications for deficit countries

The fact that current account balances of Portugal and Greece have widen primary due to decreasing private savings during the last two decades, so that they save approximately half as much in relation to their GDP as the other euro area Members States considered here, is a signal that consumption smoothing in expectation of real convergence has been the main driver. This analysis is confirmed by Blanchard and Giavazzi (2002) for the development prior 2002. Even though current account balances are driven by consumption smoothing, the outcome might not be first best if expectations are not rational and tend to be overoptimistic. Phases of rapid financial integration and improved intermediation may lead to a temporary build-up of excessively optimistic expectations, as economic agents need time to fully understand the implications of their changing environment, which involves the risk of overshooting (European Commission 2006, pp. 36-37). Since investment ratios have not been surprisingly high in Portugal and Greece in comparison to other euro area Member States, there is no indication for extraordinary high growth rates of GDP in the future.

If private expectations are indeed too optimistic, low private savings could be compensated by higher public savings, so that output is maintained at its natural level which, by implication, will reduce the current account deficits. Otherwise high private demand will lead to output in excess of its natural level, which will result in inflation higher than in the rest of the euro area and therefore generate the required real appreciation (Blanchard/Giavazzi 2002, p. 186).

As the economic boom passes, downward wage rigidities are likely to hamper wage adjustment resulting in insufficient current account deficit cuts and unemployment.

A second source of overshooting lies in the interplay between downward wage rigidities and inflation rates. Bargaining parties have difficulties adjusting to the low inflation environment of the European Monetary Union. Hence, this may lead to periods of excessive real exchange rates appreciation (European Commission 2006, pp. 34-37). To avoid overshooting of the real exchange rate, wages need to be aligned to productivity development. One policy recommendation is to develop a bargaining structure within which social partners regularly discuss and potentially agree on the macroeconomic situation and appropriate wage increases (Blanchard 2007b, p. 32). An example is the German bargaining system where the bargaining parties managed to agree on moderate nominal wage increases, so that the German economy has undergone a long process of real exchange rate depreciation to correct for the sharp appreciation incurred in the aftermath of the reunification.[1]

Another way to facilitate current account adjustment by wage moderation is suggested by Jaumotte and Sodsriwiboon (2010, p. 19). The so-called "internal devaluation" mimics a real devaluation by reducing the non-wage labour costs. This is achieved by lowering social security contributions, which can be financed by increasing the value-added tax rate. This measure can be backed by reassessing unemployment benefits and reducing the indexation of wages and retirement pensions to inflation (Jaumotte/Sodsriwiboon 2010, p. 19). These labour market and social security reforms are usually aimed at reducing unemployment. Nevertheless, they can contribute to current account improvement.

In the intertemporal approach to the current account, real exchange rates are entirely driven by the internal exchange rate, i.e. the relative price of nontrad-

[1] See Figure A.1 in the statistical appendix on the development of real exchange rates based on unit labour costs.

ables in terms of tradables, if the assumption of purchasing power parity holds for the tradable goods sector. The increasing market integration in the European Union and especially in the euro area should have fostered convergence of prices of tradable goods. Therefore, real exchange rate changes can mainly materialize by internal exchange rate changes in the euro area Member States because of fixed nominal exchange rates (Ruscher/Wolff 2009, p. 2). This strengths the role of prices of nontradable goods in the current account adjustment process. If wage changes have not been reflecting productivity changes, and wages are downward rigid, adjustment of the current account is likely to be costly in terms of unemployment.

Ruscher and Wolff (2009, pp. 13-15) show that a higher government consumption share is associated with an appreciating real exchange rate. The relationship is stronger for the broad measure of the real exchange rate, based on the GDP deflator, than for the narrow one, based on the export deflator. The identified relationship strengthens the role of fiscal policy in the current account adjustment process. As government consumption is mostly composed of nontradables and services, a rise of the share will entail a rise in the nontradable content of domestic demand. With rising demand for nontradables, the relative price of nontradables could rise. To facilitate current account adjustment, countries with expanded public sectors should revert this development by cutting expenditure in government consumption (Ruscher/Wolff 2009, pp. 14-16).

The current account balances of Greece and to a minor extent of Portugal can partly be traced back to public deficits. That means that public savings have not compensated the decreased private saving ratios, which have been based on potentially overshooting expectations. Actually, public savings have negatively contributed to the current account balance. Since there is a positive relationship between government consumption and real exchange rates, public deficits have probably triggered upward wage movement in Greece.

In contrast, Spain has experienced a countermovement of public and private savings during the last decade. This helped to stabilize the overall savings of the economy on a level comparable to that of other euro area Member States.

In Spain, the extraordinary high investment ratio was certainly partly triggered by the construction boom, which collapsed in the financial crisis. Moreover, the construction boom probably contributed to the high wage growth in Spain, which is likely to reverse as the unemployment rises. Nevertheless, the sources of net foreign debt accumulation appear to be less worrisome in Spain than in Portugal or Greece.

Clearly, the most desirable way to boost production and employment is substantial productivity growth. As long as they are not fully reflected in wage growth, productivity increases will lead to depreciating real exchange rates. This can be achieved through further deregulation of labour and product markets, which will increase competitive forces and thus boost productivity (European Commission 2006, p. 37). On the other hand, the implementation of market reforms takes some time and will not increase productivity overnight (Blanchard 2007a, p. 8).[1] Consequently, this policy recommendation can only take effect in the medium-term.

Overall, the current account balances of Spain, Portugal and Greece have been in high deficit since 1995, associated with appreciating real exchange rates based on unit labour costs and based on consumer prices. The low private saving ratios in Portugal and Greece are particularly worrisome. To improve the households' incentives for saving, one policy recommendation is to raise the value-added tax rate and enforce the value-added tax payment in the medium- to long-run. That would constrain the consumption opportunities, thereby raising the saving ratios and increase tax revenues. As a result, higher value-added tax rates can improve current account balances, and increase private and public savings. In Spain, Portugal and Greece, the governments have already raised the value-added tax rate considerably. The implementation of this measure in the middle of the economic recession could be premature because it will dampen domestic demand and economic growth.

[1] See McKinsey Global Institute (as quoted in Blanchard 2007a, pp. 13-14) for a detailed analysis where Portugal lacks of productivity in comparison to the USA for the sectors residential construction and tourism. There, also sources are examined and concrete policy recommendations are given.

4.3. Policy implications for surplus countries

Since the relative income and stage-of-development hypothesis, respectively, are confirmed by the empirical literature and the estimations in this paper, the huge current account surpluses of the Netherlands, Finland, Germany and to a lesser extend of Austria can be regarded as the counterparts of the current account deficits of the catching-up economies Spain, Portugal and Greece. The divergence of current account balances has been promoted by increased financial integration and intermediation. Nevertheless, there might be structural rigidities on the surplus countries side that hamper adjustment of the current account.

The same way as private expectations may not be rational and overoptimistic in the deficit countries, they can be overpessimistic in surplus countries. Especially Germany, which has undergone a process of real exchange rate depreciation through wage moderation since 1995 to re-establish employment, suffers from weak domestic demand (European Commission 2006, p. 36). As employees have experienced real wage reduction, expectations about future prospects are likely to be pessimistic, underestimating the future output potential. Hence, according to the consumption smoothing hypothesis, household consumption should fall and savings rise. In fact, Germany has experienced a slightly rising private saving ratio during the last decade.

A policy recommendation that aims to compensate the relatively high private savings by public deficits will, by definition, decrease the overall saving ratio, so that the current account balance could reverse. Nevertheless, this policy intervention is not advisable because it will probably hamper the real wage and real exchange rate adjustment through the nontradables' channel (see Ruscher and Wolff 2009, pp. 14-16) and prolong the recovery of employment rates. Above that, public budget consolidation is usually a more difficult political process than public budget expansion, which makes it unlikely that public savings can reverse betimes. Furthermore, Germany has implemented a debt brake that restricts the opportunities for fiscal expansion.

Regarding real exchange rate changes in terms of unit labour costs as an internal adjustment process of wages to productivity and thus employment, domestic demand will increase and thus current account surpluses decline when employment rates are restored and real wage changes will follow productivity changes from then on.[1] Moreover, acceleration of wage adjustment is even more favourable. This can be achieved through more wage differentiation to reflect productivity differentials within the domestic labour force, as proposed by the European Commission (2010b, p. 58) and Dluhosch, Freytag and Krüger (1992, pp. 144-148).

Another source of high current account surpluses are financial constraints when firms may not, after a period of low profits, have the funds needed to invest and increase production later on. This is connected to the low efficiency and profitability of the German banking sector by European standards, as stated by the European Commission (2010b, p. 55). When firms' access to funds is restricted by financial market distortions, internal funding is a viable path resulting in high corporate saving ratios and low investment ratios after financial distress. Both channels improve the current account above what is predicted by the intertemporal approach to the current account. That the corporate saving-investment decisions have in fact promoted a current account surplus is shown by the European Commission (2010b, p. 57), who reports that the net borrowing (i.e. investment minus savings) of the corporate sector turned to net lending in 2002 in Germany.

The global trade cycle could partly have contributed to current account surpluses of Germany, Austria, the Netherlands and Finland. Due to the boom in world trade, exports rose particularly in these countries because their production is specialized in high-quality investment goods (European Commission 2010a, pp. 17-18). Domestic demand and therefore imports did not increase because households could have regarded the boom to be of temporary nature.

[1] Additionally see Projektgruppe Gemeinschaftsdiagnose (April 2010, p. 84) on the discussion of requested wage increases in surplus countries to facilitate current account adjustment in deficit countries.

Hence, part of the high current account surpluses of 2004 to 2007 can be explained by temporary effects, so that they do not imply any need for policy intervention.

One feasible and desirable way to reverse current account surpluses in Germany is to strengthen the environment for domestic investments. As Dluhosch, Freytag and Krüger (1992, pp. 148-163) demonstrate, an intransparent tax system and high marginal tax rates on the rate of return on capital investment can render an investment opportunity unprofitable. Lower marginal taxes in combination with higher tax bases and a transparent tax system can improve the locational quality, so that more domestic and foreign investment can be attracted and current account surpluses reduced. Since 1992, some efforts have been undertaken to reduce the marginal tax rates in Germany. Nevertheless, reforms of the German tax system are still needed (Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung 2009, pp. 22-23).

5. Summery and conclusion

The examination of saving- and investment ratios gives indications of the underlying determinants of the current account balances for seven Member States of the euro area. Portugal and Greece suffer from low national savings, whereas Spain's current account deficits are due to high investment needs. On the other hand, high saving ratios contribute to Finland's, Germany's, Austria's and the Netherlands' current account surpluses.

Overall, the estimates confirm the theoretical predictions of the intertemporal approach concerning the domestic and foreign national income, real interest rate and financial intermediation. High domestic national income gains are associated with deteriorating current accounts, whereas high foreign national income gains are connected to improving current accounts. Temporary high interest income contributes to higher current account balances, and better financial intermediation is negatively associated with the current account balance. Moreover, they indicate that Ricardian equivalence rejected for Germany.

The real exchange rate shows no influence on the current account balance in Germany. Finally, there is just weak evidence for a negative effect of population growth on the current account balance. Structural current account balances calculated for Germany show no severe deviations from actual current account balances. Consequently, no "overshooting" phenomena are in evidence.

The actual current account balances are first-best outcomes if no distortions on markets exist and expectations are rational. On the contrary, policy interventions might be appropriate if wage and price rigidity, or financial constraints hamper adjustment of the current account. The same is true for overoptimistic or overpessimistic expectations about future income.

The deficit countries should reduce downward wage rigidities. Moreover, government expenditure has to be cut down. In the medium- to long-run, deregulation on product markets can boost productivity. Concerning the surplus countries, there are just few justifications for policy interventions that are aimed at reducing the current account surpluses. In Germany, the efficiency of the banking sector should be fostered to ease financial constraints on firms. Moreover, measures should be undertaken to improve locational quality.

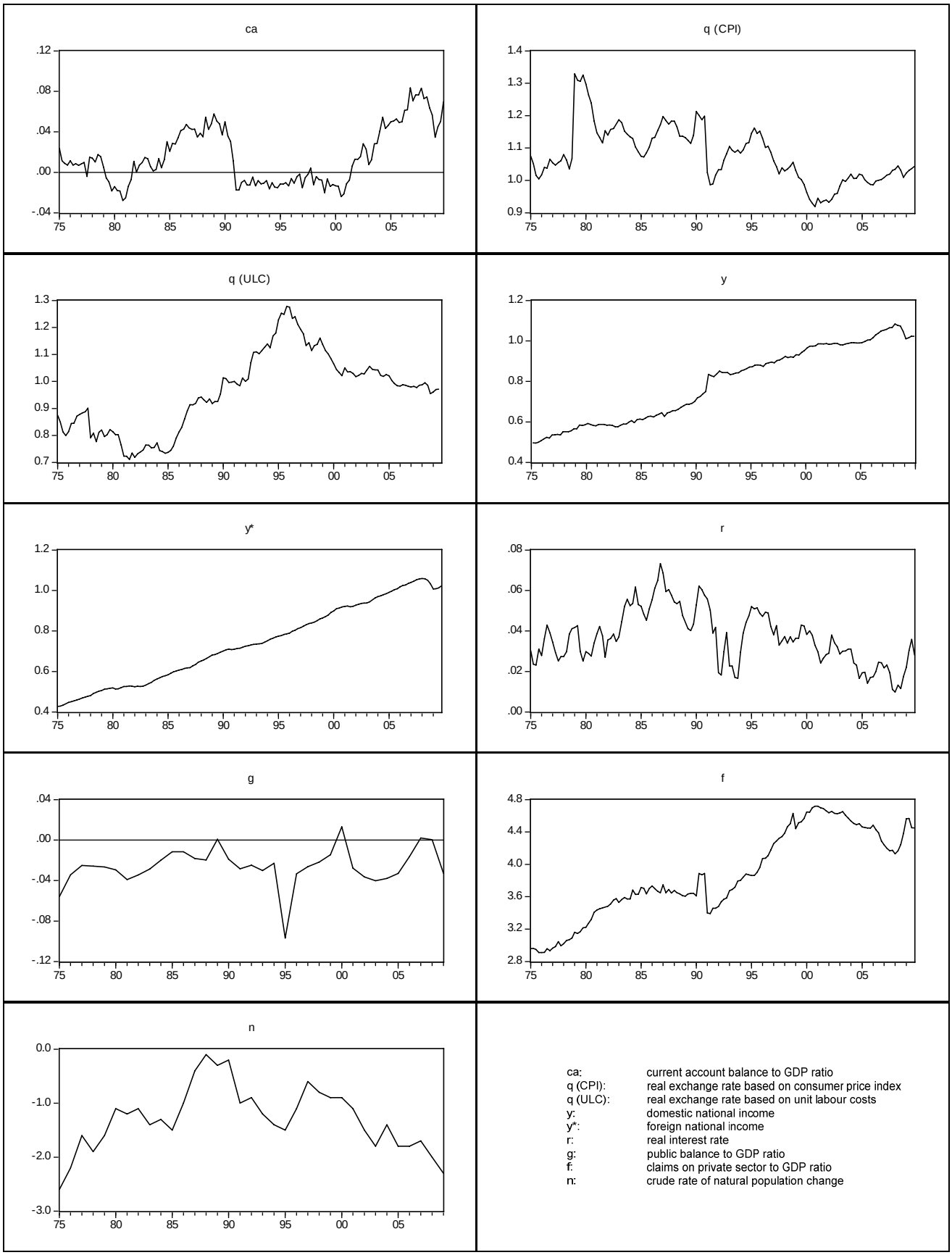
To conclude, the intertemporal approach provides theoretical justifications for current account deficits and surpluses which are usually called current account "imbalances". No "overshooting" phenomena are identifiable for Germany.

Further research can be done on determining structural current account balances for the other euro area Member States. For this purpose, the relevant long-run relationships have to be identified. Alternatively, single equation cointegration techniques can be applied. Moreover, it might be of interest whether the current account adjusts more via export or via imports.

Annexes

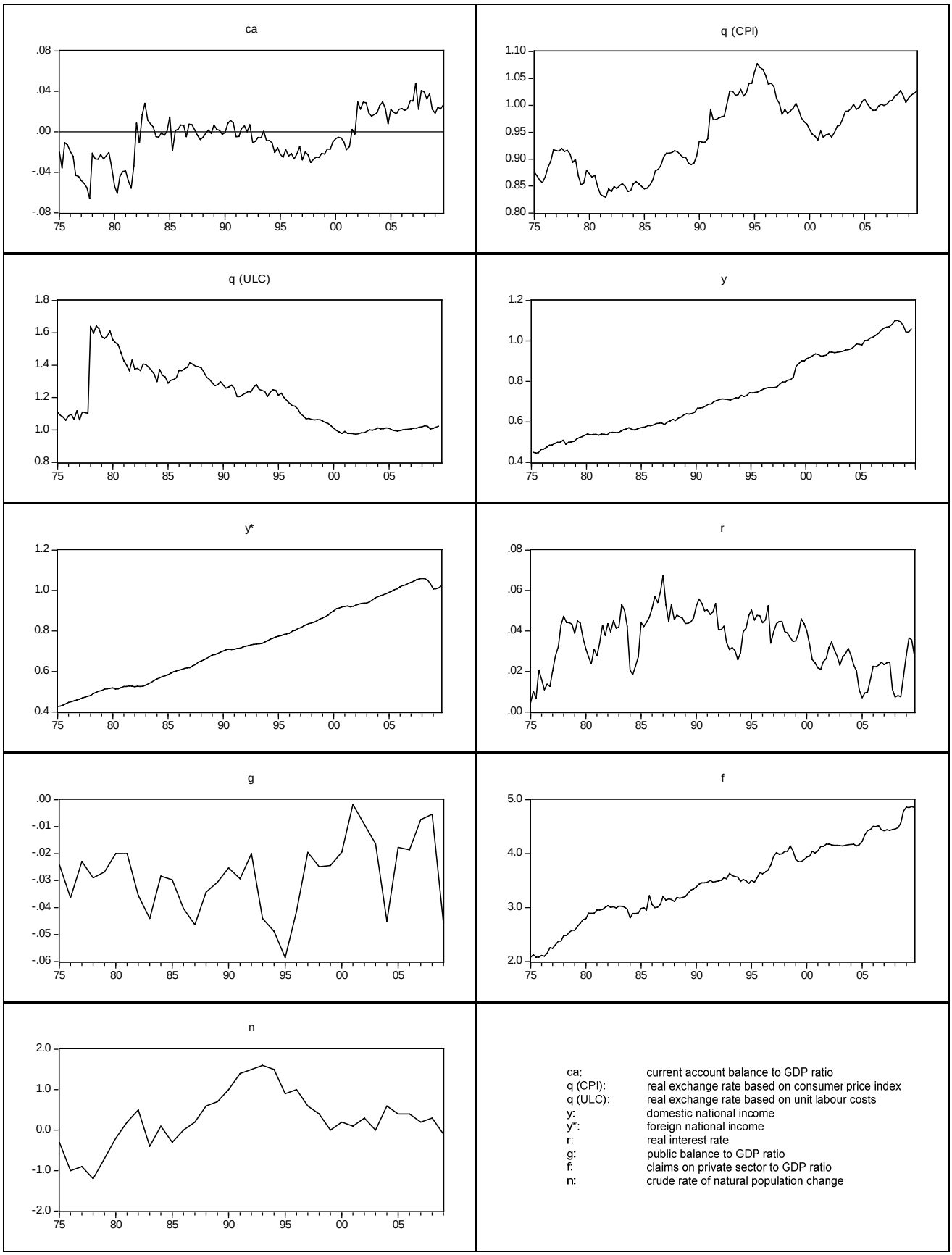
A Statistical appendix

Figure A.1 Graphs of time series: Germany



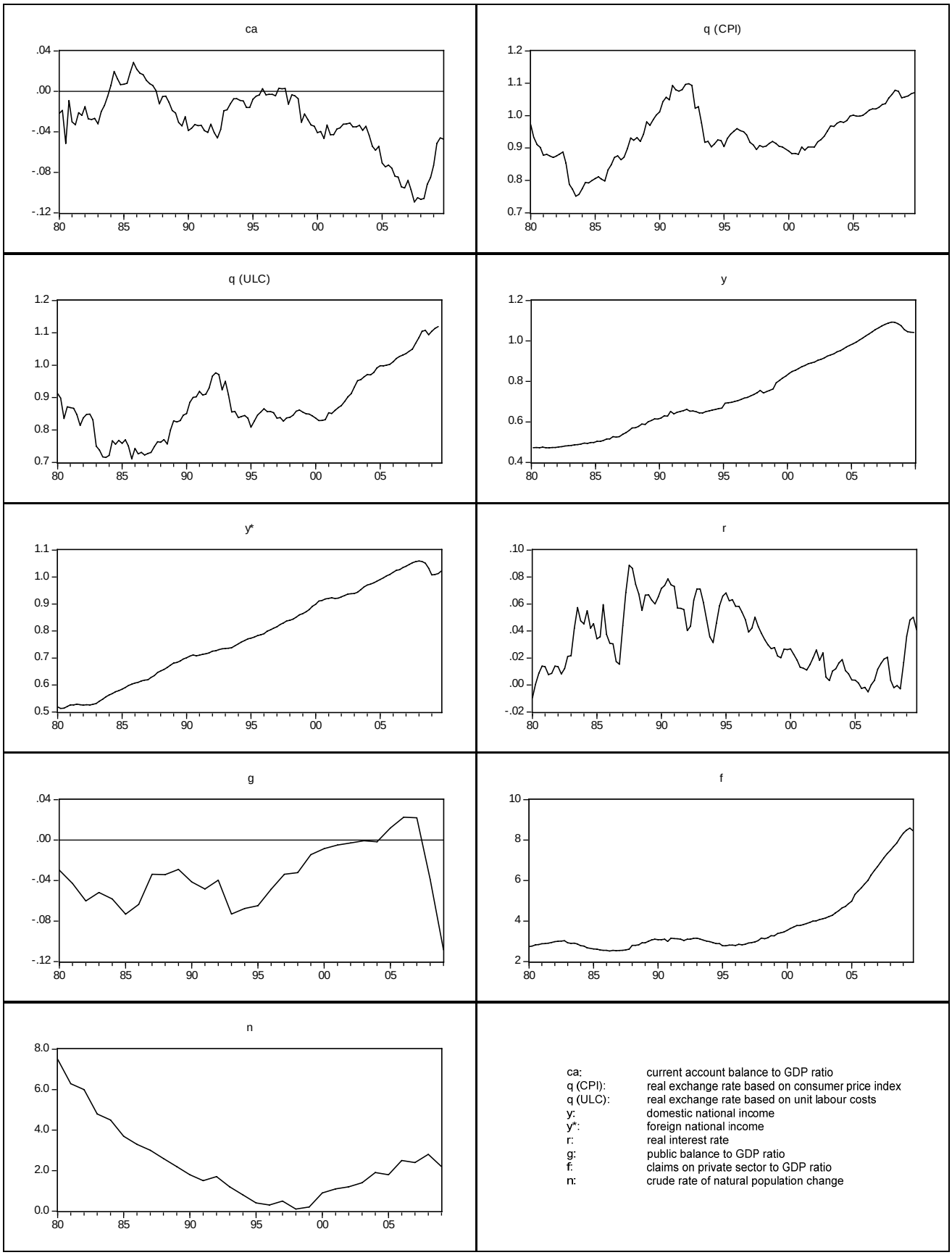
Notes: Series for *g* and *n* are displayed at annual frequency.

Figure A.2 Graphs of time series: Austria



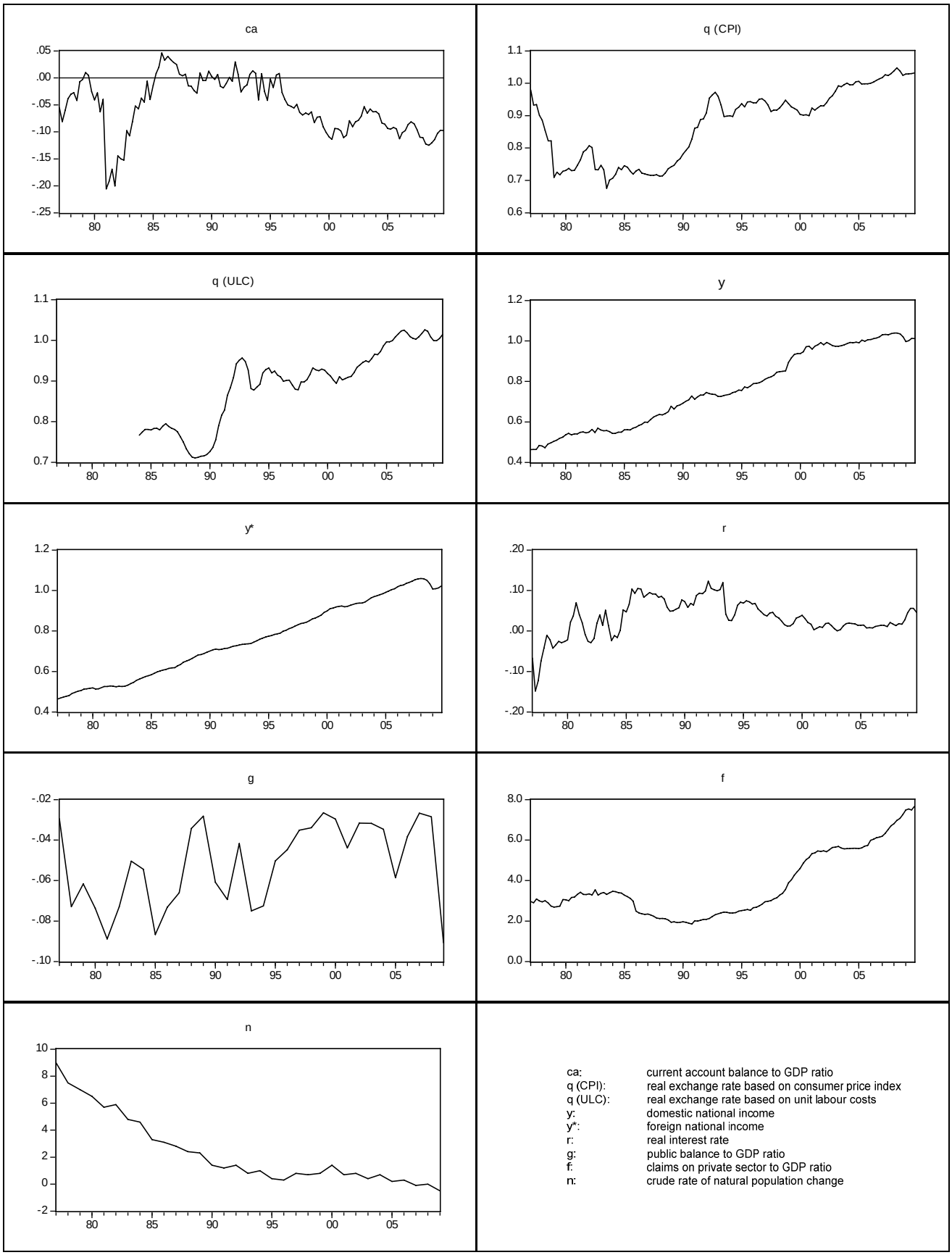
Notes: Series for *g* and *n* are displayed at annual frequency.

Figure A.3 Graphs of time series: Spain



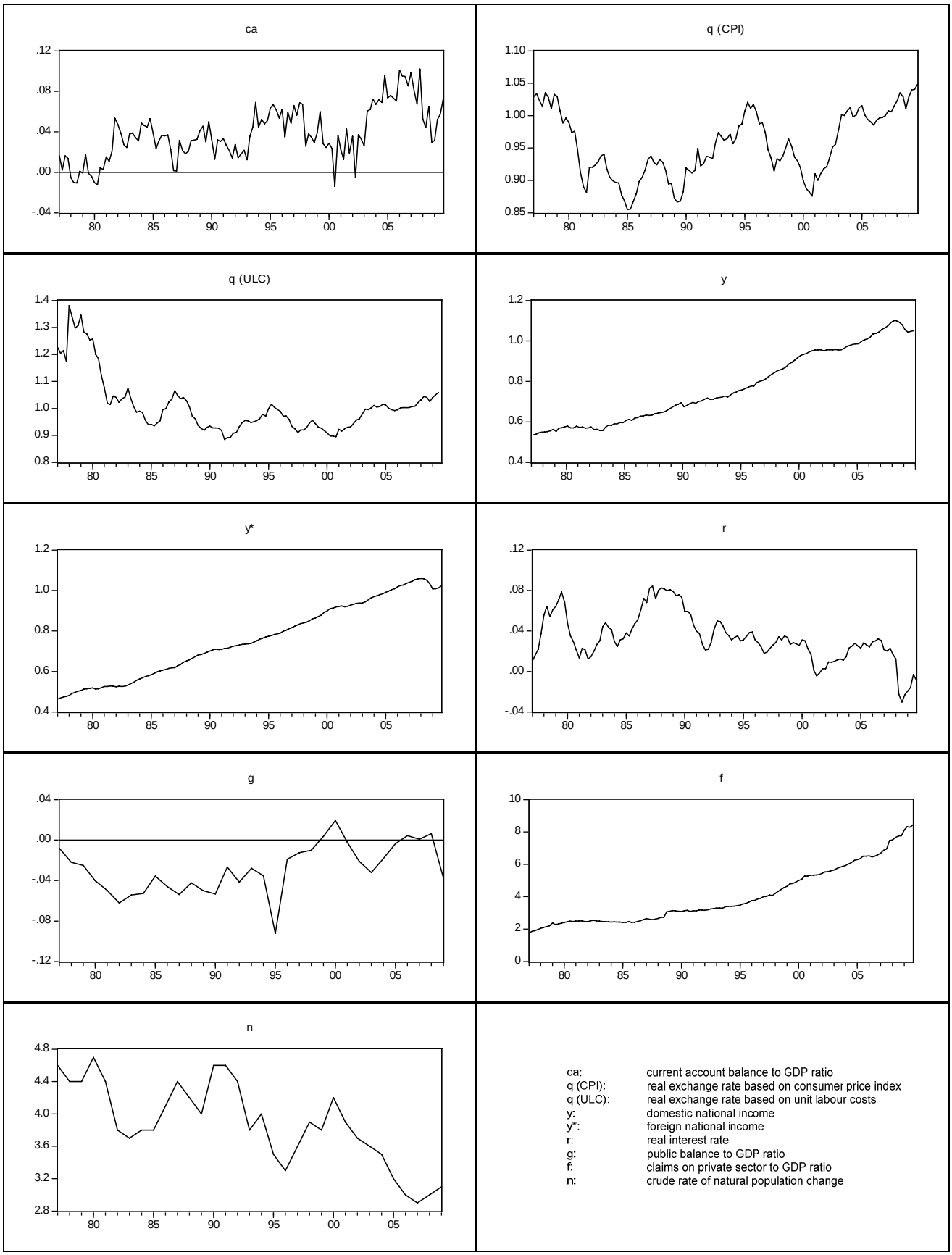
Notes: Series for *g* and *n* are displayed at annual frequency.

Figure A.4 Graphs of time series: Portugal



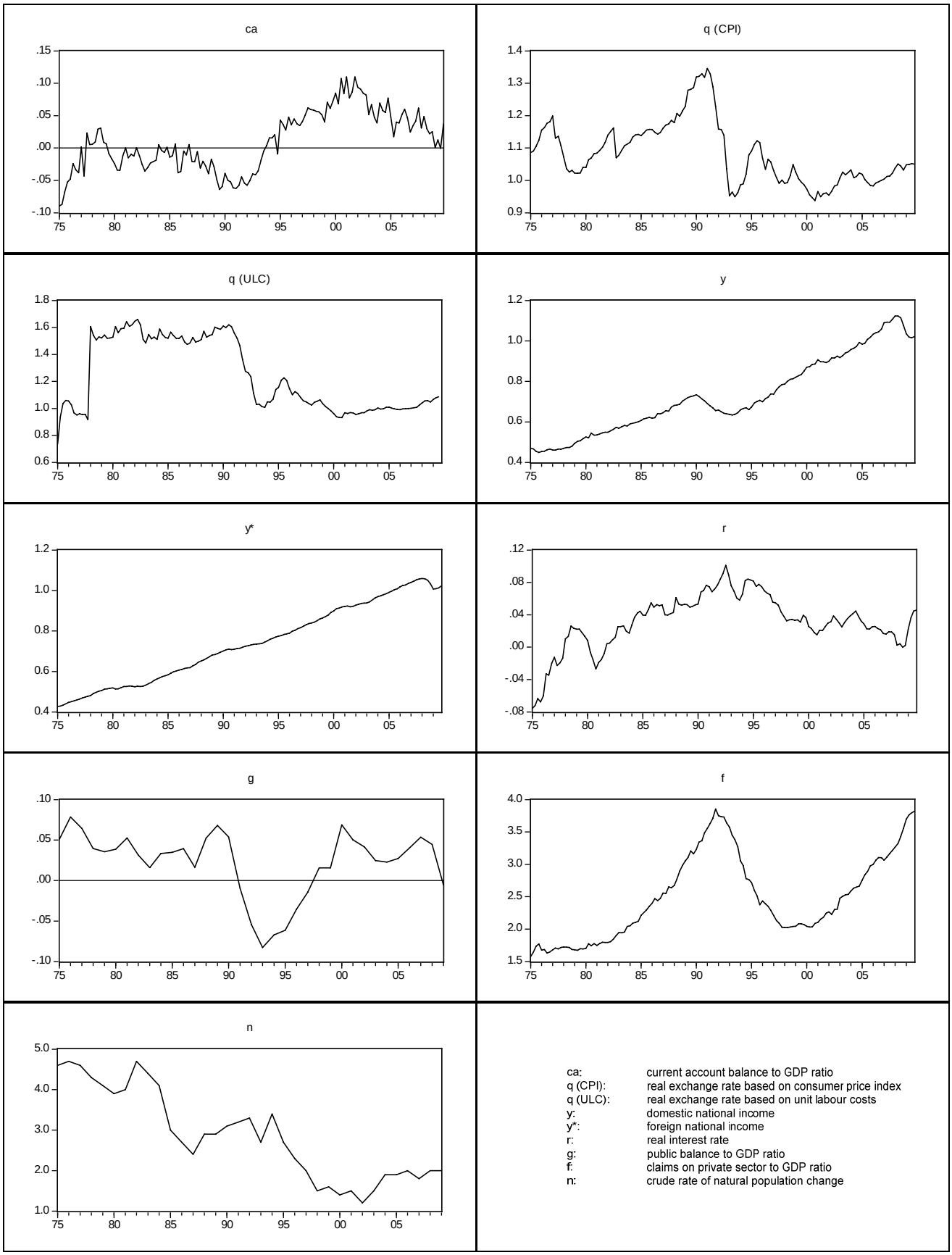
Notes: Due to data availability, *q* is the real exchange rate based on unit labour costs for the sample period 1984Q1-2009Q4. Series for *g* and *n* are displayed at annual frequency.

Figure A.5 Graphs of time series: The Netherlands



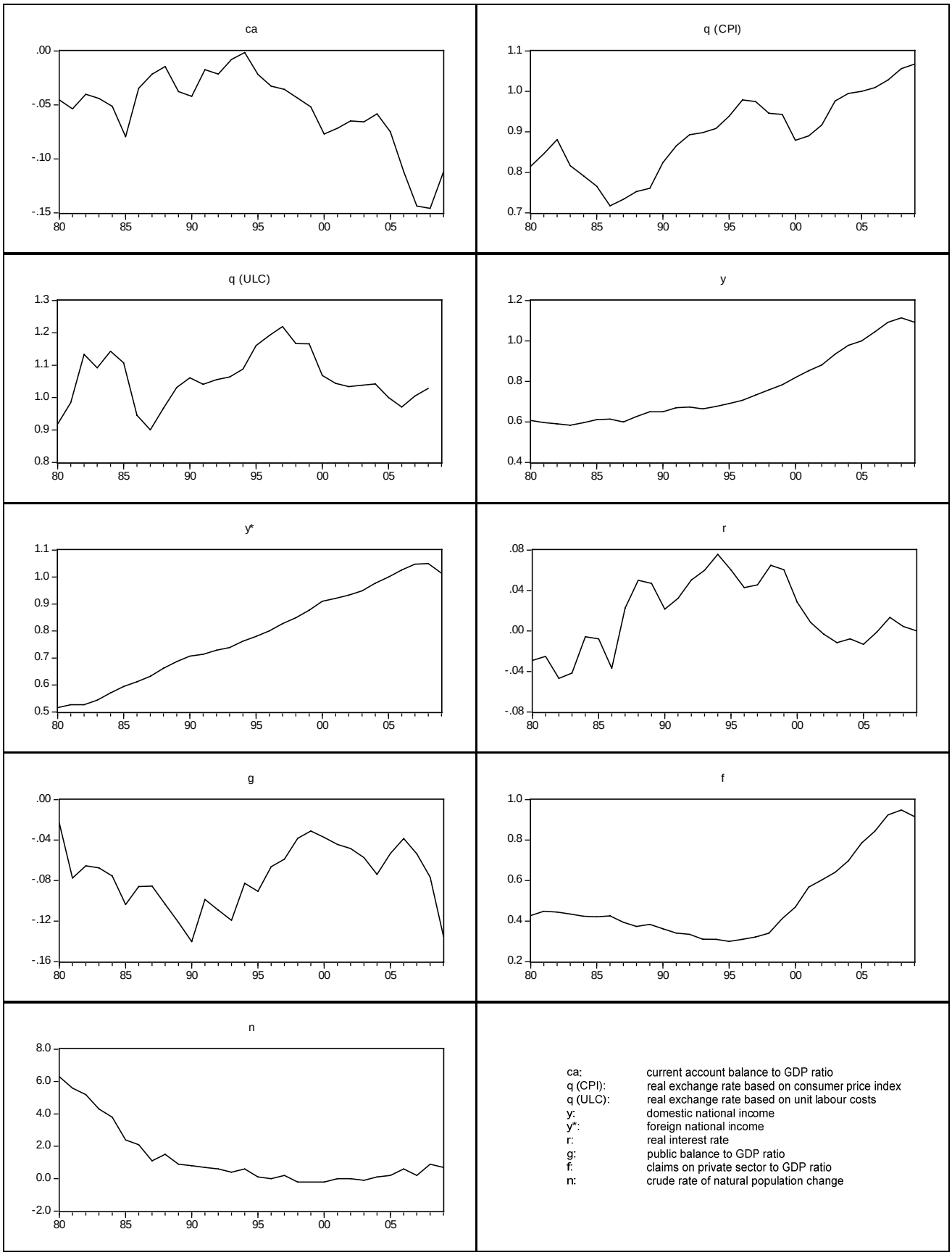
Notes: Series for *g* and *n* are displayed at annual frequency.

Figure A.6 Graphs of time series: Finland



Notes: Series for *g* and *n* are displayed at annual frequency.

Figure A.7 Graphs of time series: Greece



Notes: All series are at annual frequency.

Figure A.8 Unrestricted cointegrating relations (1 cointegrating vector): Germany (*q* based on CPI)

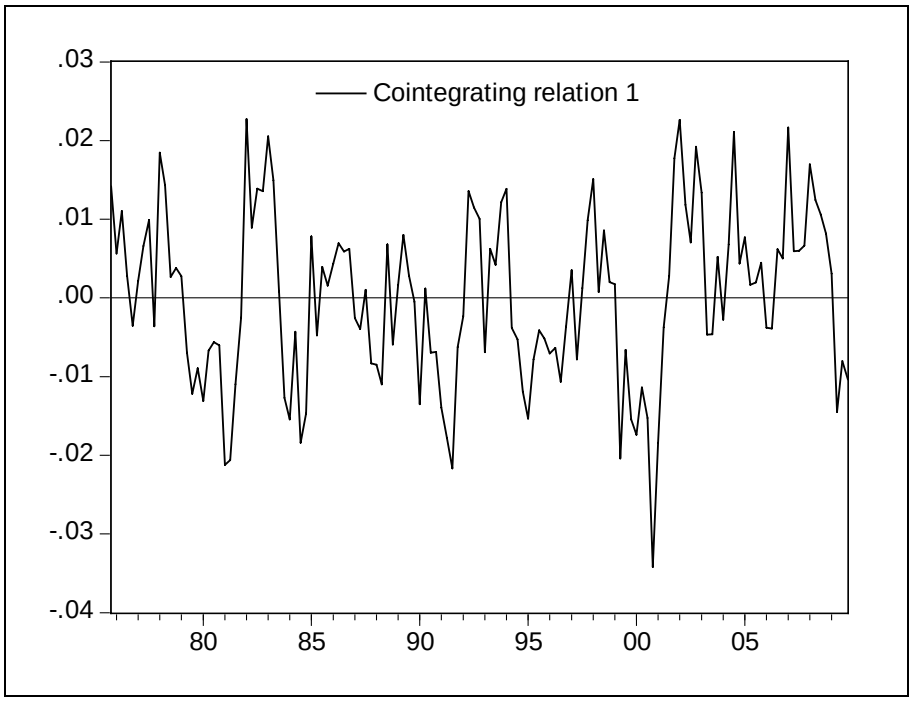


Table A.1 Johansen-Juselius cointegration tests: Germany (*q* based on ULC)

			Germany	
	Null (H_0)	Alternative (H_1)	Trace statistic	95% critical value
Trace test	r = 0	r ≥ 1	215.0501	159.5297 ***
	r ≤ 1	r ≥ 2	145.7154	125.6154 **
	r ≤ 2	r ≥ 3	100.5931	95.75366 **
	r ≤ 3	r ≥ 4	65.59344	69.81889
	r ≤ 4	r ≥ 5	36.26545	47.85613
	r ≤ 5	r ≥ 6	18.57826	29.79707
	r ≤ 6	r ≥ 7	7.227488	15.49471
	r ≤ 7	r ≥ 8	0.994678	3.841466
	Null (H_0)	Alternative (H_1)	Maximal eigenvalue statistic	95% critical value
Maximal eigenvalue test	r = 0	r = 1	69.33476	52.36261 ***
	r ≤ 1	r = 2	45.12226	46.23142 *
	r ≤ 2	r = 3	34.99967	40.07757
	r ≤ 3	r = 4	29.32799	33.87687
	r ≤ 4	r = 5	17.68719	27.58434
	r ≤ 5	r = 6	11.35077	21.13162
	r ≤ 6	r = 7	6.232810	14.26460
	r ≤ 7	r = 8	0.994678	3.841466

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively;
r denotes the number of cointegrating vectors.

Figure A.9 Unrestricted cointegrating relations (2 cointegrating vectors): Germany (*q* based on ULC)

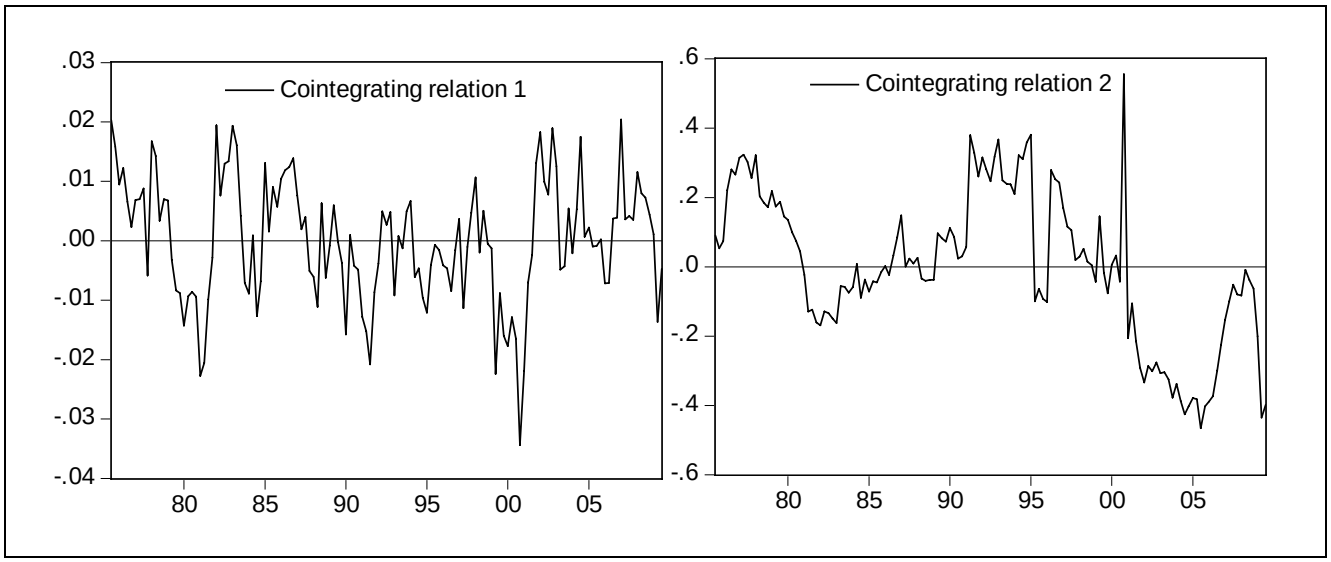
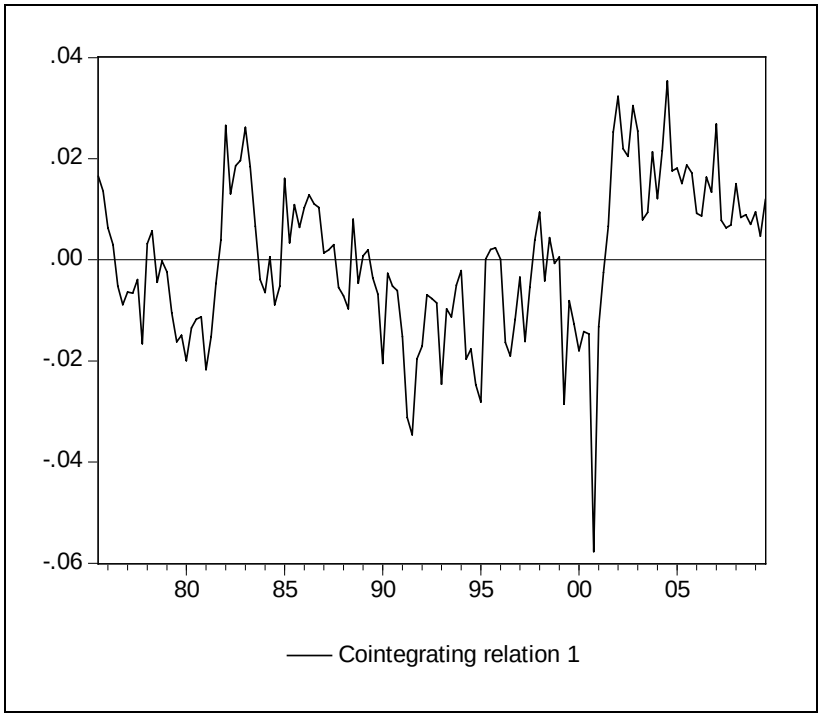


Figure A.10 Unrestricted cointegrating relations (1 cointegrating vector): Germany (*q* based on ULC)



B Data appendix

Variable	Data	Source	Unit/Calculation	Observations
ca	Current account balance	OECD, Main Economic Indicators	Quarterly data	Germany
		IMF, International Financial Statistics	Annual data	Greece
			Quarterly data	All remaining observations
	GDP, current prices	IMF, International Financial Statistics	Annual data	Greece
			Quarterly data	All remaining observations
y	GDP, index, constant prices	IMF, International Financial Statistics	Annual data	Greece
			Quarterly data	All remaining observations
y^*	GDP, index, constant prices	OECD, Main Economic Indicators	Annual data	Major Seven (G-7)
			Quarterly data	Major Seven (G-7)
n	Crude rate of natural population change	Eurostat, NewCronos	Annual data	Greece
			Annual data, constant interpolation	All remaining observations
g	Government net lending	OECD, Economic Outlook Statistics and Projections	Annual data, percent of GDP, constant interpolation	Austria (1975Q1-1998Q4), Germany (1975Q1-1998Q4, 2009Q1-2009Q4), Portugal (1977Q1-1998Q4), Finland (1975Q1-1997Q4), Spain (1980Q1-1999Q4), the Netherlands (1977Q1-1998Q3)
		OECD, Economic Outlook Statistics and Projections	Annual data, percent of GDP	Greece
		Eurostat, NewCronos	Quarterly data, per-cent of GDP	All remaining observations
q	Real effective exchange rate, index, based on consumer prices	IMF, International Financial Statistics	Annual data	Greece
			Quarterly data	All remaining observations
	Real effective exchange rate, index, based on relative normalized unit labour costs	IMF, International Financial Statistics	Annual data	Greece
			Quarterly data	All remaining observations
r	Long-term interest rate on government bonds	OECD, Economic Outlook Statistics and Projections	Quarterly data	Germany, Austria, Spain, Portugal, the Netherlands, Finland
	Short-term interest rate	OECD, Economic Outlook Statistics and Projections	Annual data	Greece
	Inflation, consumer price index	IMF, International Financial Statistics	Annual data	Greece
			Quarterly data	All remaining observations
f	Claims on private sector by deposit money banks	IMF, International Financial Statistics	Annual data	Greece
			Quarterly data	Austria (1975Q1-1998Q3), Portugal (1977Q1-1998Q4), Spain (1980Q1-1998Q4)
	Claims on other resident sectors in country by deposit money banks	IMF, International Financial Statistics	Quarterly data	All remaining observations
	GDP, current prices	IMF, International Financial Statistics	Annual data	Greece
			Quarterly data	All remaining observations

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