

Körner, Finn Marten; Zemanek, Holger

**Working Paper**

## On the brink? Intra-euro area imbalances and the sustainability of foreign debt

Working Paper, No. 109

**Provided in Cooperation with:**

University of Leipzig, Faculty of Economics and Management Science

*Suggested Citation:* Körner, Finn Marten; Zemanek, Holger (2012) : On the brink? Intra-euro area imbalances and the sustainability of foreign debt, Working Paper, No. 109, Universität Leipzig, Wirtschaftswissenschaftliche Fakultät, Leipzig

This Version is available at:

<https://hdl.handle.net/10419/60098>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# UNIVERSITÄT LEIPZIG

**Wirtschaftswissenschaftliche Fakultät  
Faculty of Economics and Management Science**

Working Paper, No. 109

Finn Marten Körner / Holger Zemanek

**On the Brink?  
Intra-euro area imbalances and the  
sustainability of foreign dept**

Juli 2012

ISSN 1437-9384

# **On the brink? Intra-euro area imbalances and the sustainability of foreign debt**

**Finn Marten Körner**

Centre for Transnational Studies (ZenTra)  
University of Oldenburg  
Ammerländer Heerstraße 138  
D-26129 Oldenburg  
(koerner@zen-tra.de)

**Holger Zemanek\***

University of Leipzig  
Institute for Economic Policy  
Grimmaische Str. 12  
D-04109 Leipzig/Germany  
(zemanek@wifa.uni-leipzig.de)

This version: 03 July 2012

## **Abstract**

In this paper we study the intra-euro area imbalances based on a dynamic general equilibrium model. We show that European financial integration and the introduction of the euro might have contributed to the development of imbalances. Interest rate convergence following EMU accession led to net foreign debt positions, which prove difficult to reverse. Simulation results for the euro area suggest that current account imbalances and foreign debt positions of today's crisis countries have significantly diverged from a sustainable path. Increasing investment in the EMU core and productivity in crisis countries may permit a return to sustainable foreign debt levels and correct macroeconomic imbalances in the euro area.

**Keywords:** Current account imbalances, euro area, foreign debt, sustainability, general equilibrium model

**JEL-Codes:** E44, F32, F34, G15

\* This article reflects the author's personal opinions and not those of his employer.

## 1. Introduction

Prior to the current crisis, diverging current account imbalances in the euro area have significantly changed the net investment positions of the euro area's member countries. While in particular Germany accumulated substantial net foreign assets, southern European countries and Ireland heavily increased their net foreign debt positions. The common view links these macroeconomic imbalances to diverging wage growth, unit labour costs and inflation rates as well as national differences in investment and consumption (e.g. European Commission 2010). As a general policy implication, today's crisis countries are being asked to readjust their wages and prices to regain international competitiveness and to reduce their net foreign debt by future current account surpluses.

Another strand of the literature links the emergence of current account imbalances to changed conditions on financial markets (Caballero et al. 2008, Körner 2011). Thereby, European financial market integration has been a positive credibility shock for the southern European countries. The attractiveness of southern Europe's financial markets improved relatively to the euro area core countries, such as Germany. This asymmetric change in financial market attractiveness might explain initial capital flows from the euro area core to the southern periphery as well as persistent current account deficits in the euro periphery and surpluses in the core of the euro area. If this setting describes a new equilibrium situation, then Europe might not need to worry about current account (im)balances.

Such a conclusion has been stated by Caballero et al. (2008) in their paper on US–Asia imbalances. Based on a dynamic general equilibrium model Caballero et al. (2008) showed that the Asian crisis was a negative credibility shock reducing the relative attractiveness of Asian financial markets against US financial markets. As a result, capital has persistently flowed from Asia to the US financial market. These flows created the observed divergence of current account balances between Asia and the US. Moreover the authors conclude that US current account deficits can be sustained via any of the three rebalancing channels i) future trade balance surpluses, ii) investment income from FDI or iii) a depreciation of the long run real exchange rate.

In this paper we adopt this theory for the euro area by using an augmented model that allows all three rebalancing channels to work in conjunction (Körner 2011). The European monetary and financial integration is assumed to have bestowed positive credibility on former high

inflation countries in southern Europe – a positive financial market shock from EMU participation. The simulated results are compared with actual data, which provides evidence that current account imbalances and in particular net foreign debt positions of crisis countries are far from sustainable. Alternative simulation scenarios with increasing investment or productivity allow to draw implications how today's crisis countries might adjust macroeconomic imbalances.

## **2. Macroeconomic imbalances in the euro area?**

### **2.1 The common views on intra-euro area imbalances**

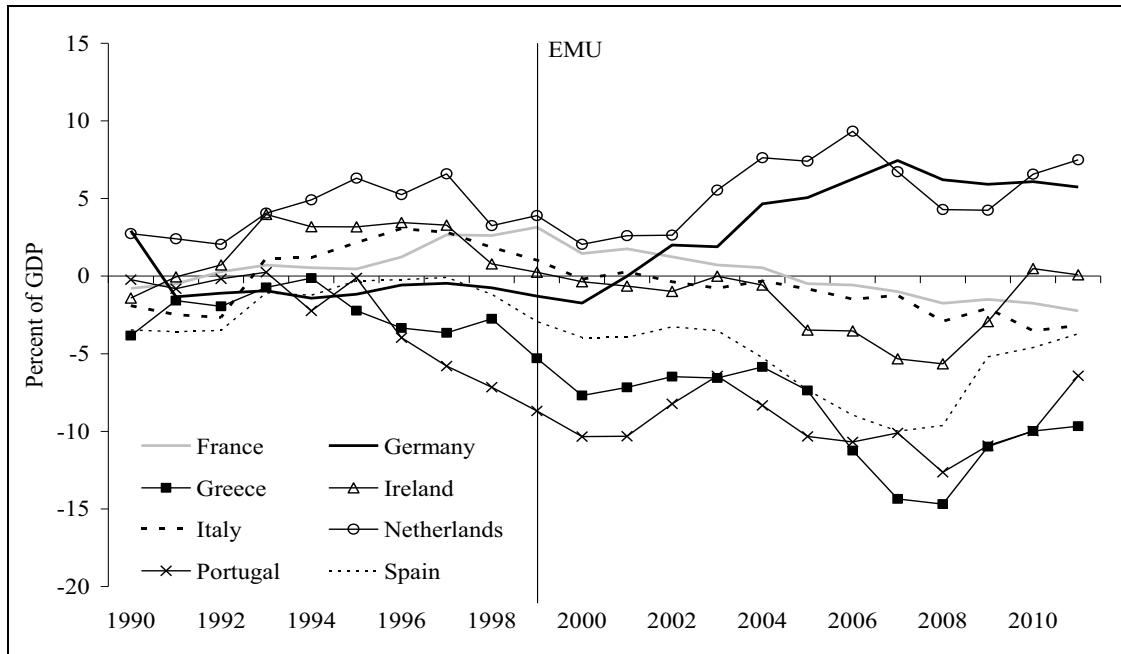
Since the introduction of the euro until the financial crisis, euro area countries experienced a build-up of significant macroeconomic imbalances (European Commission 2008, 2009, 2010). These imbalances became visible in divergent developments of current account balances and net foreign debt positions, as well as significant differences in growth rates of unit labour costs, consumer prices, investment and GDP.

Thereby, countries of the euro periphery (Greece, Ireland, Portugal, Spain, and Italy) have developed current account deficits leading to strong increases in their net foreign debt positions. Rising unit labour costs and consumer prices, credit expansion and strong GDP growth accompanied the process in these countries. In contrast, most core countries of the euro area (Benelux, Austria, Finland) but in particular Germany have accumulated high net foreign asset positions (or reduced their net debt position) by running persistently high current account surpluses after the year 2000. Moreover, consumer prices, GDP and unit labour costs grew moderately in surplus countries relative to the periphery. In Germany and Austria unit labour costs almost kept the level of 1999 in real terms. Figures 1 and 2 show the divergence of current account balances and net international investment positions in the euro area.

In general, changes of the current account balance of whatever sign are not necessarily an indication of imbalances. They may simply reflect inter-temporal saving as well as consumption and investment preferences of private enterprises, households and governments (Obstfeld and Rogoff 1994). Additionally, business cycles, demographic developments (De Santis and Lührmann 2006) and fiscal policy are important determinants of empirical realisations of the current account balance. Moreover, rising prices and unit labour costs and

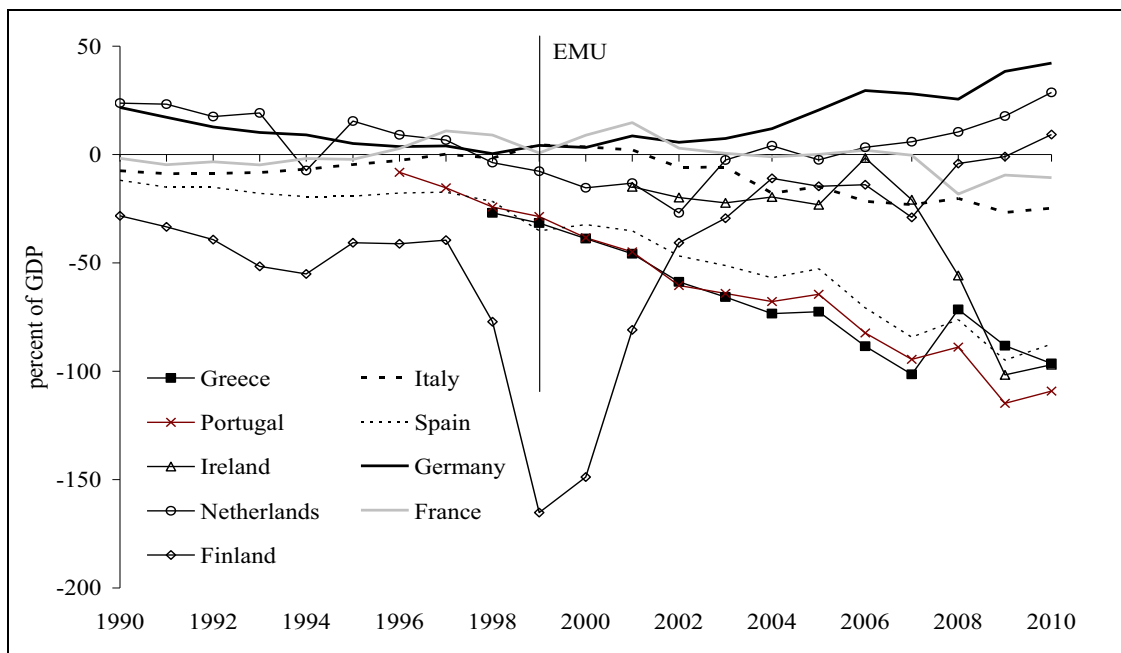
strong investment could be due to a catch-up of periphery countries within the euro area (Balassa 1964, Samuelson 1964).

Figure 1 Diverging current account balances after EMU accession



Source: IMF.

Figure 2 Net international investment positions



Source: IMF.

Blanchard and Giavazzi (2002) labelled intra-euro area capital flows from the euro core to the periphery, underlying the current account development, the end of the Feldstein-Horioka puzzle. Instead of savings being invested domestically as found by Feldstein and Horioka (1980), savings were invested abroad in countries with the largest expected marginal return on capital. Euro core's net savings were funnelled via integrated capital markets to periphery countries.<sup>1</sup> The elimination of the exchange rate risk and the common monetary policy conducted by the ECB improved macroeconomic conditions and therefore credit conditions in former high inflation countries of the periphery, such as Greece, Portugal, and Spain. EMU membership seemed to have nourished the notion of enhanced international capital allocation efficiency and international risk sharing (Schnabl and Zemanek 2011).

A more pessimistic explanation can be drawn from the theory of optimum currency areas. In a monetary union, relatively stronger growing consumer prices and unit labour costs in the euro periphery imply a real appreciation against the core countries, in particular Germany. From the perspective of the real exchange rate being a measure of cost and price competitiveness (Lipschitz and McDonald 1992; Arghyrou and Chortareas 2006, European Commission 2010), the euro periphery lost competitiveness vis-à-vis euro core countries. The periphery's products have become relatively expensive compared to goods from core countries. Imports increased, exports decreased and the current account balance worsened alongside the trade balance. A pattern of diverging current account balances appeared with current account surpluses in most core countries and current account deficits in periphery countries. Capital flows from the core to the periphery are not the offsetting factor in this process but rather the necessary consequence of current account differences.

The common monetary policy of the European Central Bank (ECB) was not able to counter these developments. It failed to steer against rising wages and inflation in the euro periphery as core countries' (in particular German) low wage and price growth kept average euro area inflation close to the central bank target of two per cent. The single nominal interest rate for the euro area in combination with dispersing national inflation rates (and inflation expectations) created too low real interest rates in high inflation countries and too high real interest rates in low inflation countries (Sturm and Wollmershäuser 2008, foreseen by Walters 1990). The one-size-fits-all monetary policy of the EMU further fuelled the asymmetric

---

<sup>1</sup> This can be related to a European version of the savings glut/investment slump hypothesis by Bernanke (2005).

economic development by providing pro-cyclical investment incentives. The nominal differences in wage and price inflation translated into real divergences.

In addition, “*the long shadow of the fall of the wall*” (Gros 2010) further promoted the build-up of macroeconomic imbalances in the euro area. In the recession following the post-reunification boom German unemployment and public debt rocketed (Schnabl and Zemanek 2011). During the second half of the 1990s, public wage austerity, high unemployment and also the integration of the Central and Eastern European countries into the European Union kept private sector wage growth down (Schnabl and Zemanek 2011). In contrast, based on overoptimistic expectations (Lane and Pels 2011), citizens of the euro periphery anticipated or expected continuing future income growth consequently increasing their present consumption and investment in exchange for future income (Tobin 1967, Summers 1981). Capital inflows and rising consumption and investment entrenched current account deficits.

According to the theory of optimum currency areas (OCA) by Mundell (1961), real imbalances either triggered by an asymmetric shock or adverse economic developments constitute a disequilibrium and need to be adjusted via a realignment of the real exchange rate. As no nominal exchange rate exist between euro area countries, the real exchange rate alignment depends on changing relative wages and prices between the core and the periphery. However, low labour market flexibility in Europe (Bayoumi and Eichengreen 1992, European Commission 2008) has so far prevented timely real exchange rate realignment or large-scale labour migration. The latter seems to be on the rise as recent reports on a 25% drop in Greek nominal wages in 2011 and a 90% increase in migration of Greeks to Germany hint at (Rogers and Philippe 2012, Destatis 2012). Thus, the OCA theory implicates that macroeconomic imbalances are a failure of economies in a monetary union to readjust to the equilibrium. Mundell (2000) himself doubts that the euro area thus constructed would be able to overcome these impediments – rightly so in hindsight.

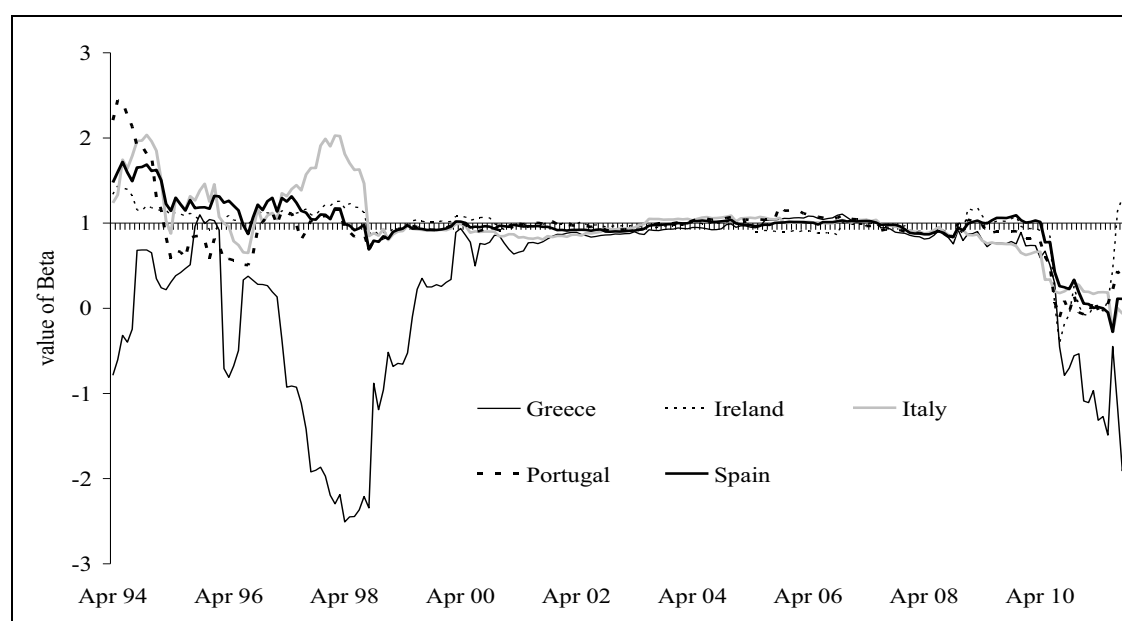
## **2.2 An equilibrium view on intra-euro area imbalances**

In contrast, Caballero et al. (2008) argue that persistent macroeconomic imbalances may constitute a new equilibrium following an external shock. They show for the example of US–Asia imbalances that the Asian crisis might have led to such a new equilibrium incorporating persistent current account deficits in the United States and reciprocate surpluses in Asia as well as a new debtor–creditor situation. Thereby, Caballero et al. (2008) argue that the Asian crisis of 1997 was a negative credibility shock reducing the relative attractiveness of Asian



financial markets against US financial markets. As a result, capital has persistently flowed from Asia to the US financial market creating the observed persistent divergence of current account balances between Asia and the US. Based on a dynamic general equilibrium model Caballero et al. (2008) show that the US may further sustain persistent current account deficits via any of the three channels i) future trade balance surpluses, ii) investment income from FDI or iii) a depreciation of the long run real exchange rate.<sup>2</sup>

Figure 3 Evolution of beta coefficients of euro periphery government bonds



Source: ECB. Based on monthly data.

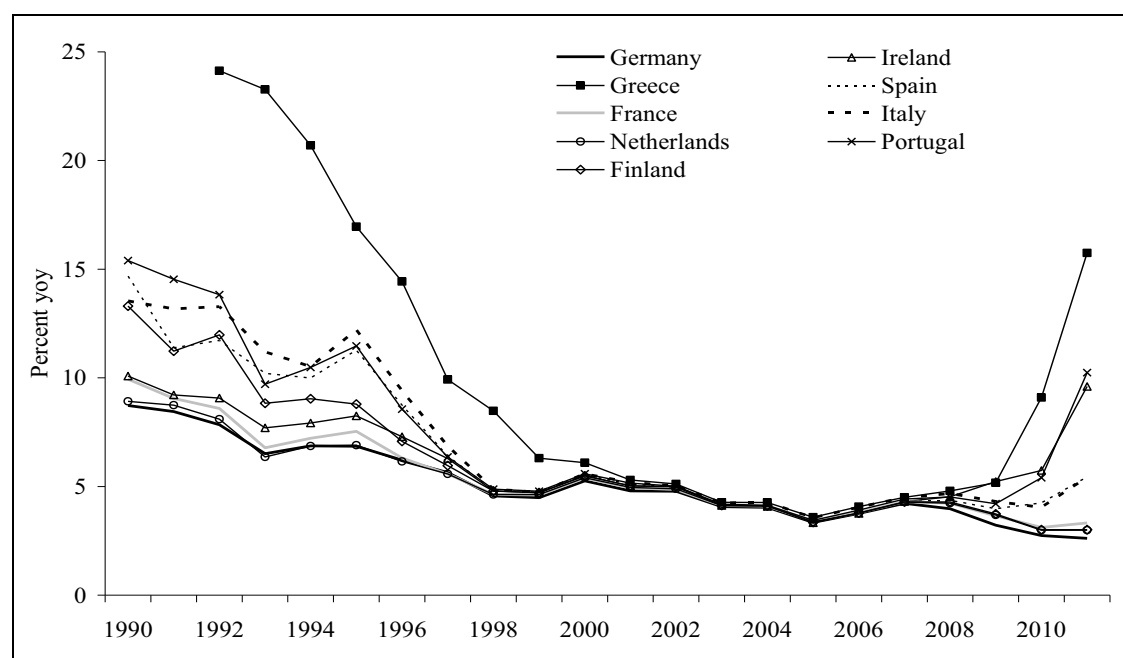
Following the argumentation of Caballero et al. (2008), the European financial market integration in the 1990s can be interpreted as a positive shock for many euro periphery countries. In preparation of the monetary union, the development towards a single financial market was fostered. Barriers of entry were reduced, common standards as well as common clearing and payment transfers systems were introduced in addition to several financial market regulations harmonized at the European level. As a result financial market integration increased in the euro area as shown by highly synchronized financial integration indicators and market developments. For instance, financial market integration became clearly visible in

<sup>2</sup> Caballero et al. (2008) assume that current account balances are financed by US-dollar denominated debt. The depreciation of the US-dollar reduces the value of the debt and provides external debt sustainability.

the relative market volatility of a government bonds expressed as beta value depicted in Figure 3.<sup>3</sup> With the start of EMU in 1999 (and Greece in 2001), beta values of periphery countries converged to a uniform value of one, indicating an almost perfect co-movement of government bond prices in the euro area.

In the course of financial market integration, formerly high interest rates of periphery countries significantly fell to the established low levels of core countries. This convergence is visible in Figure 4 showing government bond yields of euro area countries. Since the middle of the 1990s, government bond yields converged to relatively low rates of German government bonds. Private lending rates did also converge. Figure 5 illustrates the cross-country standard deviation of bank lending rates among euro area countries. Since 1999 bank-lending rates converged strongly as a result of financial market integration. The era of equal interest rates of core and periphery lasted for about one decade. During the current government debt crisis, government bond yields of periphery countries again increased significantly against the core's rates while bank-lending rates diverged only slightly.

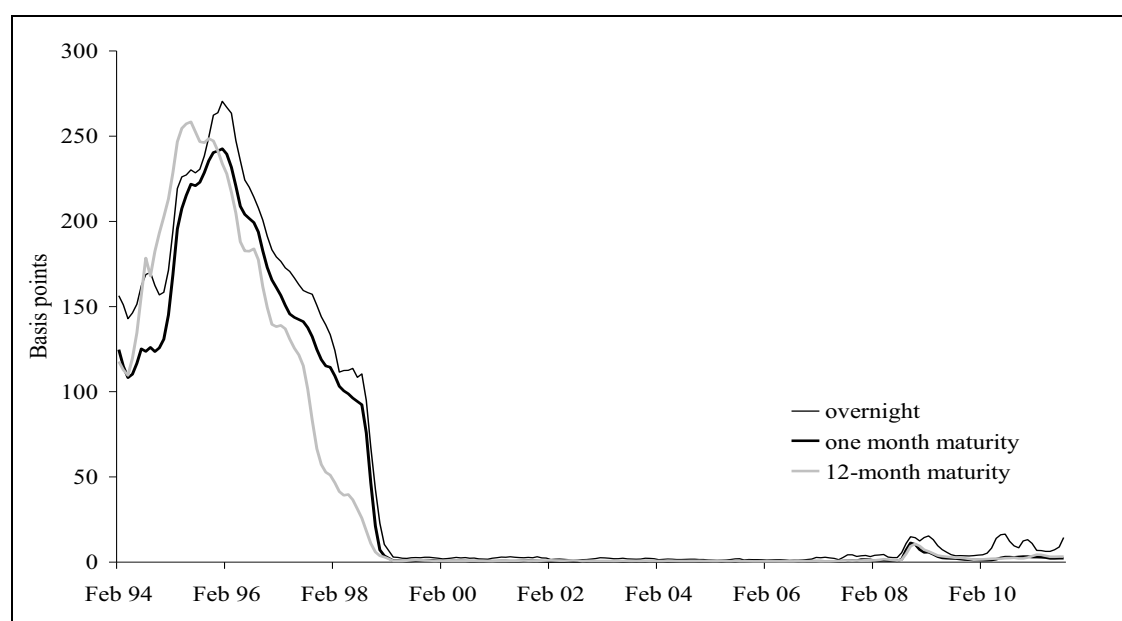
Figure 4 EMU convergence criterion bond yields, at yearend in per cent



Source: Eurostat

<sup>3</sup> In this case, beta is a number describing the risk of a bond relative to the market risk and is defined as  $\beta = \text{cov}(p_i, p_m) / \text{var}(p_m)$ . Variable  $p$  is the price of a bond with  $i$  indicating a specific country and  $m$  the average. A value of 1 indicates that the respective bond is as volatile as the average.

Figure 5 Cross-country standard deviation of lending rates among euro area countries



Source: ECB

In the context of Caballero et al. (2008), European financial market integration has been a positive credibility shock for the periphery countries relative to core countries in the 1990s. The attractiveness of the periphery's financial markets improved relatively to the core. This rise in attractiveness possibly explains initial capital flows from the euro area core to the periphery as well as persistent current account deficits in the euro periphery and surpluses in the core of the euro area. If this setting describes a new equilibrium situation, then Europe might not need to worry about the current account imbalances experienced so far and the sustainability of crisis countries foreign debt. A favourable outcome of this analysis would mean that a hair-cut as decided by Greece would not have to be the necessary consequence to reduce international debt in other European periphery countries. The significance of this hypothesis will be analysed based on an augmented general equilibrium model of intra-euro area imbalances.

### 3. A dynamic general equilibrium model of intra-euro area imbalances

#### 3.1 The Caballero et al. (2008) model revisited

The augmented model of global imbalances (Körner 2011) is expanding upon the model scenarios considered by Caballero et al. (2008) in their ‘equilibrium model of global imbalances’. It closes the gap between the so far unconnected parts of the dynamic general equilibrium model by fully integrating foreign direct investment and associated capital flows together with real exchange rates in a joint model. The key difference between the original Caballero et al. (2008) model and the augmented version is the property of all three rebalancing channels working in conjunction. The joint modelling pushes the model closer to reality by facilitating an interaction of net exports and the current account, capital flows and FDI, and real exchange rate adjustments all taking place at the same time. In addition, Körner (2011) uses a more realistic calibration of domestic and foreign investment costs enabling us to show that the trajectories of international indebtedness of countries are difficult to reverse in cases of extreme international investment positions. This is particularly true if the real exchange rate channel cannot be fully utilized to correct imbalances – as in the case of limited nominal exchange rate flexibility when all real exchange rate adjustment comes from price level changes. The last property links the model to the case of imbalances in the European monetary union.

#### 3.2 Model properties

The model applies a setup with two regions of the euro area countries, named *Periphery* (euro periphery, labelled with superscript  $P$ ) and *Core* (euro core, labelled with superscript  $C$ ), each standing for a representative set of countries.<sup>4</sup> Initially, both regions are assumed to be symmetric. In each of them stylized goods markets and more elaborate asset markets with investment, saving and production in assets in the tradition of Kiyotaki and Moore’s (1997) ‘trees’ are modelled. As both regions are assumed to be open economies, excess supply and demand are equilibrated via current account transactions. One of the regions, namely *periphery*, experiences an unexpected financial market credibility shock. The shock leads to the emergence of persistent imbalances between the two regions in the model (in our case

---

<sup>4</sup> To reduce complexity in the model, we divide euro area countries into the two regions *Core* and *Periphery*. In the following, we will only refer to regions, although they imply separate countries.

within the euro area) in terms of interest rates, current accounts and the global asset portfolio allocation constituting a new equilibrium.

### *The goods market*

The goods market is modelled using CES preferences for a single country-specific good  $x$  produced in each region's country  $i$  at time  $t$ . The sum of all relative demands for the goods basket of each country  $i \neq j$  is equal to the country's gross national product. Aggregate demand is equal to aggregate production on a global scale so there is no demand deficiency (unemployment) in the model. Aggregate production  $X$ , the sum of all countries' relative demands  $C$  for country  $i$ 's good, has the following property:

$$\sum_i x_t^{ij} = \sum_i \gamma^{ij} C_t^i \left( \frac{q_t^j}{P_t^i} \right)^{-\sigma} = X_t^j, \forall i, j \in \{\text{Core}, \text{Periphery}\}$$

In this setting,  $\gamma^{ij}$  is the CES parameter defining relative demand of region  $j$  for region  $i$ 's good. For  $i = j$ , the value is the domestic demand elasticity given domestic consumption  $C$ . The variable  $q_t^j$  defines the terms of trade with country  $j$  as a function of the prices  $P_t^i$  for the goods demanded domestically and from the other region. The parameter  $\sigma$  defines the speed of adjustment of the terms of trade to changes in prices; the lower  $\sigma$ , the slower adjustment takes place, with  $\sigma = \infty$  signifying instantaneous adjustment and a value of nil showing no reaction to price changes.

Each region  $j$ 's aggregate production can be split into a scale ( $N$ ) and a productivity component ( $Z$ ) respectively, yielding  $X_t^j = N_t^j Z_t^j$ . Production's exogenously given rate of growth is  $\dot{X}_t^j / X_t^j \equiv g = g^n + g^z$  which may be region-specific. The terms of trade of one of the regions is set as numéraire, here  $q_t^C = 1$ . Consequently, total aggregate output  $X_t$  over all regions  $j \in \{\text{Core}, \text{Periphery}\}$  is the sum of individual regions. As countries of the *periphery* region experience a shock, their output before the financial market shock is  $X_{t=0}^{Po}$  while production thereafter is denoted by  $X_{t>0}^{Pn}$ . The real exchange rate  $\lambda_t^{CP}$  is defined as the inverse ratio of the two regions' price levels  $P_t^i$ . It brings about equilibrium in the goods market by equating relative demands for each region's basket of goods in relation to the price charged for it:

$$\lambda_t^{CP} = P_t^P / P_t^C \quad \text{using}$$

$$P_t^i = \left( \gamma q_t^{i(\sigma-1)} + (1-\gamma) q_t^{j(\sigma-1)} \right)^{1/(1-\sigma)}, \text{ with } i \neq j \text{ and } i, j \in \{Core, Periphery\}$$

Total demand is equal to total output being the sum of the individual regions' output. The *periphery's* output before and after the financial market shock is converted by the region's terms of trade:

$$X_t = X_t^C + q_t^P (X_t^{Po} + X_t^{Pn})$$

### *The asset market*

The asset market is the part of the model creating the dynamics from which imbalances arise after the financial market shock. It is assumed that a share  $\delta^j q_t^j X_t^j$  of the available assets used for production in the economy can be capitalized on financial markets, with parameter  $\delta^j$  defining the capability of these financial markets. The remainder  $(1-\delta^j) q_t^j X_t^j$  is unalienable and may be regarded as human capital.

The asset market is characterized by an overlapping generations setting determining asset supply and demand. Agents are not modelled individually but can be envisaged as being the multitude of constituents of the aggregate region's values. The instantaneous return on holding assets  $r_t V_t^j$  in any period  $t$  is the result of additions to the asset stock  $\delta^j q_t^j X_t^j$ , capital gains on existing assets  $\dot{V}_t^j$  and a deduction for keeping up the growth rate of assets  $g^n V_t^j$ . Asset supply is thus a positive function of financial market capabilities  $\delta^j$  and the terms of trade  $q_t^j$  while negatively reacting to increases in the interest rate  $r_t$  or the exogenous rate of growth of assets  $g^n$ :

$$r_t V_t^j = \delta^j q_t^j X_t^j + \dot{V}_t^j - g^n V_t^j$$

Asset demand arises from the inter-temporal balance of agents' wealth and the asset supply to be spent on. If a region's wealth exceeds its available asset supply, the surplus wealth is exported to and invested in more asset-abundant countries via the capital account. If the capital account is closed the interest rate serves as an equilibrator on the domestic market. Asset demand has three components: a return on accumulated wealth, additions from population growth and deductions for investment. Specifically, asset demand is domestically determined by the return on existing assets minus endowment for new generations  $(r_t - \vartheta) W_t^j$

with parameter  $\vartheta$  being the demographic parameter from the overlapping-generation component. To this, the uncapitalizable part of assets in production  $(1 - \delta^j)q_t^j X_t^j$ , or human capital, adds new assets while domestic investment costs  $g^n V_t^j - I_t^j$  reduce wealth. The dynamic change in a region's wealth is then defined by the following flow equation:

$$\dot{W}_t^j = (r_t - \theta)W_t^j + (1 - \delta^j)q_t^j X_t^j + g^n V_t^j - I_t^j$$

Investment  $I$  is a crucial component of the model. In order to sustain asset growth  $g^n N_t^j$  a share of the region's domestic output is required as investment:  $I_t^j = \kappa q_t^j X_t^j$ . The investment cost parameter  $\kappa$  is initially constant but can be made dynamic in simulations. A financial market shock may reduce the functioning of domestic financial markets so that investment becomes unprofitable for domestic investors. In this case, investment may still be profitably carried out by investors using capital of (deeper) financial markets from abroad via foreign direct investment (FDI). A bargaining price  $\kappa_p$  is paid by the investor to the shock region<sup>5</sup> for the right to carry out FDI. Total FDI costs  $P_t$  are determined by the amount of investment carried out and the FDI parameter  $\kappa_p$ , which is determined by the bargaining power of the investor and the investee. FDI costs for the investor in prices of the region invested in become:

$$P_t = \kappa_p q_t^j X_t^j$$

FDI takes place if there are bilateral private gains from trade. Private gains will occur if the discounted cash flow of future returns on investment exceeds the initial cost of investment. For investing agents from the *core* region, the following condition needs to be met to make FDI in the *periphery* region with lower financial market parameter  $\delta^p$  profitable:

$$g^n \frac{\delta^c}{r - g^z} > \kappa + \kappa_p > g^n \frac{\delta^p}{r - g^z}$$

Foreign investment can alternatively be thought of as an exporting process. Financial market 'know-how' is exported from the region holding this knowledge in abundance to the deprived region. In this sense, FDI resembles net exports of goods with the difference of affecting the financial account rather than the current account.

---

<sup>5</sup> These FDI costs can be thought of as acquiring a public license for conducting FDI or the costs of carrying out a joint venture with a domestic firm. They are generalized by the catchall parameter  $\kappa_p$ .

### *Open economy properties*

Export between regions takes place if there is an imbalance of supply and demand on the domestic asset market. While the trade balance  $TB_t^j$  is defined as the domestic production less domestic absorption from consumption and investment, the current account balance  $CA_t^j$  is the difference between changes in asset demand and asset supply of a region:

$$\begin{aligned} TB_t^j &= X_t^j - \theta W_t^j - I_t^j \\ CA_t^j &= \dot{W}_t^j - \dot{V}_t^j \end{aligned}$$

The current account is the dual of the financial account. The current account may be equivalently written in national accounts as the sum of net exports and net investment income  $NINV_t^j$  from abroad. With the share of total assets of region  $j$  invested in region  $i$  being  $\alpha_t^{ji}$  the current account is:

$$\begin{aligned} CA_t^j &= X_t^j - \theta W_t^j - I_t^j + r_t (\alpha_t^{ji} V_t^i - \alpha_t^{ij} V_t^j) \\ &= TB_t^j + NINV_t^j \end{aligned}$$

The share of a region's total wealth invested in foreign assets  $\alpha_t^{ji}$  is given by the sum of past current account surpluses –source of changes in the net investment position. The main difference with FDI is the change in property rights taking place when acquiring assets via the current account while for FDI only the income stream from returns on investment abroad is repatriated. Foreign asset shares and the share of domestic assets in the global portfolio  $\square_t^{ji}$ , i.e. all wealth in all regions, is given by:

$$\begin{aligned} \alpha_t^{ji} &= \frac{W_t^j - V_t^j}{V_t^i} = \frac{\sum_{s=0}^{t-1} CA_s^j}{V_t^i} \\ \dot{\alpha}_t^{ji} &= \frac{\dot{W}_t^j - \dot{V}_t^j}{V_t^i} = \frac{CA_t^j}{V_t^i} \\ \square_t^{ji} &= \alpha_t^{ji} \frac{V_t^i}{W_t^j} = \frac{\sum_{s=0}^{t-1} CA_s^j}{V_t^i} \frac{V_t^i}{W_t^j} = \frac{\sum_{s=0}^{t-1} CA_s^j}{W_t^j} \end{aligned}$$

The global portfolio share will be one of the benchmarks for model dynamics. It captures the longer lasting effects of imbalances between regions resulting from a shock to financial markets in the *Periphery*-region.



### *The shock*

A shock to the financial markets in countries of the *Periphery*-region changes those countries' ability to convert assets used for production into capital assets tradable on financial markets. A negative shock may be envisaged as a decrease in the number of safe assets as a reliable store of value available on financial market of a region's countries. Alternatively, a sudden improvement of financial markets like entering the European Monetary Union may constitute a positive shock thereby improving the number of safe assets. The change of  $\delta^P$  (e.g. in the case of a positive shock indicated by  $\delta_{t=0^-}^P < \delta_{t=0^+}^P$  with  $t=0^-$  marking the period before the shock and  $t=0^+$  the time directly afterwards) affects the initial equilibrium that prevailed between asset supply and asset demand within countries of both regions and alters the dynamic allocation of assets between regions.

The shock to the financial market development parameter  $\delta$  is the main driver of this dynamic general equilibrium model. It affects all areas – nominal and real – of the economy of the respective region and has an additional impact upon the other region, too. In our two-region setting with a *Core* and a *Periphery*, markets are asymmetrically affected by a shock to the *Periphery*'s financial market development parameter. In the *Core*-region, a surplus in the trade balance ensues while the *Periphery* experiences a deficit in the trade balance and, most likely, also in the current account leading to a long-term change in the international allocation of assets and debt between both regions. The drivers of the international investment position of a region are the main focus in the model simulations.

### *Balance of payments and exchange rate dynamics*

The properties of the balance of payments and exchange rate dynamics in this two-region setting are such that any increase in a variable of one region causes a decrease in the other region. The following set of six indicators constitute the core of the analysis:

The *trade balance* reacts immediately. It adapts to changes in wealth induced by the financial market shock and dynamically adjusts to investment flow patterns:

$$\frac{TB_t^C}{X_t^C} = -\theta \frac{(1-\delta^C) + g^n (V_t^C + N_t^P v_t^{Pn}) / X_t^C - \kappa_P x_t^{Pn} / x_t^C - \kappa / x_t^C}{(g^z + \theta - r_t)} + (1-\kappa)$$

The *current account balance* is composed of the trade balance and net investment income:

$$\frac{CA_t^C}{X_t^C} = g^C \left( \frac{(1 - \delta^C) + g^n (V_t^C + N_t^P v_t^{Pn}) / X_t^C - \kappa_P x_t^{Pn} / x_t^C - \kappa (1 + x_t^{Pn} / x_t^C)}{(g^z + \theta - r_t)} + \frac{\delta^C}{r_t - g^z} \right)$$

The *international investment position* of the core or its amount of net foreign assets/debt:

$$NA_t^C = \alpha_t^{CP} V_t^P - \alpha_t^{PC} V_t^C \equiv W_t^C - V_t^C$$

The *real interest rate* is a variation on the golden-rule rate of interest accounting for real exchange rate changes, changing weights of the countries and costs of domestic and foreign investment:

$$r_t = g^z + \frac{\dot{q}_t^P}{q_t^P} (x_t^{Pn} + x_t^{Po}) + \frac{\theta}{1 - \kappa} \left[ \delta^C - (\delta^C - \delta^P) x_t^{Po} - g^n \hat{v}_t^{Po} x_t^R \left( \frac{\delta^C}{\delta^P} - 1 \right) \right]$$

The *terms of trade* from which the real exchange rate is calculated, are as follows:

$$\lambda_t^{CP} = P_t^P / P_t^C = \left( \gamma q_t^{P(\sigma-1)} + (1 - \gamma) \right)^{1/(1-\sigma)} / \left( \gamma + (1 - \gamma) q_t^{P(\sigma-1)} \right)^{1/(1-\sigma)}$$

The *long term share of assets* of the core in the overall number of capitalizable assets consists of a country's past current account balances with respect to current overall wealth:

$$\bar{\alpha}_t^{ij} = \alpha_t^{ij} \frac{V_t^j}{W_t^i} = \frac{\sum_{s=0}^{t-1} CA_s^i}{V_t^j} \frac{V_t^j}{W_t^i} = \frac{\sum_{s=0}^{t-1} CA_s^i}{W_t^i}$$

The dynamics of these six equations will be presented in the simulation results below.

### *Solving the non-linear dynamic system*

The system of equations constitutes a non-linear dynamic system which cannot be uniquely solved. The model contains four dynamic equations, which can be approximated using an iterative simulation procedure. Starting from a set of estimated initial parameters the model is iterated until all simulated values reach their equilibrium values and further iterations do not change the equilibrium found. Due to the design of the model, this equilibrium is unique so that the only solution to the model is found by solving the following dynamic equation system. It is comprised of the four dynamic equations for the share of wealth dynamics  $\dot{w}_t^C$ , the price levels  $P_t^i$ , the output share dynamics  $\dot{x}_t^C$ , and asset value dynamics  $\dot{\hat{v}}_t^{Po}$ . For more technical details see Körner (2011):

$$\begin{aligned}
\dot{w}_t^C &= (r_t - \theta - g^C) w_t + \left(1 - \delta^C - \frac{\kappa}{x_t}\right) + g^n \left[ \frac{(1 - \kappa)}{\theta x_t^C} + \hat{v}_t^{Po} \left( \frac{\delta^C}{\delta^P} - 1 \right) \right] - \kappa_P \frac{x_t^{Pn}}{x_t^C} \\
1 &= \theta \gamma w_t^C P_t^{C(\sigma-1)} + (1 - \gamma) \left( \frac{(1 - \kappa)}{x_t^C} - \theta w_t^C \right) P_t^{P(\sigma-1)} \\
\dot{x}_t^C &= x_t^C (1 - x_t^C) \left( g^C - g^P - \frac{\dot{q}_t^P}{q_t^P} \right) \\
\dot{\hat{v}}_t^{Po} &= \frac{\theta}{1 - \kappa} \left[ \delta^C (1 - x_t^{Po}) + \delta^P x_t^{Po} - g^n \hat{v}_t^{Po} x_t^{Po} \left( \frac{\delta^C}{\delta^P} - 1 \right) \right] \hat{v}_t^{Po} - \delta^P
\end{aligned}$$

The simulation consists of a building period ( $t=0^-$ ) before the shock, the time of the shock ( $t=0$ ), the immediate aftermath of the shock ( $t=0^+$ ) and a secession of periods following the shock ( $t>1$ ). After ( $t=0^+$ ) the regions in the model converge to a new steady-state-like equilibrium for which all parameters asymptotically converge to a new set of values.

The state variables of the model are not directly affected by the shock. They change in accordance with the new model dynamics and bring about the new equilibrium:

$$\begin{aligned}
r_t &= g^z + x_t^P \frac{\dot{q}_t^P}{q_t^P} + \frac{\theta}{1 - \kappa} \left[ \delta^C - (\delta^C - \delta^P) x_t^{Po} - g^n \hat{v}_t^{Po} x_t^P \left( \frac{\delta^C}{\delta^P} - 1 \right) \right] \\
\lambda_t^{CP} &= P_t^P / P_t^C \\
P_t^P &= \left( \gamma q_t^{P(\sigma-1)} + (1 - \gamma) \right)^{1/(1-\sigma)} \\
P_t^C &= \left( \gamma + (1 - \gamma) q_t^{P(\sigma-1)} \right)^{1/(1-\sigma)} \\
x_t^P &= 1 - x_t^C = x_t^{Po} + x_t^{Pn} \\
\dot{x}_t^P &= -\dot{x}_t^C = \dot{x}_t^{Po} + \dot{x}_t^{Pn}
\end{aligned}$$

The solution to the non-linear dynamic system of equations is obtained by initially guessing and/or calibrating the shock to the capital values on the financial market. This loss in capital values feeds into wealth, which then depresses consumption in favour of savings. Savings generate intra-country flows of funds. These flows are the result of the initial shock and feed into the parameter values in the post-shock periods. At the ‘end’ of simulation time, capital values, wealth and all dynamics reach a steady-state value without further change. The final value is then used to calculate the present value of capital assets, which is then applied to update the initial guess of the capital market shock. Consecutive iterations use updated values.

### 3.3 Calibration and data

The model is calibrated using the same techniques as in Caballero et al. (2008) and Körner (2011). The convergence in nominal interest rates and inflation rates in the run-up to the start of the euro in 1999 serves as financial market shock. The convergence of government bond yields from EMU membership was strongest in the euro zone accession countries from the periphery as depicted in Figure 3 , Figure 4 and Figure 5 . Interest rates have converged significantly before the start of the monetary union and continued to do so in the first years of EMU's existence. Asset values of euro area countries increased through higher present values from lower interest rate discounting. The increase in capital values from this positive shock in the periphery serves as the calibration factor for the financial market development parameter  $\delta$ . In this sense, EMU accession served as a promulgator of financial market development.

All other parameters are calibrated using real data or computed values. The size of core and periphery regions  $C$  and  $P$  are computed as the weights of their relative GDP values. Growth rates are past rates of GDP growth and investment and FDI costs are estimated using a moving window of past net investment over GDP ratios and net investment income measures. Data stem from Eurostat databases listed in the appendix. The baseline set of core parameters including the demographics parameter  $\phi$ , the CES adjustment parameter  $\sigma$  and starting values for the international investment positions is kept as in the theory papers:

Parameter	$\theta$	$g$	$\delta^C$	$\bar{\Pi}_{0-}^{PC}$	$NA_{0-}^C$	$\sigma$	$\gamma$	$g^z$	$g^n$	$K$	$K_P$	$r_{aut}$
<b>Caballero et al.</b>	0.25	0.03	0.24	0.05	0	4	0.9	0.0	0.03	0.0	0.12	0.06
<b>Calibrated</b>	0.79	0.036	0.09	0.05	0	4	0.9	0.0	0.036	0.065	0.05	0.078

The European core-periphery model is simulated for different sets of countries. The baseline simulation has the notorious GIPS countries (Greece, Ireland, Portugal, and Spain) in the periphery group. Simulations are also run for the GIIPS group including Italy and also for single countries like Spain and Italy versus a Northern core. The core is composed of the other euro area countries that started the euro in 1999, namely Austria, Belgium, Germany, Finland, France, Luxemburg and the Netherlands — and Italy, when applicable. All simulations are based on EMU-12. Those countries that joined the euro after 2001 do not alter the composition of EMU significantly due to their relatively small economies. In addition, they do not all have a full set of historic time-series available at Eurostat for the 1990s as a building period for calibration. The late euro entrants are hence excluded from our simulations without loss of generality in our view.

However, simulation results should be treated as a stylized picture alone. This is because only EMU-12 countries are included in the simulation but net international investments positions or current account balances comprise virtually all countries of the world.<sup>6</sup> Nevertheless, as intra-euro area trade accounts for a large share of overall trade by euro area countries and the euro area's current account is overall roughly balanced, results still provide valuable insights on the sustainability of current account positions and foreign debts related to intra-euro area imbalances.

Investment and FDI parameters  $\kappa$  and  $\kappa_p$  are of particular interest. Caballero et al. (2008) do not calibrate but simply assume values of 0% and 12% respectively. Calibrations show that these values are far from the European (and US) reality: the net investment share  $\kappa$  is around 6.5% in the euro area (6.2% in the core, 8.2% in the GIPS-periphery) for the run-up to EMU in 1999. The catchall FDI parameter  $\kappa_p$  captures the return on investment abroad as the weighted sum of countries' primary income from the rest of the world over the depreciated present value of past FDI. This value is found to be around 5% for European countries.

## 4. Simulations results for the euro area

### 4.1 Baseline results – core-periphery (GIPS)

The simulation results are shown in 0 depicting the course of actual and of estimated variables of periphery countries (GIPS) against the remaining EMU-12 countries (core). The 'baseline' scenario shows the equilibrium path of the periphery's current account, net foreign assets (debt if negative), interest rates and the real exchange rate given the financial market shock from lowered interest differentials after 1999. The 'actual' line shows the de facto development between 1997 and 2011 and serves as the frame of reference for all subsequent simulations.

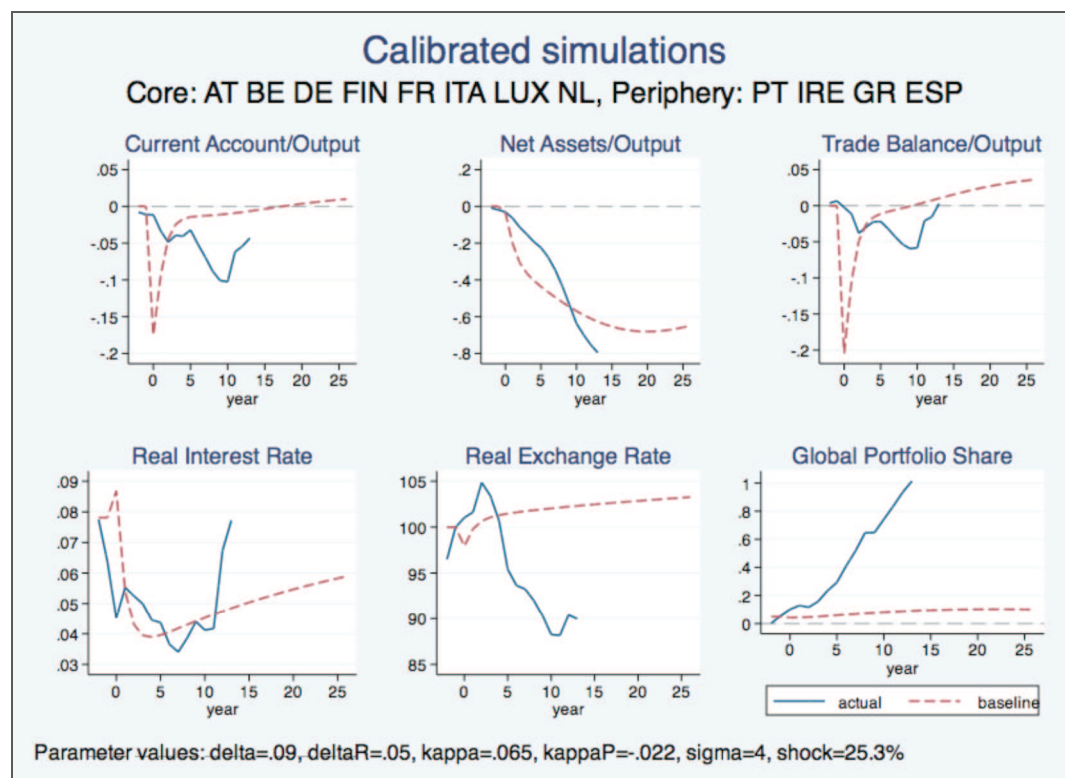
The financial market shock through EMU accession at time 0 (beginning of the two-year convergence period in 1997) has resulted in considerable current account deficits of the periphery. The development of the current account is shown by the line labelled actual, which

---

<sup>6</sup> Eurostat publishes data on intra-European current account balances and investment positions only for the 2000s, not for the building period of model simulations in the years before EMU accession in 1999. The same applies to other data required for simulations for countries joining the euro area after 1999 (except Greece).

signals increasing deficits in the top left hand pane of 0. These deficits are due to trade deficits on the one hand as illustrated in the top right hand pane. In addition, the initial real depreciation of the exchange rate in the first five years has been reversed and turned into a strong appreciation depicted in the bottom centre pane favouring a negative current account.

Figure 6 Baseline simulation results for the PIGS-periphery



Source: own computations

The positive shock to periphery financial markets from lower real interest rates increased the present value of domestic capital assets by 25.3%.<sup>7</sup> Due to the wealth allocation at the time of the shock, a large part of these future discounted capital gains went to domestic owners of these assets whose perceived wealth increased accordingly. From the link between wealth and present and future consumption, a current account deficit ensued. The increased financial market capabilities led to an appreciation of the real exchange rate favouring increasing foreign indebtedness. These initial deficits should have been countered by a future depreciation and future trade balance surpluses in order to service international debt.

A comparison between simulations and the actual development of the benchmark parameters of periphery countries shows that this kind of rebalancing did not take place. To make matters

<sup>7</sup> See appendix 6.1 for the calibration of the financial market shock from EMU bond yield convergence.

worse, instead of countering initial current account deficits by real exchange rate depreciation and future trade balance surpluses, the opposite took place. Real exchange rate appreciation and an increase in trade balance deficits led to a further worsening of the current account and resulted in an unsustainable path of international debt.

The main problem of periphery countries today is, as our results suggest, the unsustainable path of international indebtedness. The top centre pane of 0 has net foreign assets of the PIGS countries reach the same level as predicted by the equilibrium model in 2007 (54%). The dynamics, however, is completely reversed. Instead of a converging and decreasing ratio of net foreign assets (negative assets are debt) over GDP, the actual line exhibits a strongly diverging pattern. While net assets over output in the reference simulation scenario peak at 68.1% (20 years after the shock), actual development has already surpassed this value by 2011 (79.6%). See appendix 6.2 for the full set of results for actual and simulated scenarios.

Neither current account surpluses nor a strong real depreciation are in view to change the current picture. Nonetheless, in 2011 the PIGS countries managed a weighted trade balance surplus of 0.3%. Yet real interest rates rose to a weighted 7.7% in 2011 and the disadvantageously high real exchange rate inhibits a reversal of the debt dynamics. And if a devaluation came about, rising real debt service would require an even stronger counter-reaction: Simulations hint at a required reduction of the trade balance over GDP ratio by five percentage points, and a real depreciation by at least 15 per cent to close the gap to simulated values. Only then would lower current account deficits lead to a convergence of the international investment positions of debtor countries.<sup>8</sup>

The main outcome of the baseline simulations is therefore the inability of periphery countries to reverse their accumulated current account positions by real exchange rate depreciations alone. Therefore, we present two alternative simulations, which might provide strategies for an adjustment leading to more sustainable net foreign debt levels.

## **4.2 Alternative 1: Increasing investment**

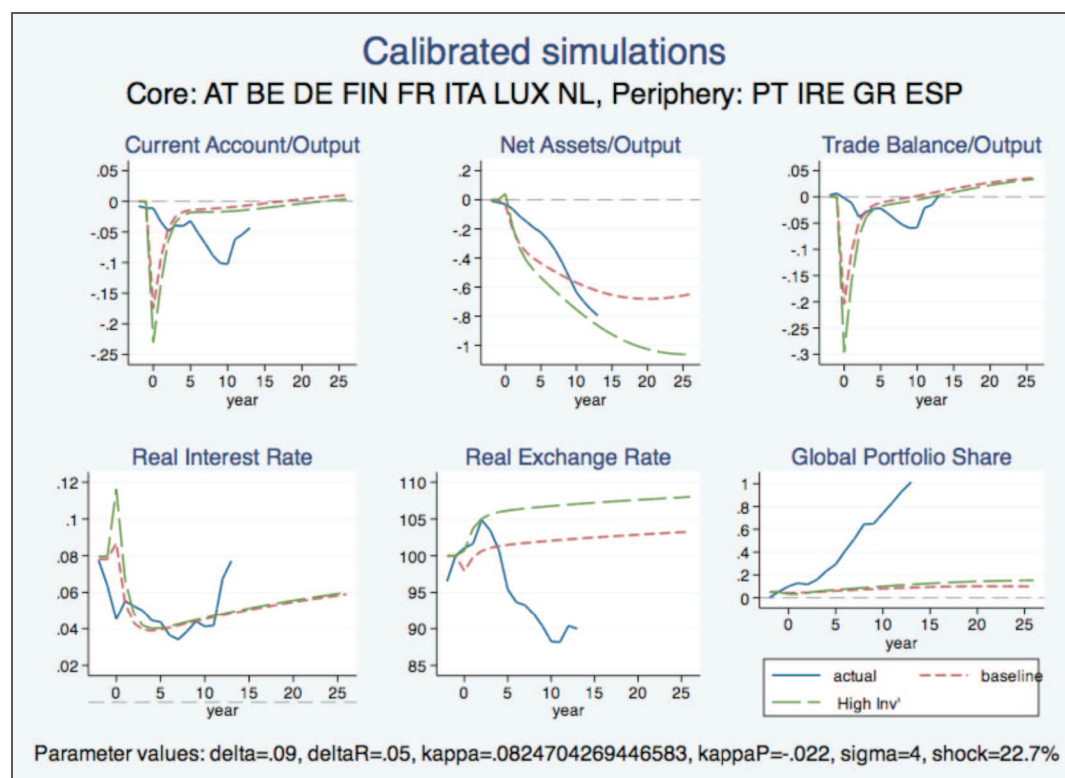
Investment in productive capital is a straightforward proposal to increase production and thus reduce the denominator of the debt-to-output ratio. More investment could be carried out in the core and periphery by increasing the net investment share  $\kappa$ . The average calibrated net investment parameter from gross capital formation less consumption of fixed capital

---

<sup>8</sup> Simulations using the GIIPS countries as periphery yield similar, yet more attenuated results.

(depreciation) is found to be higher in the periphery (8.2%) than in the core (6.2%). It can be understood as the effort made to maintain the current capital stock and invest in new capital to sustain growth. If the overall level of investment were increased to the periphery's level, demand from core countries for periphery's capital goods would surge because of relatively lower investment costs in the periphery.

Figure 7 Simulation results for the PIGS-periphery assuming investment variation in the core countries



Source: own computations

The top center pane of Figure 7 shows a significantly higher sustainable debt level for the scenario labeled 'High Inv(estment)'. The sustainable debt level increases to 86.5% (year 13) while the current account can stay slightly more in deficit (1.4% instead of 0.6% for the baseline scenario). Capital exports to the core help decrease the real exchange rate in the periphery by five percentage points (107 rather than 102.3) fostering competitiveness relative to the centre and increasing demand. However, in reality periphery countries are far from achieving this degree of competitiveness: the weighted real exchange rate index is at 90.0 in 2011 and thus overvalued by 19% compared to the high investment scenario and 13% to the equilibrium calibrated baseline case. Unless this overvaluation is reduced, the FDI and net export channels in the model are blocked because they are unattractive to foreign buyers.



Additional demand from the core region for capital or production goods in the periphery cannot materialize.

### **4.3 Alternative 2: Increasing productivity**

Improving productivity and thus becoming more competitive internationally is an oft-heard demand for periphery countries. A variation in total factor productivity (TFP) does indeed improve the sustainability of current international debt positions. In Figure 8 a variation in TFP by an additional 1 or 2 percentage points respectively allows greater initial current account deficits. The average weighted current account deficit of the four PIGS countries has increased to a maximum of 10.2% in 2008. Strikingly, this value is higher than the one in the most optimistic “TFP+2%” scenario. It postulates a two percentage point increase in TFP from the financial market shock and goes along with a current account deficit of only 8.4% in year 10 after the shock (2008). In contrast to simulations, PIGS countries did not plunge into deficit after the shock; deficits rather built up over time. Net foreign debt is therefore currently only at a weighted 79.6% since 1999 — 16.9 percentage points higher than in the calibrated baseline scenario but within the range of realistic scenarios like a TFP increase by 0.5 percentage point (88.3%) or the above discussed rise in net investment.<sup>9</sup>

Debt levels can be sustained for longer when future productivity increases make up for current debt by over-proportionally increasing production. This positive link between higher TFP growth and debt sustainability is shown in the international investment position (Net Assets/Output) in the top center pane of Figure 8 . An increase in TFP by 1 percentage point would extend the sustainable debt level from 62.7% to 114% after 13 years (2011). A TFP increase of +0.5% would still allow for a maximum of over 100% of net foreign debt to be sustainable. However, in any case a future depreciation of the exchange rate and a turn-around in the current account position is required to return to the required equilibrium path.

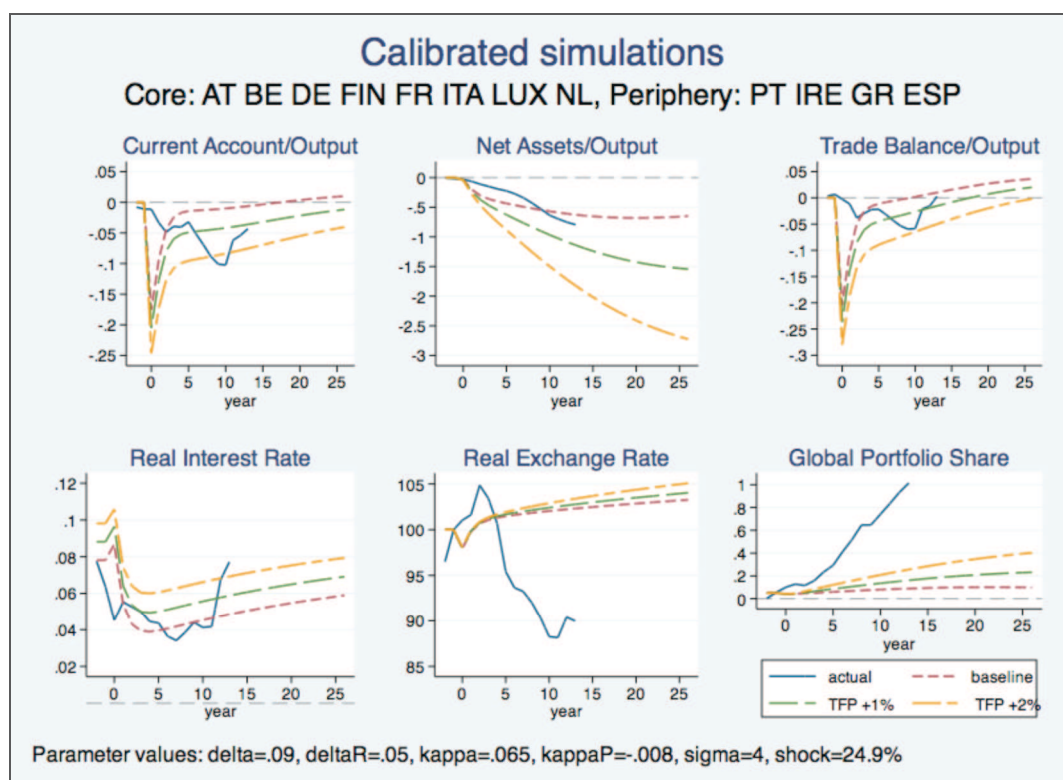
The actual path of the periphery’s current accounts has reversed in 2011 to a weighted deficit of 4.3%. Despite this reduction, values are still in the (highly unrealistic) range of the scenario with “TFP +2%” assuming productivity to have increased as a consequence of the financial market shock by two percentage points. Real appreciation in the bottom center pane has prevented debt levels from rising too much so far. However, a future depreciation, which equilibrium in the model calls for, might make current debt increasingly unsustainable.

---

<sup>9</sup> See appendix 6.3 for simulation results of the 0.5% TFP variation not displayed in Figure 8 .

However, a lower real exchange rate is required to bring the balance of payments back towards sustainable levels. In its absence, the only alternative to considerable current account and trade balance surpluses to reduce foreign indebtedness would be lower domestic demand — currently to be seen in some periphery countries in recent times.

Figure 8 Simulations and TFP variation for core and PIGS-periphery model



Source: own computations

#### 4.4 Country case studies: Italy and Spain

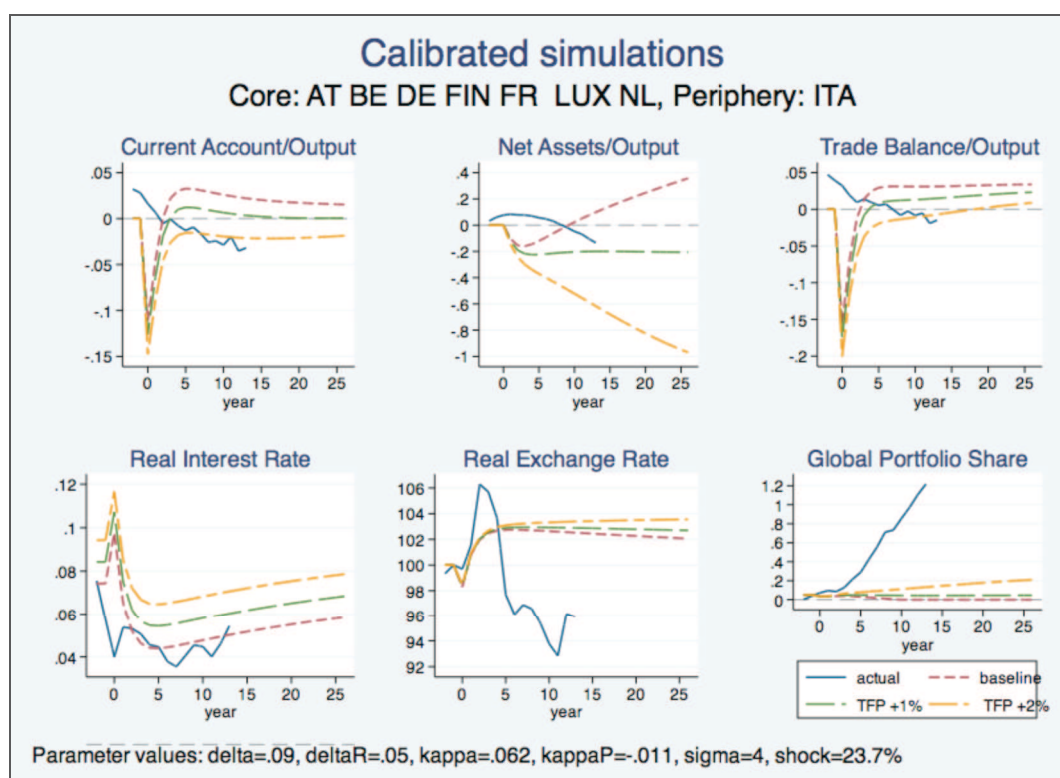
An application of the model to Italy as the single-country periphery and a Northern core highlights the versatility of the model. Italy's current problems are rather due to negative prospects from an uncompetitive real exchange rate stemming from low growth. In contrast to other periphery countries (and like France), Italy even had current account surpluses in the early years of the euro's existence. Only with time did the current account turn into deficit alongside the trade balance. Italy's net foreign asset position is almost balanced after 12 years.

In Italy, the financial market shock from convergence of interest rates did not lead to higher international debt but to domestic indebtedness. The income effect from lower interest rates is

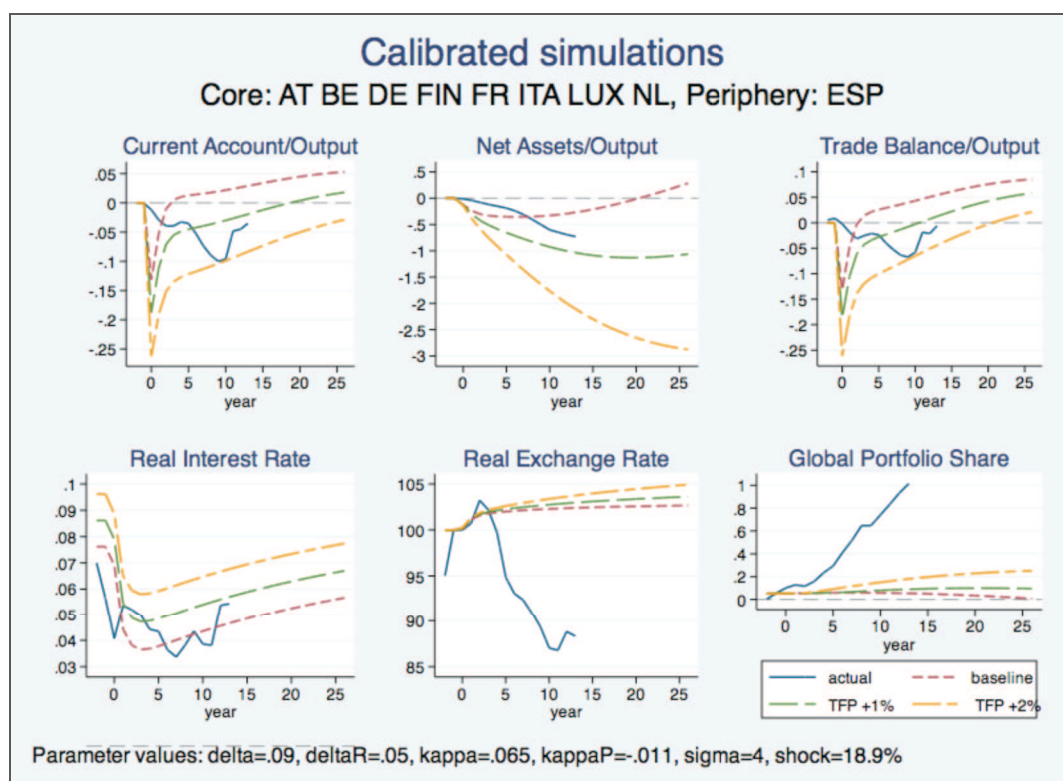
nonetheless visible in the real exchange rate: It increased by 7% since 1999 (year 0) and even 16% since 1997 as shown in the bottom centre pane of the upper part of Figure 9.<sup>10</sup> Italy needs to regain competitiveness by reducing the real exchange rate overvaluation and increasing growth prospects. The country's problems thus stem from a lack of international competitiveness visible in slowly deteriorating current account and trade balances.

For Spain, the picture is again a different one. The country has benefited from EMU accession and low interest rates and turned this advantage into a domestic demand boom. Current account deficits and capital inflows ensued, appreciating the real exchange rate by 13% compared to the rest of the euro zone. Since 1999, Spain has added 65.5% of its GDP to net foreign debt. However, recent turn-arounds in current account and trade balances look promising since they come close to equilibrium levels demanded in the 'TFP+1%' scenario, which only requires a feasible productivity increase by 1 percentage point. However, as for the other countries, the real exchange rate poses the main impediment to realignment of European imbalances.

Figure 9 Simulations and TFP variation for core countries and Italy and Spain



<sup>10</sup> Simulation results for the single-country simulations for Italy and Spain are not reported in the appendix but are available upon request from the authors.



Source: own computations

## 5. Economic policy implications

In this paper we study the intra-euro area imbalances based on a dynamic general equilibrium model. We show that the financial market shock, triggered by European financial integration and the introduction of the euro, might have contributed to the development of imbalances. The attractiveness of financial markets in southern Europe improved relatively to the core countries. Based on our model simulations, this explains capital flows from the euro area core to the periphery, persistent trade account and current account deficits in the euro periphery and surpluses in the core as well as diverging net foreign investment positions in the euro area.

More worrisome, our baseline simulation results for the euro area further suggest that foreign debt positions of the euro periphery countries are far from sustainable. Rising debt servicing costs would require a rather strong improvement of the trade balance and a real depreciation. Only then would lower current account deficits lead to a convergence of the international investment positions of debtor countries. However, future real depreciation would increase the real value of debt and might make current debt increasingly unsustainable. Alternative

scenarios, assuming rising investment and productivity, draw a less dramatic picture. The level of sustainability widens to a higher level of foreign debt.

Therefore, today's crisis countries will need to adjust to imbalances in current accounts and net foreign positions not only by real exchange rate depreciations alone. Our alternative simulation scenarios point at two possible strategies. First, investment in productive capital needs to be restarted and accelerated. To unburden the current account, capital needs to be accumulated by rising domestic savings in crisis countries. Second, raising crisis countries' productivity will add to their competitiveness and growth potential. Increasing production reduces the debt per GDP relation and provides income to serve debt.

A precondition is, however, to restore confidence in crisis countries and to solve their banking problems. Both continue to act as an opposite and thus negative financial market shock to the one experienced after EMU accession. Only after overcoming them will domestic savings stay in countries and can investments be allocated to productive sectors. On the other hand, crisis countries need to support investments by substantial structural reforms and enhancing investment conditions. Then foreign debt positions might – in the end – prove to be sustainable again.

## References

- Alesina, Alberto / Ardagna, Silvia / Trebbi, Francesco 2006: Who Adjusts and When? On the Political Economy of Reforms, *NBER Working Paper* 12049, National Bureau of Economic Research, Cambridge MA.
- Argyrou Michal / Chortareas Georgios 2006: Current Account Imbalances and Real Exchange Rates in the Euro Area. *Cardiff Economics Working Paper* 23. Cardiff University, Cardiff.
- Balassa, Bela 1964: The Purchasing Power Parity Doctrine: A Reappraisal, *Journal of Political Economy* 72 (6), 584-596.
- Bayoumi, Tamin / Eichengreen, Barry 1992: Shocking Aspects of European Monetary Unification, *NBER Working Paper* 3949, National Bureau of Economic Research, Cambridge, MA.
- Blanchard, Oliver / Giavazzi, Francesco 2002: Current Account Deficits in the Euro Area: The End of the Feldstein-Horioka Puzzle? *Brookings Papers of Economic Activity* 33, 147-186, Brookings Institution, Washington, DC.
- Caballero Ricardo J. / Farhi, Emmanuel / Gourinchas, Pierre-Olivier 2008: An Equilibrium Model of “Global Imbalances” and Low Interest Rates, *American Economic Review* 98 (1), 358-393.
- Caballero Ricardo J. / Krishnamurthy Arvind 2009: Global Imbalances and Financial Fragility, *American Economic Review* 99 (2), 584-88.
- de Santis, Robert A. / Lührmann, Melanie 2006: On the Determinants of External Imbalances and Net International Portfolio Flows: A Global Perspective, *ECB Working Paper* 651, European Central Bank, Frankfurt/Main.
- Destatis 2012: Hohe Zuwanderung nach Deutschland im Jahr 2011, Deutsches Statistisches Bundesamt, *Press Release* No. 171, Available at: [https://www.destatis.de/DE/PresseService/Presse/Pressemitteilungen/2012/05/PD12\\_171\\_12711.html](https://www.destatis.de/DE/PresseService/Presse/Pressemitteilungen/2012/05/PD12_171_12711.html)
- European Commission (EC) 2008: EMU@10: Success and Challenges after 10 Years of Economic and Monetary Union, *European Economy* 2/2008, Brussels.
- European Commission 2009: Quarterly Report on the Euro Area 8(1). Brussels.
- European Commission (EC) 2010: Surveillance of Intra-Euro-Area Competitiveness and Imbalances. *European Economy* 1/2010. Brussels.

- Feldstein, Martin / Horioka, Charles 1980: Domestic Saving and International Capital Flows, *Economic Journal* 90, 314-329.
- Gros, Daniel 2010: The Long Shadow of the Fall of the Wall, VOX Column, Available at:  
<http://www.voxeu.org/index.php?q=node/5191>.
- Kiyotaki, Nobuhiro / Moore, John 1997: Credit cycles, *Journal of Political Economy* 105 (2), 211– 248.
- Körner, Finn M. 2011: An equilibrium model of ‘global imbalances’ revisited, Violette Reihe Arbeitspapiere 33/2011, Promotionsschwerpunkt Globalisierung und Beschäftigung.
- Lane, Philip R. / Pels, Barbara 2011: Current Account Imbalances in Europe, paper prepared for the XXIVth Moneda y Credito Symposium, Madrid, November 2011.
- Mundell, Robert 1961: A Theory of Optimum Currency Areas, *American Economic Review* 51, 657-665.
- Mundell, Robert A. 2000: Currency Areas, Exchange Rate Systems and International Monetary Reform. CEMA Working Papers, Serie Documentos de Trabajo No. 167, Universidad del CEMA, Buenos Aires, May 2000.
- Obstfeld, Maurice / Rogoff, Kenneth 1994: The Intertemporal Approach to the Current Account, *NBER Working Paper* 4893, National Bureau of Economic Research, Cambridge, M.A.
- Rogers, James / Cécile Philippe 2012: The Tax Burden of Typical Workers in the EU 27, *Technical Report*, New Direction Foundation and Institut Économique Molinari, Paris, May 2012
- Samuelson, Paul A. 1964: Theoretical Notes on Trade Problems, *Review of Economics and Statistics* 46 (2), 145–154.
- Schnabl, Gunther / Zemanek, Holger 2011: Inter-temporal Savings, Current Account Trends and Asymmetric Shocks in a Heterogeneous European Monetary Union, *Intereconomics* 46 (3), 153-160.
- Summers, Larry H. 1981: Capital taxation and accumulation in a life cycle growth model, *American Economic Review* 71, 533-544.
- Tobin, James 1967: Life cycle saving and balanced growth, in: Ten Economic Studies in the Tradition of Irving Fisher, Wiley, 231-256.

Walters, Alan A. 1990: *Sterling in Danger: The Economic Consequences of Pegged Exchange Rates*. Fontana/Collins, London.

## 6. Appendix

### 6.1 Calibration and variable description

Data source: Eurostat, <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>

Time span: 1994 to 2011; building period for calibration: 1996 to 1998

Variable	Label	Variable abbreviation	Description	Unit/Formula
W	Wealth	NfaHnsh_EUR	Net financial assets Household sector	Millions of Euro
$\theta$	Financialization parameter	theta	Share of GDP over total capital assets	$1 / ('total\_wealth' / 'total\_gdp')$
$\delta^c$	Financial market development parameter	delta	Cost of transforming output into marketable capital assets	$('r\_aut')*(1-'kappa')^{\theta}$
		deltaR		$('r\_0plus')*(1-'kappa')^{\theta}$
X	Output	Gdpamp_EUR	Gross domestic product at market prices	Millions of Euro
$g$	Growth rate of output	g	Gross domestic product at market prices	Year-on-year in %
$g^z$	Productivity growth (TFP)	gz	$g^z = g - g^n$	as in Caballero et al. (2008)
$g^n$	Real growth less TFP	gn	$g^n = g - g^z$	as in Caballero et al. (2008)
CA	Current account balance	BoPCANAcotw_EUR	Balance of payments Current account. Net	Millions of Euro
TB	Trade balance	Ebogas_EUR	External balance of goods and services Net	Millions of Euro
NA	Net foreign assets	IipTNP_EUR	International investment position Total Net Position	Millions of Euro
$K$	Net investment share	Gcf_EUR	Gross capital formation	Millions of Euro
		Cofc_EUR	Consumption of fixed capital	Millions of Euro
$\kappa_P$	Rate of return on FDI	BoPFaDiNAcotw_EUR	Balance of Payments Financial account. Direct investment Net	Millions of Euro
		Npitwtrotw_EUR	Net primary income transfers with the rest of the world	Millions of Euro
	Rate of return on FDI (Alt.)	Bop_fdi_inc	FDI income and rates of return	Rate of return on FDI stocks
$r_{aut}$	Real interest rate	Eccby_index	EMU convergence criterion bond yields	At yearend in %
$\lambda_i^{CP}$	Real exchange rate	REER_index	Real Effective Exchange Rate	Index; deflator consumer price indices - 36 trading partners
$\sigma$	CES preference parameter	sigma	Speed of price level adjustment	as in Caballero et al. (2008)
$\gamma$	Cross-demand parameter	gamma	Strength of cross-border relative demand	as in Caballero et al. (2008)
Shock	Size of financial market shock	shock	Financial market shock from change in bond yields from EMU convergence	$1 - 'deltaR'/'delta'$

The shock is calibrated as the mean weighted spread of periphery countries' interest rates measured by EMU convergence criterion bond yields over the core's rate. Spreads are averaged over the last three years of the pre-convergence period (1994–96) and compared with the three-year average after two years of EMU's existence (2001–03). The shock translates into an increase in the net present value of the periphery's total capital assets of 24.9%.



## 6.2 Data for GIPS calibrated simulations (actual baseline and high investment scenarios)

		Actual							Baseline							High investment						
AD	year	CA	NFA	TB	IR	RER	RER2	GAS	CA	NFA	TB	IR	RER	RER2	GAS	CA	NFA	TB	IR	RER	RER2	GAS
1996	-2	-0.8	-0.8	0.4	7.8	100.0	96.5	0.2	0.0	0.0	0.0	7.8	0.8	100.0	5.0	0.0	0.0	0.0	8.0	0.8	100.0	5.0
1997	-1	-1.1	-1.9	0.7	6.4	103.6	100.0	5.5	0.0	0.0	0.0	7.8	0.8	100.0	5.0	0.0	0.0	0.0	8.0	0.8	100.0	5.0
1998	0	-1.1	-3.0	-0.3	4.5	104.7	101.0	10.0	-17.5	-3.4	-20.5	8.7	0.8	97.9	4.2	-23.0	4.2	-29.7	11.6	0.8	100.7	3.2
1999	1	-3.3	-6.4	-1.1	5.5	105.3	101.6	12.8	-9.4	-20.2	-10.5	5.4	0.8	99.8	4.5	-13.6	-18.3	-16.2	6.7	0.8	103.7	3.2
2000	2	-4.9	-11.2	-3.8	5.3	108.7	104.9	11.6	-4.4	-30.5	-4.9	4.3	0.8	100.7	4.6	-6.4	-33.5	-7.6	4.8	0.8	105.0	4.4
2001	3	-3.9	-15.2	-3.0	5.0	107.2	103.4	15.7	-2.4	-36.3	-2.6	3.9	0.8	101.1	5.0	-3.4	-42.3	-3.9	4.2	0.9	105.6	5.5
2002	4	-4.0	-19.2	-2.2	4.4	104.4	100.7	23.4	-1.7	-40.3	-1.6	3.9	0.8	101.3	5.5	-2.2	-48.4	-2.4	4.0	0.9	105.9	6.3
2003	5	-3.2	-22.4	-2.2	4.4	98.9	95.4	29.3	-1.4	-43.6	-1.1	4.0	0.8	101.5	6.0	-1.9	-53.5	-1.8	4.0	0.9	106.1	7.0
2004	6	-5.1	-27.6	-3.2	3.7	97.1	93.7	41.2	-1.3	-46.6	-0.8	4.1	0.8	101.6	6.4	-1.8	-58.2	-1.5	4.1	0.9	106.3	7.6
2005	7	-6.9	-34.5	-4.3	3.4	96.6	93.3	51.9	-1.3	-49.4	-0.6	4.2	0.8	101.7	6.9	-1.8	-62.7	-1.3	4.2	0.9	106.4	8.2
2006	8	-8.8	-43.3	-5.4	3.9	95.4	92.0	64.6	-1.2	-52.1	-0.3	4.3	0.8	101.8	7.3	-1.7	-67.1	-1.1	4.4	0.9	106.5	8.8
2007	9	-10.1	-53.4	-5.9	4.4	93.6	90.3	64.7	-1.1	-54.6	-0.1	4.4	0.8	101.9	7.6	-1.7	-71.4	-0.8	4.5	0.9	106.7	9.4
2008	10	-10.2	-63.7	-5.9	4.1	91.5	88.2	74.1	-1.0	-56.9	0.2	4.5	0.8	102.0	8.0	-1.7	-75.5	-0.6	4.6	0.9	106.8	10.0
2009	11	-6.2	-69.8	-2.1	4.2	91.4	88.1	83.5	-0.9	-59.1	0.5	4.6	0.8	102.1	8.3	-1.6	-79.4	-0.3	4.7	0.9	106.9	10.6
2010	12	-5.4	-75.2	-1.6	6.7	93.7	90.4	93.3	-0.8	-61.0	0.7	4.7	0.8	102.2	8.7	-1.5	-83.0	0.0	4.8	0.9	107.0	11.1
2011	13	-4.3	-79.6	0.3	7.7	93.2	90.0	101.4	-0.6	-62.7	1.0	4.8	0.8	102.3	8.9	-1.4	-86.5	0.3	4.9	0.9	107.0	11.6
2012	14								-0.5	-64.2	1.3	4.9	0.8	102.4	9.2	-1.2	-89.6	0.6	5.0	0.9	107.1	12.1
2013	15								-0.4	-65.4	1.5	5.0	0.8	102.5	9.4	-1.1	-92.5	0.9	5.1	0.9	107.2	12.6
2014	16								-0.2	-66.4	1.8	5.1	0.8	102.6	9.6	-1.0	-95.1	1.1	5.2	0.9	107.3	13.0
2015	17								-0.1	-67.2	2.1	5.2	0.8	102.6	9.8	-0.8	-97.4	1.4	5.3	0.9	107.4	13.4
2016	18								0.1	-67.7	2.3	5.3	0.8	102.7	9.9	-0.7	-99.5	1.7	5.4	0.9	107.5	13.7
2017	19								0.2	-68.0	2.5	5.4	0.8	102.8	10.0	-0.5	-101.2	2.0	5.5	0.9	107.5	14.0
2018	20								0.4	-68.1	2.7	5.5	0.8	102.9	10.1	-0.4	-102.7	2.2	5.6	0.9	107.6	14.3
2019	21								0.5	-68.0	2.9	5.5	0.8	102.9	10.1	-0.2	-103.9	2.4	5.6	0.9	107.7	14.5
2020	22								0.6	-67.7	3.1	5.6	0.8	103.0	10.1	-0.1	-104.8	2.7	5.7	0.9	107.7	14.7

CA: current account balance in % of GDP; NFA: net foreign assets in % of GDP; TB: trade balance in % of GDP; IR: interest rate in %; RER: real exchange rate/inverted terms of trade; RER2: real exchange rate index; GAS: global asset share in % of total assets

## 6.3 Data for GIPS calibrated simulations (Variation of total factor productivity)

		TFP + 0.5%							TFP +1%							TFP +2%						
AD	year	CA	NFA	TB	IR	RER	RER2	GAS	CA	NFA	TB	IR	RER	RER2	GAS	CA	NFA	TB	IR	RER	RER2	GAS
1996	-2	0.0	0.0	0.0	8.3	0.8	100.0	5.0	0.0	0.0	0.0	8.8	0.8	100.0	5.0	0.0	0.0	0.0	9.8	0.8	100.0	5.0
1997	-1	0.0	0.0	0.0	8.3	0.8	100.0	5.0	0.0	0.0	0.0	8.8	0.8	100.0	5.0	0.0	0.0	0.0	9.8	0.8	100.0	5.0
1998	0	-19.0	-3.5	-22.1	9.2	0.8	98.0	4.2	-20.5	-3.7	-23.7	9.6	0.8	98.0	4.3	-24.6	-4.1	-28.0	10.6	0.8	98.1	4.3
1999	1	-11.0	-21.9	-12.3	5.9	0.8	99.8	4.5	-12.7	-23.7	-14.0	6.4	0.8	99.9	4.5	-17.3	-28.4	-18.7	7.4	0.8	100.0	4.5
2000	2	-6.2	-34.0	-6.7	4.8	0.8	100.7	4.7	-7.9	-37.5	-8.5	5.3	0.8	100.8	5.2	-12.7	-47.0	-13.2	6.4	0.8	100.9	6.5
2001	3	-4.2	-41.7	-4.3	4.5	0.8	101.1	5.7	-6.0	-47.2	-6.1	5.0	0.8	101.2	6.5	-10.8	-62.0	-10.8	6.0	0.8	101.4	8.5
2002	4	-3.5	-47.8	-3.3	4.4	0.8	101.4	6.6	-5.2	-55.3	-5.0	4.9	0.8	101.5	7.6	-9.9	-75.5	-9.7	6.0	0.8	101.7	10.3
2003	5	-3.2	-53.1	-2.8	4.5	0.8	101.6	7.3	-4.9	-62.7	-4.5	5.0	0.8	101.7	8.6	-9.5	-88.5	-8.9	6.1	0.8	101.9	12.1
2004	6	-3.0	-58.2	-2.4	4.6	0.8	101.7	8.0	-4.7	-69.9	-4.1	5.1	0.8	101.8	9.6	-9.3	-101.3	-8.4	6.2	0.8	102.2	13.9
2005	7	-2.9	-63.1	-2.1	4.7	0.8	101.9	8.7	-4.6	-76.9	-3.7	5.2	0.8	102.0	10.6	-9.1	-113.8	-7.9	6.3	0.8	102.4	15.7
2006	8	-2.8	-67.8	-1.8	4.8	0.8	102.0	9.4	-4.5	-83.7	-3.4	5.3	0.8	102.1	11.6	-8.9	-126.1	-7.4	6.4	0.8	102.5	17.4
2007	9	-2.7	-72.4	-1.5	4.9	0.8	102.1	10.1	-4.3	-90.3	-3.0	5.5	0.8	102.3	12.6	-8.6	-138.2	-6.9	6.5	0.8	102.7	19.1
2008	10	-2.6	-76.7	-1.2	5.0	0.8	102.2	10.8	-4.2	-96.7	-2.6	5.6	0.8	102.4	13.5	-8.4	-149.9	-6.5	6.6	0.8	102.9	20.8

		TFP + 0.5%							TFP +1%							TFP +2%						
AD	year	CA	NFA	TB	IR	RER	RER2	GAS	CA	NFA	TB	IR	RER	RER2	GAS	CA	NFA	TB	IR	RER	RER2	GAS
2009	11	-2.4	-80.9	-0.9	5.2	0.8	102.3	11.4	-4.0	-102.8	-2.3	5.7	0.8	102.5	14.4	-8.1	-161.2	-6.0	6.7	0.8	103.1	22.5
2010	12	-2.3	-84.7	-0.6	5.3	0.8	102.4	12.0	-3.8	-108.6	-1.9	5.8	0.8	102.7	15.3	-7.8	-172.0	-5.5	6.8	0.8	103.2	24.1
2011	13	-2.1	-88.3	-0.3	5.4	0.8	102.5	12.6	-3.6	-114.0	-1.5	5.9	0.8	102.8	16.2	-7.5	-182.4	-5.0	6.9	0.8	103.4	25.6
2012	14	-1.9	-91.6	0.1	5.5	0.8	102.6	13.1	-3.4	-119.2	-1.2	6.0	0.8	102.9	17.0	-7.2	-192.4	-4.5	7.0	0.8	103.5	27.1
2013	15	-1.8	-94.6	0.4	5.6	0.8	102.7	13.6	-3.2	-124.0	-0.8	6.1	0.8	103.0	17.7	-7.0	-201.8	-4.1	7.1	0.8	103.7	28.5
2014	16	-1.6	-97.3	0.7	5.6	0.8	102.8	14.0	-3.0	-128.4	-0.5	6.2	0.8	103.1	18.4	-6.7	-210.7	-3.6	7.2	0.8	103.8	29.9
2015	17	-1.4	-99.7	0.9	5.7	0.8	102.9	14.4	-2.8	-132.4	-0.2	6.2	0.8	103.2	19.1	-6.4	-219.1	-3.2	7.3	0.8	104.0	31.2
2016	18	-1.2	-101.8	1.2	5.8	0.8	103.0	14.8	-2.6	-136.2	0.1	6.3	0.8	103.3	19.7	-6.1	-226.9	-2.8	7.4	0.8	104.1	32.5
2017	19	-1.1	-103.7	1.5	5.9	0.8	103.1	15.2	-2.4	-139.5	0.4	6.4	0.8	103.4	20.3	-5.8	-234.3	-2.4	7.4	0.8	104.2	33.6
2018	20	-0.9	-105.2	1.7	6.0	0.8	103.2	15.5	-2.2	-142.6	0.7	6.5	0.8	103.5	20.8	-5.5	-241.1	-2.0	7.5	0.8	104.4	34.8
2019	21	-0.7	-106.5	1.9	6.1	0.8	103.3	15.7	-2.0	-145.3	1.0	6.6	0.8	103.6	21.3	-5.2	-247.5	-1.6	7.6	0.8	104.5	35.8
2020	22	-1.8	-147.6	1.2	6.6	0.8	103.7	21.8	-5.0	-253.4	-1.3	7.7	0.8	104.6	36.8	-5.0	-253.4	-1.3	7.7	0.8	104.6	36.8

CA: current account balance in % of GDP; NFA: net foreign assets in % of GDP; TB: trade balance in % of GDP; IR: interest rate in %;  
RER: real exchange rate/inverted terms of trade; RER2: real exchange rate index; GAS: global asset share in % of total assets

# Universität Leipzig

## Wirtschaftswissenschaftliche Fakultät

Nr. 1	Wolfgang Bernhardt	Stock Options wegen oder gegen Shareholder Value? Vergütungsmodelle für Vorstände und Führungskräfte 04/1998
Nr. 2	Thomas Lenk / Volkmar Teichmann	Bei der Reform der Finanzverfassung die neuen Bundesländer nicht vergessen! 10/1998
Nr. 3	Wolfgang Bernhardt	Gedanken über Führen – Dienen – Verantworten 11/1998
Nr. 4	Kristin Wellner	Möglichkeiten und Grenzen kooperativer Standortgestaltung zur Revitalisierung von Innenstädten 12/1998
Nr. 5	Gerhardt Wolff	Brauchen wir eine weitere Internationalisierung der Betriebswirtschaftslehre? 01/1999
Nr. 6	Thomas Lenk / Friedrich Schneider	Zurück zu mehr Föderalismus: Ein Vorschlag zur Neugestaltung des Finanzausgleichs in der Bundesrepublik Deutschland unter besonderer Berücksichtigung der neuen Bundesländer 12/1998
Nr. 7	Thomas Lenk	Kooperativer Förderalismus – Wettbewerbsorientierter Förderalismus 03/1999
Nr. 8	Thomas Lenk / Andreas Mathes	EU – Osterweiterung – Finanzierbar? 03/1999
Nr. 9	Thomas Lenk / Volkmar Teichmann	Die fiskalischen Wirkungen verschiedener Forderungen zur Neugestaltung des Länderfinanzausgleichs in der Bundesrepublik Deutschland: Eine empirische Analyse unter Einbeziehung der Normenkontrollanträge der Länder Baden-Württemberg, Bayern und Hessen sowie der Stellungnahmen verschiedener Bundesländer 09/1999
Nr. 10	Kai-Uwe Graw	Gedanken zur Entwicklung der Strukturen im Bereich der Wasserversorgung unter besonderer Berücksichtigung kleiner und mittlerer Unternehmen 10/1999
Nr. 11	Adolf Wagner	Materialien zur Konjunkturforschung 12/1999
Nr. 12	Anja Birke	Die Übertragung westdeutscher Institutionen auf die ostdeutsche Wirklichkeit – ein erfolg-versprechendes Zusammenspiel oder Aufdeckung systematischer Mängel? Ein empirischer Bericht für den kommunalen Finanzausgleich am Beispiel Sachsen 02/2000
Nr. 13	Rolf H. Hasse	Internationaler Kapitalverkehr in den letzten 40 Jahren – Wohlstandsmotor oder Krisenursache? 03/2000
Nr. 14	Wolfgang Bernhardt	Unternehmensführung (Corporate Governance) und Hauptversammlung 04/2000
Nr. 15	Adolf Wagner	Materialien zur Wachstumsforschung 03/2000
Nr. 16	Thomas Lenk / Anja Birke	Determinanten des kommunalen Gebührenaufkommens unter besonderer Berücksichtigung der neuen Bundesländer 04/2000
Nr. 17	Thomas Lenk	Finanzwirtschaftliche Auswirkungen des Bundesverfassungsgerichtsurteils zum Länderfinanzausgleich vom 11.11.1999 04/2000
Nr. 18	Dirk Büttel	Continuous linear utility for preferences on convex sets in normal real vector spaces 05/2000
Nr. 19	Stefan Dierkes / Stephanie Hanrath	Steuerung dezentraler Investitionsentscheidungen bei nutzungsabhängigem und nutzungsunabhängigem Verschleiß des Anlagenvermögens 06/2000
Nr. 20	Thomas Lenk / Andreas Mathes / Olaf Hirschfeld	Zur Trennung von Bundes- und Landeskompentzen in der Finanzverfassung Deutschlands 07/2000
Nr. 21	Stefan Dierkes	Marktwerte, Kapitalkosten und Betafaktoren bei wertabhängiger Finanzierung 10/2000
Nr. 22	Thomas Lenk	Intergovernmental Fiscal Relationships in Germany: Requirement for New Regulations? 03/2001
Nr. 23	Wolfgang Bernhardt	Stock Options – Aktuelle Fragen Besteuerung, Bewertung, Offenlegung 03/2001

Nr. 24	Thomas Lenk	Die „kleine Reform“ des Länderfinanzausgleichs als Nukleus für die „große Finanzverfassungs-reform“? 10/2001
Nr. 25	Wolfgang Bernhardt	Biotechnologie im Spannungsfeld von Menschenwürde, Forschung, Markt und Moral Wirtschaftsethik zwischen Beredsamkeit und Schweigen 11/2001
Nr. 26	Thomas Lenk	Finanzwirtschaftliche Bedeutung der Neuregelung des bundestaatlichen Finanzausgleichs – Eine allokoative und distributive Wirkungsanalyse für das Jahr 2005 11/2001
Nr. 27	Sören Bär	Grundzüge eines Tourismusmarketing, untersucht für den Südraum Leipzig 05/2002
Nr. 28	Wolfgang Bernhardt	Der Deutsche Corporate Governance Kodex: Zuwahl (comply) oder Abwahl (explain)? 06/2002
Nr. 29	Adolf Wagner	Konjunkturtheorie, Globalisierung und Evolutionsökonomik 08/2002
Nr. 30	Adolf Wagner	Zur Profilbildung der Universitäten 08/2002
Nr. 31	Sabine Klinger / Jens Ulrich / Hans-Joachim Rudolph	Konjunktur als Determinante des Erdgasverbrauchs in der ostdeutschen Industrie? 10/2002
Nr. 32	Thomas Lenk / Anja Birke	The Measurement of Expenditure Needs in the Fiscal Equalization at the Local Level Empirical Evidence from German Municipalities 10/2002
Nr. 33	Wolfgang Bernhardt	Die Lust am Fliegen Eine Parabel auf viel Corporate Governance und wenig Unternehmensführung 11/2002
Nr. 34	Udo Hielscher	Wie reich waren die reichsten Amerikaner wirklich? (US-Vermögensbewertungsindex 1800 – 2000) 12/2002
Nr. 35	Uwe Haubold / Michael Nowak	Risikoanalyse für Langfrist-Investments Eine simulationsbasierte Studie 12/2002
Nr. 36	Thomas Lenk	Die Neuregelung des bundesstaatlichen Finanzausgleichs auf Basis der Steuerschätzung Mai 2002 und einer aktualisierten Bevölkerungsstatistik 12/2002
Nr. 37	Uwe Haubold / Michael Nowak	Auswirkungen der Renditeverteilungsannahme auf Anlageentscheidungen Eine simulationsbasierte Studie 02/2003
Nr. 38	Wolfgang Bernhard	Corporate Governance Kodex für den Mittel-Stand? 06/2003
Nr. 39	Hermut Kormann	Familienunternehmen: Grundfragen mit finanzwirtschaftlichen Bezug 10/2003
Nr. 40	Matthias Folk	Launhardt'sche Trichter 11/2003
Nr. 41	Wolfgang Bernhardt	Corporate Governance statt Unternehmensführung 11/2003
Nr. 42	Thomas Lenk / Karolina Kaiser	Das Prämienmodell im Länderfinanzausgleich – Anreiz- und Verteilungsmittelnwirkungen 11/2003
Nr. 43	Sabine Klinger	Die Volkswirtschaftliche Gesamtrechnung des Haushaltsektors in einer Matrix 03/2004
Nr. 44	Thomas Lenk / Heide Köpping	Strategien zur Armutsbekämpfung und –vermeidung in Ostdeutschland: 05/2004
Nr. 45	Wolfgang Bernhardt	Sommernachtsfantasien Corporate Governance im Land der Träume. 07/2004
Nr. 46	Thomas Lenk / Karolina Kaiser	The Premium Model in the German Fiscal Equalization System 12/2004
Nr. 47	Thomas Lenk / Christine Falken	Komparative Analyse ausgewählter Indikatoren des Kommunalwirtschaftlichen Gesamt-ergebnisses 05/2005
Nr. 48	Michael Nowak / Stephan Barth	Immobilienanlagen im Portfolio institutioneller Investoren am Beispiel von Versicherungsunternehmen Auswirkungen auf die Risikosituation 08/2005

Nr. 49	Wolfgang Bernhardt	Familiengesellschaften – Quo Vadis? Vorsicht vor zu viel „Professionalisierung“ und Ver-Fremdung 11/2005
Nr. 50	Christian Milow	Der Griff des Staates nach dem Währungsgold 12/2005
Nr. 51	Anja Eichhorst / Karolina Kaiser	The Institutional Design of Bailouts and Its Role in Hardening Budget Constraints in Federations 03/2006
Nr. 52	Ullrich Heilemann / Nancy Beck	Die Mühen der Ebene – Regionale Wirtschaftsförderung in Leipzig 1991 bis 2004 08/2006
Nr. 53	Gunther Schnabl	Die Grenzen der monetären Integration in Europa 08/2006
Nr. 54	Hermut Kormann	Gibt es so etwas wie typisch mittelständige Strategien? 11/2006
Nr. 55	Wolfgang Bernhardt	(Miss-)Stimmung, Bestimmung und Mitbestimmung Zwischen Juristentag und Biedenkopf-Kommission 11/2006
Nr. 56	Ullrich Heilemann / Annika Blaschzik	Indicators and the German Business Cycle A Multivariate Perspective on Indicators of Ifo, OECD, and ZEW 01/2007
Nr. 57	Ullrich Heilemann	“The Soul of a new Machine” zu den Anfängen des RWI-Konjunkturmodells 12/2006
Nr. 58	Ullrich Heilemann / Roland Schuhr / Annika Blaschzik	Zur Evolution des deutschen Konjunkturzyklus 1958 bis 2004 Ergebnisse einer dynamischen Diskriminanzanalyse 01/2007
Nr. 59	Christine Falken / Mario Schmidt	Kameralistik versus Doppik Zur Informationsfunktion des alten und neuen Rechnungswesens der Kommunen Teil I: Einführende und Erläuternde Betrachtungen zum Systemwechsel im kommunalen Rechnungswesen 01/2007
Nr. 60	Christine Falken / Mario Schmidt	Kameralistik versus Doppik Zur Informationsfunktion des alten und neuen Rechnungswesens der Kommunen Teil II Bewertung der Informationsfunktion im Vergleich 01/2007
Nr. 61	Udo Hielscher	Monti della città di firenze Innovative Finanzierungen im Zeitalter Der Medici. Wurzeln der modernen Finanzmärkte 03/2007
Nr. 62	Ullrich Heilemann / Stefan Wappler	Sachsen wächst anders Konjunkturelle, sektorale und regionale Bestimmungsgründe der Entwicklung der Bruttowertschöpfung 1992 bis 2006 07/2007
Nr. 63	Adolf Wagner	Regionalökonomik: Konvergierende oder divergierende Regionalentwicklungen 08/2007
Nr. 64	Ullrich Heilemann / Jens Ulrich	Good bye, Professir Phillips? Zum Wandel der Tariflohndeterminanten in der Bundesrepublik 1952 – 2004 08/2007
Nr. 65	Gunther Schnabl / Franziska Schobert	Monetary Policy Operations of Debtor Central Banks in MENA Countries 10/2007
Nr. 66	Andreas Schäfer / Simone Valente	Habit Formation, Dynastic Altruism, and Population Dynamics 11/2007
Nr. 67	Wolfgang Bernhardt	5 Jahre Deutscher Corporate Governance Kodex Eine Erfolgsgeschichte? 01/2008
Nr. 68	Ullrich Heilemann / Jens Ulrich	Viel Lärm um wenig? Zur Empirie von Lohnformeln in der Bundesrepublik 01/2008
Nr. 69	Christian Groth / Karl-Josef Koch / Thomas M. Steger	When economic growth is less than exponential 02/2008
Nr. 70	Andreas Bohne / Linda Kochmann	Ökonomische Umweltbewertung und endogene Entwicklung peripherer Regionen Synthese einer Methodik und einer Theorie 02/2008
Nr. 71	Andreas Bohne / Linda Kochmann / Jan Slavík / Lenka Slavíková	Deutsch-tschechische Bibliographie Studien der kontingenten Bewertung in Mittel- und Osteuropa 06/2008

Nr. 72	Paul Lehmann / Christoph Schröter-Schlaack	Regulating Land Development with Tradable Permits: What Can We Learn from Air Pollution Control? 08/2008
Nr. 73	Ronald McKinnon / Gunther Schnabl	China's Exchange Rate Impasse and the Weak U.S. Dollar 10/2008
Nr. 74	Wolfgang Bernhardt	Managervergütungen in der Finanz- und Wirtschaftskrise Rückkehr zu (guter) Ordnung, (klugem) Maß und (vernünftigem) Ziel? 12/2008
Nr. 75	Moritz Schularick / Thomas M. Steger	Financial Integration, Investment, and Economic Growth: Evidence From Two Eras of Financial Globalization 12/2008
Nr. 76	Gunther Schnabl / Stephan Freitag	An Asymmetry Matrix in Global Current Accounts 01/2009
Nr. 77	Christina Ziegler	Testing Predictive Ability of Business Cycle Indicators for the Euro Area 01/2009
Nr. 78	Thomas Lenk / Oliver Rottmann / Florian F. Woitek	Public Corporate Governance in Public Enterprises Transparency in the Face of Divergent Positions of Interest 02/2009
Nr. 79	Thomas Steger / Lucas Bretschger	Globalization, the Volatility of Intermediate Goods Prices, and Economic Growth 02/2009
Nr. 80	Marcela Munoz Escobar / Robert Holländer	Institutional Sustainability of Payment for Watershed Ecosystem Services. Enabling conditions of institutional arrangement in watersheds 04/2009
Nr. 81	Robert Holländer / WU Chunyou / DUAN Ning	Sustainable Development of Industrial Parks 07/2009
Nr. 82	Georg Quaas	Realgrößen und Preisindizes im alten und im neuen VGR-System 10/2009
Nr. 83	Ulrich Heilemann / Hagen Findeis	Empirical Determination of Aggregate Demand and Supply Curves: The Example of the RWI Business Cycle Model 12/2009
Nr. 84	Gunther Schnabl / Andreas Hoffmann	The Theory of Optimum Currency Areas and Growth in Emerging Markets 03/2010
Nr. 85	Georg Quaas	Does the macroeconomic policy of the global economy's leader cause the worldwide asymmetry in current accounts? 03/2010
Nr. 86	Volker Grossmann / Thomas M. Steger / Timo Trimborn	Quantifying Optimal Growth Policy 06/2010
Nr. 87	Wolfgang Bernhardt	Corporate Governance Kodex für Familienunternehmen? Eine Widerrede 06/2010
Nr. 88	Philipp Mandel / Bernd Süßmuth	A Re-Examination of the Role of Gender in Determining Digital Piracy Behavior 07/2010
Nr. 89	Philipp Mandel / Bernd Süßmuth	Size Matters. The Relevance and Hicksian Surplus of Agreeable College Class Size 07/2010
Nr. 90	Thomas Kohstall / Bernd Süßmuth	Cyclic Dynamics of Prevention Spending and Occupational Injuries in Germany: 1886-2009 07/2010
Nr. 91	Martina Padmanabhan	Gender and Institutional Analysis. A Feminist Approach to Economic and Social Norms 08/2010
Nr. 92	Gunther Schnabl / Ansgar Belke	Finanzkrise, globale Liquidität und makroökonomischer Exit 09/2010
Nr. 93	Ulrich Heilemann / Roland Schuhr / Heinz Josef Münch	A "perfect storm"? The present crisis and German crisis patterns 12/2010
Nr. 94	Gunther Schnabl / Holger Zemanek	Die Deutsche Wiedervereinigung und die europäische Schuldenkrise im Lichte der Theorie optimaler Währungsräume 06/2011
Nr. 95	Andreas Hoffmann / Gunther Schnabl	Symmetrische Regeln und asymmetrisches Handeln in der Geld- und Finanzpolitik 07/2011
Nr. 96	Andreas Schäfer / Maik T. Schneider	Endogenous Enforcement of Intellectual Property, North-South Trade, and Growth 08/2011
Nr. 97	Volker Grossmann / Thomas M. Steger / Timo Trimborn	Dynamically Optimal R&D Subsidization 08/2011

Nr. 98	Erik Gawel	Political drivers of and barriers to Public-Private Partnerships: The role of political involvement 09/2011
Nr. 99	André Casajus	Collusion, symmetry, and the Banzhaf value 09/2011
Nr. 100	Frank Hüttner / Marco Sunder	Decomposing $R^2$ with the Owen value 10/2011
Nr. 101	Volker Grossmann / Thomas M. Steger / Timo Trimborn	The Macroeconomics of TANSTAAFL 11/2011
Nr. 102	Andreas Hoffmann	Determinants of Carry Trades in Central and Eastern Europe 11/2011
Nr. 103	Andreas Hoffmann	Did the Fed and ECB react asymmetrically with respect to asset market developments? 01/2012
Nr. 104	Christina Ziegler	Monetary Policy under Alternative Exchange Rate Regimes in Central and Eastern Europe 02/2012
Nr. 105	José Abad / Axel Löffler / Gunther Schnabl / Holger Zemanek	Fiscal Divergence, Current Account and TARGET2 Imbalances in the EMU 03/2012
Nr. 106	Georg Quaas / Robert Köster	Ein Modell für die Wirtschaftszweige der deutschen Volkswirtschaft: Das "MOGBOT" (Model of Germany's Branches of Trade)
Nr. 107	Andreas Schäfer / Thomas Steger	Journey into the Unknown? Economic Consequences of Factor Market Integration under Increasing Returns to Scale 04/2012
Nr. 108	Andreas Hoffmann / Björn Urbansky	Order, Displacements and Recurring Financial Crises 06/2012
Nr. 109	Finn Marten Körner / Holger Zemanek	On the Brink? Intra-euro area imbalances and the sustainability of foreign debt 07/2012