Structural Reforms, Macroeconomic Imbalances and the Crisis in the European Monetary Union

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To Anne and Svea

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Publications

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Introduction

"[...] *dangers* [for the euro area] *can be identified relatively easily. The most obvious one is the lack of flexibility in the labour market.* [...] *this poses an almost lethal threat to Monetary Union.*"

Ottmar Issing (Issing, 2000, 35)

The European debt crisis has caused the most serious crisis in the euro area since its foundation in 1999. In May 2010, Greek government bond yields reached new peaks and financial markets feared a contagion of the crisis to a set of heavily indebted euro area countries (Portugal, Italy, Ireland, Spain). As response, European governments, the European Commission and the IMF agreed on a bilateral fiscal support for Greece and the European Financial Stability Facility (EFSF). In spring 2011, the quasi-default of Ireland and Portugal sparked the set up of a permanent crisis fund, the European Stability Mechanism (ESM). Both extraordinary steps calmed financial markets in the short-run. In fall 2011, fears of illiquidity or insolvency of Italy, the haircut on Greek government bonds, and uncertainty about the stability of the financial system triggered a further wave of the crisis. Even the EMU exit of Greece or the break-up of the EMU were discussed. In response the EFSF was bolstered up and politicians agreed on a strengthened Stability and Growth Pact. However, the fiscal support and tighter budget rules will not solve the underlying structural problems of the euro area economies - rigid wages and prices that prevent a realignment of real exchange rates to adjust intra-euro area current account imbalances.

Since 1999 until the recent crisis, the euro area experienced an era of increasing current account imbalances triggered by diverging wage growth, inflation rates, competitiveness and real growth. In particular in southern Europe, wages increased far above what was justified by productivity. As consequence, these countries lost competitiveness within

the euro area and accumulated current account deficits, financed by net capital imports. In contrast, wage austerity in Germany, which slowed down German domestic consumption and investment, led to immense German current account surpluses and net capital exports (Schnabl and Zemanek, 2011). This development continued for about a decade and set up the foundations of the current crisis. The consequences of the crisis – high public and private debt levels, rising government bond yields and capital outflows from crisis countries, slowing euro area economic growth and even worse growth forecasts[1] – highlight the necessity of a timely adjustment of macroeconomic imbalances in the euro area.

Given a single currency in the euro area, the theory of optimum currency areas provides a framework for the discussion of economic adjustment in the monetary union. In particular, the seminal paper by Mundell (1961) shows that the realignment of real exchange rates in a monetary union depends on changes of relative wages and prices. That is because nominal exchange rates can no longer balance diverging wage growth and price inflation. Moreover, the common monetary policy might not fit to a single country's need. To facilitate a timely realignment of real exchange rates, member countries of a monetary union need flexible labour markets. However, labour market flexibility had been low before the EMU was constituted in 1999 (Bayoumi and Eichengreen, 1992) and has remained relatively low (European Commission, 2008, 2010). Today, this threatens the stability of the euro area.

Yet this general need for macroeconomic flexibility in a monetary union can be softened by integrated euro area capital markets (Mundell, 1973) or fiscal policies (Persson and Tabellini, 1996, Belke and Baumgärtner, 2002, von Hagen and Wyplosz, 2008), which both can serve as a risk sharing mechanism in the face of asymmetric shocks. Mundell (1973) argued that a monetary union would accelerate capital market integration by stimulating cross-border capital asset holdings. Portfolio diversification provides a risk sharing mechanism between countries that mitigates asymmetric shocks. Fiscal policy can mitigate asymmetric shocks, too, either by inter-regional redistribution or by anti-cyclical public deficits or surpluses (Persson and Tabellini, 1996, Belke and Baumgärtner, 2002). However, the experience of the last years, a constrained fiscal policy due to high public debt levels and current disturbances in international financial

[1] Only Germany seems to be an exception.

markets point to a very prominent role of the labour markets for economic adjustment of euro area macroeconomic imbalances.

The important stance of labour market flexibility for the functioning of the euro area has been highlighted in early research (Bayoumi and Eichengreen, 1992, Gordon, 1996, Pissarides, 1997, Bean, 1998). There was also the thinking that countries who enter a monetary union would promote structural reforms. As under fixed exchange rates realignments of nominal exchange rates or expansionary policy is lost, structural reforms are the only option to address unemployment and rising government deficits (Sibert and Sutherland, 2000, Calmfors, 2001, Belke et al., 2006a). However, Herz and Vogel (2005), Belke et al. (2006b) as well as Duval and Elmeskov (2006) find no clear empirical evidence that EMU has enhanced structural reform activity.

Literature on the political economy of reforms in a general context explains reasons for delayed structural reforms. Saint-Paul (2004) and Alesina et al. (2006) use the insider-outsider-theory to explain how insiders can block structural reforms. Reforms would only be implemented if there were no alternative. Conesa and Garriga (2003) argue that reform deadlocks could emerge because the costs of reforms arise immediately but benefits are only earned in the future (time asymmetry of welfare costs and gains). In this context, Drazen and Grilli (1993) argue that economic downturns accelerate structural reforms because political groups will more easily accept reforms.

Up to now, little research has been done on the determinants of structural reforms within a monetary union. This thesis wants to help to close that gap by investigating determinants for structural reforms in the euro area. First, we theoretically scrutinize how the common monetary policy of the European Central Bank causes a reform bias between small and large countries because inflation rates of small and large countries enter the monetary policy objective function with different country weights (Chapter 1). Second, we examine how private market adjustment, structural reforms and their interaction affect the intra euro area current account balances of euro area countries (Chapter 2). Third, we analyse how an asymmetric foreign asset and liability distribution across the euro area affects single countries' need for structural reforms in labour markets (Chapter 3). Fourth, the impact of fiscal stabilization policy on structural reform activity is examined (Chapter 4).

Chapter 1

Common Monetary Policy and Optimum Labour Market Flexibility in the Euro Area

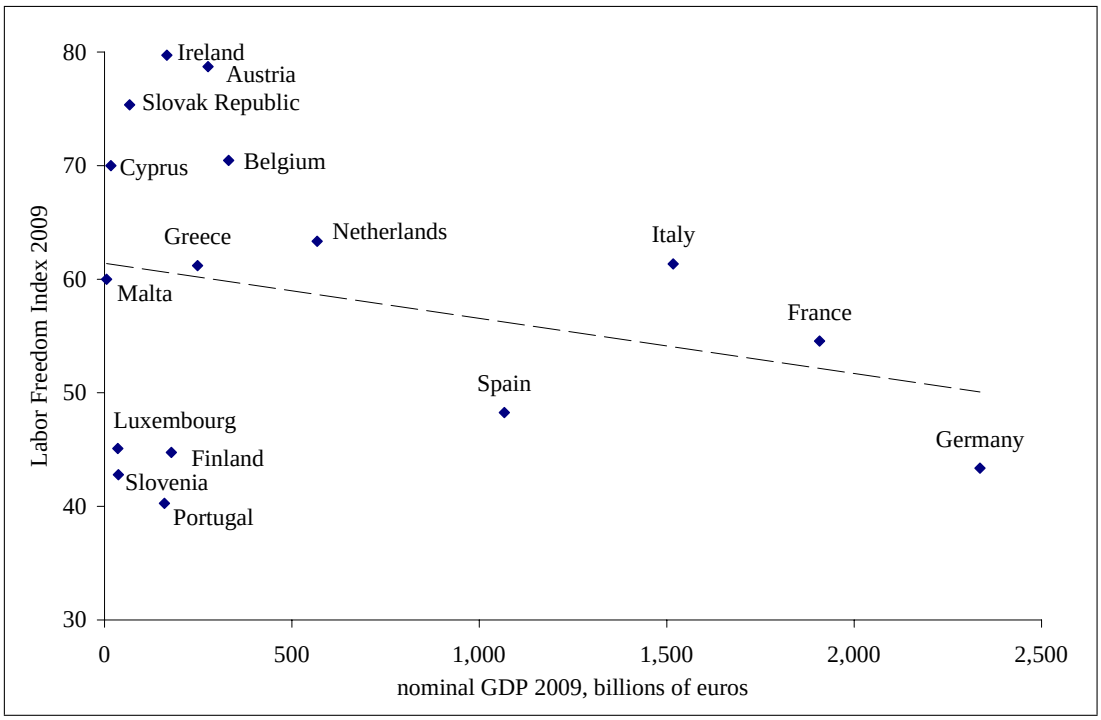
Abstract This paper analyses national differences in labour market flexibility between small and large euro area countries. An augmented Barro-Gordon model of a monetary union is used to analyse the impact of a common monetary policy on single countries' labour market flexibility. It is shown that given a common monetary policy based on inflation targeting, a small member of the monetary union requires a more flexible labour market than a large country. The small country substitutes lost monetary autonomy by labour market flexibility in the case of domestic economic shocks and maintains its independence from inflation shocks in other member countries of the monetary union. It is further shown that business cycle synchronization in the monetary union reduces the need for labour market flexibility.

1.1 Introduction

Globalization, the European integration process and most recently the need to adjust to diverging current account imbalances in the context of the European debt crisis have built up pressure on euro area countries to deregulate labour markets (International Monetary Fund, 2007, European Commission, 2008, Zemanek, 2010). The lack of labour market flexibility in euro area countries prior to the year 1999, which had been identified as risk for the stability of the monetary union (Bayoumi and Eichengreen, 1992, Issing, 2000) has not significantly improved after more than a decade of EMU. The level of labour market flexibility remains low for most of euro area countries as measured for example by the labor sub-index of the Heritage Index of Economic Freedom (The Heritage Foundation, 2009). However, there is evidence that small open countries

of the euro area have on average more flexible labour markets than large countries (Figure 1). This observation is backed by empirical results of Duval and Elmeskov (2006) who find that small countries implement more structural reforms than large countries.

Figure 1: Country size and labour market flexibility in the euro area



Source: IMF and the Heritage Foundation, Note: The Labour Freedom Index ranges from 0 to 100 with high values indicating higher labour market freedom. Nominal GDP figures of 2009 are taken from the IMF World Economic Outlook.

Previous research has identified low industrial diversification (Kenen, 1969), trade openness and the exposure to world market competition (Belke et al., 2006b) as well as less political opposition against reforms (Duval and Elmeskov, 2006, Saint-Paul, 2004) as explanations for relatively higher labour market flexibility in small countries. In the context of a monetary union, a common monetary policy can also explain high labour market flexibility in small countries (Hefeker, 2006). The central bank reacts only to a lower extend to country specific unemployment shocks in small countries due to their small weight in the one-size monetary policy reaction function. To avoid rising unemployment due to an unemployment shock the small country requires a relative high degree of labour market flexibility.

In this paper, we show how a common monetary policy that primarily aims for low and stable inflation, as implemented in the case of the EMU, is a source for different

degrees of labour market flexibility of small and large euro area countries. Our theoretical analysis follows research on labour market flexibility based on an augmented *Barro-Gordon framework* (Kydland and Prescott, 1977, Barro and Gordon, 1983b,a). The framework is based on research by Berthold and Fehn (1998), Sibert and Sutherland (2000), Calmfors (2001) and Belke et al. (2006b) who compare labour market flexibility given autonomous (nationally independent) and a common (supranational) monetary policy. We analyze the determinants of labour market flexibility in a baseline scenario and show how the consideration of domestic business cycles and business cycle synchronisation in the monetary union affect optimum labour market flexibility.

1.2 Differences in labour market flexibility in a monetary union

1.2.1 Diversification, openness and political power

The general need for macroeconomic flexibility in a monetary union arises from irreversible fixed nominal exchange rates and a common monetary policy. Autonomous monetary policy and/or nominal exchange rate alignments cannot be used in a monetary union to adjust to asymmetric macroeconomic shocks. For a real exchange rate realignment, relative prices and wages between countries have to change. Given fixed nominal exchange rates, prices and wages, and therefore labour markets need to be flexible in a monetary union (Mundell, 1961).

The level of labour market flexibility depends on factors as discussed e.g. by Bean (1998), who argues that more flexibility will be particularly required if business cycles within the monetary union are less synchronized. The common monetary policy cannot work as a country-specific stabilizer and may be regarded with discontent from a single country's perspective. Moreover, if countries of a monetary union have different production structures, the probability of asymmetric shocks increases, which raises the required degree of labour market flexibility. This argument is in line with Krugman (1993) who argues that in a monetary union regional specialization of industries increases, because market integration and market harmonisation unlocks the cost ad-

vantages of a single region.

In this context, Kenen (1969) contributes industrial diversification as determinant of divergent degrees of labour market flexibility within a monetary union. Small countries with a low-level of industrial diversification are vulnerable to asymmetric shocks because other industrial sectors cannot compensate for sector specific asymmetric shocks. Therefore, the need for labour market flexibility in less diversified, small countries of a currency union is greater than in large countries.

Another strand of literature links different levels of trade openness to differences in labour market flexibility (Herz and Vogel, 2005, Belke et al., 2006a,b). Trade openness increases the share of output and employment that is exposed to international competition. The economic success of the international sector depends on the country's competitiveness in the world market. A high degree of regulation is a disadvantage for a relatively large share of the economy. To assure international competitiveness, open countries, which are often small countries (Alesina, 1998), require more flexible labour market institutions.

Research on the political economy of reforms comes to a similar conclusion. Duval and Elmeskov (2006) argue that higher international competition of small open countries is associated with a higher degree of overall labour demand elasticity with respect to wages. As enterprises react more likely with job cuts on wage growth above productivity growth in a highly competitive environment the power of trade unions to set wages above clearing-level is limited in small open economies. Saint-Paul (2004) argues that labour market rigidities allow a redistribution of rents between different categories of workers (from low skilled to skilled). In small open economies, the high degree of dependency from world market competition leads to a higher degree of factor price equalization and reduces the possibility of rent distribution. Therefore rents from rigid labour market institutions are smaller in small open countries and opposition from insiders and lobbyists to protect rigid institutions is reduced.

Less opposition from insiders lowers the political costs of reforms for politicians and makes structural reforms more likely. On the other hand, political costs of avoiding reforms are higher in a small open country with a large international sector because rising

unemployment from the relatively large international sector cannot be absorbed by additional labour demand of the relatively small domestic sector. That makes politicians more willing to implement flexible labour market institutions to prevent rising unemployment. Moreover, the large international sector lobbies more intensively for labour market flexibility to enhance the competitiveness against foreign firms (Høj et al., 2006).

The empirical literature on determinants of labour market flexibility is less clear-cut. Pitlik and Wirth (2003) find in their empirical analysis a small but significant positive impact of trade openness (a proxy of country size) on structural reform activity. Duval and Elmeskov (2006) find a significant positive influence of country size on structural reforms. In contrast, in a study of Herz and Vogel (2005) regression coefficients for openness and country size on structural reforms are not significant. Belke et al. (2006a,b) find that significant coefficients of country size and trade openness depend on the underlying sample.

1.2.2 Common monetary policy and labour market flexibility in the euro area

An important explanation for differences in labour market flexibility in a monetary union is the common monetary policy. With a common monetary policy, the ECB conducts a monetary policy for the euro area as a whole. Given that the ECB uses average target indicators weighted by country size, the central bank will only marginally react to country specific shocks in small countries due to their small weight in the monetary policy reaction function. In contrast, country specific shocks in large country are reflected to a larger extend in the monetary policy reaction function. Thus, a "one-size" common monetary policy does not equally stabilize all countries against asymmetric shocks.

Hefeker (2006) analyses the role of a common monetary policy in a theoretical setting, where a common central bank reacts to unemployment in single member states according to their size. He shows that small countries have the incentive for flexible labour markets in a monetary union to compensate for national unemployment shocks which are only marginally addressed by a common monetary policy. Hefeker (2006)

assumes that inflation rates are equal in all countries of the monetary union and that the central bank reacts to average unemployment in the monetary union. However, the de jure aim of the ECB is to provide price stability for the euro area as a whole (European Central Bank, 2004).[2]

The ECB primarily decides on interest rates based on the Harmonized Index of Consumer Prices (*HICP*). This euro area index is calculated from weighted national price indices of all member countries. Country weights in the *HICP* depend on the member countries' economic size in terms of private consumption as a share of overall euro area consumption (European Central Bank, 2004, Eurostat, 2001) which differ significantly (Table 1). The focus of the common monetary policy on the euro area-wide *HICP* allows a single country's national inflation rate to deviate from the central bank's target, for instance, because of different domestic wage growth rates, fiscal policies or country specific shocks. Thus, the impact of national inflation on average inflation and monetary policy of the ECB depends on a country's weight.

Table 1: Country weights of euro area countries in the *HICP* in 2009 (in percent)

Country	Weight
Austria	3.02
Belgium	3.39
Cyprus	0.25
Finland	1.68
France	20.60
Germany	26.07
Greece	3.46
Ireland	1.56
Italy	18.50
Luxembourg	0.26
Malta	0.08
Netherlands	5.09
Portugal	2.20
Slovak Republic	0.68
Slovenia	0.37
Spain	12.79

Source: Eurostat (2009)

[2]Sauer and Sturm (2007) provide empirical evidence that the ECB's monetary policy is in line with its aim.

1.3 Common monetary policy and optimum labour market flexibility in a monetary union

1.3.1 Model setting

We augment a *Barro-Gordon* model (Kydland and Prescott, 1977, Barro and Gordon, 1983a,b) to analyse differences in labour market flexibility between large and small countries in a monetary union. In contrast to the previous literature (Berthold and Fehn, 1998, Sibert and Sutherland, 2000, Calmfors, 2001, Belke et al., 2006b, Hefeker, 2006), the central bank has only inflation in its monetary policy reaction function. Based on this conservative monetary policy setting, which aims to reflect the ECB monetary policy, we analyse the impact of country size on labour market flexibility.

The original framework by Barro and Gordon (1983a,b) analyses monetary policy of a central bank that has an inflation target as well as an unemployment target and assumes a short-term Phillips-curve trade-off between inflation and unemployment.[3] If inflation rises above expected inflation (surprise inflation), the labour cost will fall in real terms because nominal wages are temporally fixed in contracts. Unemployment falls. Therefore, the central bank can exploit the Philips-curve trade-off to reduce unemployment at the cost of higher than expected surprise inflation. However, rational forward-looking economic agents will anticipate surprise inflation and adjust their inflation expectations, which lifts in the long run overall inflation. The outcome is a inflation bias of a monetary policy with two objectives – inflation and unemployment.

This framework has been augmented to analyse optimum labour market flexibility (Calmfors, 2001). In addition to the decision of the central bank on inflation and unemployment, the national government decides on the optimal degree of labour market flexibility for the economy. The government can opt for high labour market flexibility to allow the economy to adjust more easily to idiosyncratic unemployment shocks. Nevertheless, higher labour market flexibility is not without costs. The government faces political costs in form of opposition from voters such as employees who lose their rents originating in rigid labour markets. General strikes, as they have occurred in

[3] Alternatively, the model can be set up with a central bank that targets inflation and economic growth. A Lucas-supply function describes the trade-off between growth and inflation.

France on several occasions, or a change in government, as in Germany in 2005, are examples for such political costs. Hence, the government balances the political costs of flexible labour markets against lower unemployment.

Within this extended framework, unemployment can either be reduced by surprise inflation of the central bank or by increased labour market flexibility of the government. The central bank decides on the optimum inflation rate given its desired level of unemployment, the government decides based on the expected monetary policy reaction function on the optimum labour market flexibility. In contrast, in our model, the central bank only aims to achieve its inflation target while national governments decide on labour market flexibility. That model setting aims to reflect the decision process in the euro area. The independent ECB decides on monetary policy to keep euro area inflation low, while labour market policy remains at a national level.

The monetary union model consists of two countries called 1 and 2. A supranational central bank is responsible for a common monetary policy, which targets stable and low inflation based on an union-wide inflation index weighted by country size. The central bank minimizes its loss, which is defined as the deviation of union-wide inflation π_{EMU} from the objective inflation rate k with $k > 0$. Thereby, k indicates an inflation target above zero, similar to the ECB objective inflation of "[...]*below but close to 2%*[...]" (European Central Bank, 2004, 51). Positive and negative deviations of union-wide inflation from the target are a loss for the central bank and enter the loss function multiplied by 0.5. Thus, following the literature, the loss functions of the central bank in a monetary union L_{EMU} is defined as standard quadratic loss function:

$$L_{EMU} = \frac{1}{2} \left(\pi_{EMU} - k\right)^2 \tag{1}$$

Union-wide inflation π_{EMU} is the average of domestic inflation rates of both countries π_m^D with m indicating country 1 or 2, weighted by the relative economic size. Relative economic size is expressed by a for country 1 and $(1 - a)$ for country 2 with $0 < a < 1$.

$$\pi_{EMU} = a\pi_1^D + (1 - a)\, \pi_2^D \tag{2}$$

Domestic inflation rates π_m^D consist of common inflation π that depends on common monetary policy which is assumed to be equal in both countries. Further, domestic

inflation is affected by country-specific inflation shocks ϵ_m, with $\epsilon_m \sim N\left(0, \sigma^2_{\epsilon_m}\right)$. These shocks are at this stage assumed to be exogenous and independent from other variables. Thus, domestic inflation rates are defined as:

$$\pi_1^D = \pi + \epsilon_1 \tag{3}$$

$$\pi_2^D = \pi + \epsilon_2 \tag{4}$$

Inserting equations (3) and (4) into equation (2) and then into equation (1) yields the central bank's extended loss function in the monetary union, accounting for country specific domestic inflation rates:

$$L_{EMU} = \frac{1}{2}\left[a\left(\pi + \epsilon_1\right) + \left(1 - a\right)\left(\pi + \epsilon_2\right) - k\right]^2 \tag{5}$$

Given the reaction function of the supranational central bank, each country's government independently decides on labour market flexibility based on the loss functions V_m. The governments' loss functions include unemployment u_m, the deviation of domestic inflation π_m^D from target inflation k and the political costs of implementing labour market flexibility via structural reforms γs_m. The term s_m represents the degree of labour market flexibility and γ its weight in the governments loss function with $\gamma > 0$ and $s_m \in (0, 1)$. Given that $\pi_m^D = \pi + \epsilon_m$, the loss function V_m is:

$$V_m = \frac{1}{2}\left(\pi + \epsilon_m - k\right)^2 + \frac{1}{2}u_m^2 + \gamma s_m \tag{6}$$

National unemployment u_m is defined by an augmented Phillips curve (Calmfors, 2001) and is determined by structural unemployment $\tilde{u}$ with $\tilde{u}$ ranging from 0 to 1, the deviation of domestic inflation π_m^d from expected inflation π^e and a country-specific idiosyncratic unemployment shock μ_m with $\mu_m \sim N\left(0, \sigma^2_{\mu_m}\right)$. In addition, the degree of labour market flexibility s_m in the domestic economy determines unemployment (Calmfors, 2001). The variable s_m is defined as the share of unregulated sectors in the economy while $(1 - s_m)$ is the share of regulated sectors. In unregulated sectors of the economy wages are assumed to be fully flexible. Real wages are renegotiated continuously keeping track with domestic inflation. In contrast, in regulated sectors, wages are set by long-term contracts based on the expected inflation. The Phillips-curve applies:

$$u_m = (\tilde{u} - \theta s_m) - (1 - s_m)(\pi + \epsilon_m - \pi^e) + (1 - s_m)\mu_m \tag{7}$$

Labour market flexibility s_m has three effects on unemployment. First, labour market flexibility lowers structural unemployment weighted by factor θ with $\theta \in (0, \tilde{u})$ (first term).[4] Second, rising labour market flexibility reduces the trade-off between unemployment and inflation as a larger share of the economy will renegotiate wage contracts (second term). Third, labour market flexibility lowers the impact of country specific idiosyncratic shocks on unemployment (third term) because wages easily adjust to the shock. Thus, labour market flexibility reduces the effect of surprise inflation (deflation) on unemployment and increases the ability of an economy to absorb country specific idiosyncratic unemployment shocks via wage variation instead of employment variation.

To obtain the desired degree of labour market flexibility given a certain country size, both governments of the monetary union independently minimize their loss from unemployment and political costs of implementing labour market flexibility. The governments decide under uncertainty at the beginning of the period, using ex-ante information about future unemployment as well as expected inflation and anticipate the central bank's monetary policy reaction for the whole monetary union. The level of labour market flexibility that minimizes a government's loss based on the available information is its optimum degree of labour market flexibility.

1.3.2 Optimum labour market flexibility

First, the baseline model is solved to obtain optimum labour market flexibility for country 1.[5] In this baseline model, it is assumed that domestic and foreign inflation shocks and idiosyncratic unemployment shocks are uncorrelated, with covariances $\sigma_{\epsilon_1,\epsilon_2} = 0$, $\sigma_{\mu_1,\mu_2} = 0$ and $\sigma_{\epsilon_m,\mu_m} = 0$. The terms γ, θ and $\tilde{u}$ are assumed to be equal in both countries to simplify the model. To derive optimum labour market flexibility the model is solved backwards, starting with the optimization of the central bank's loss function.

[4] θ can only reach the value of $\tilde{u}$, which ensures a non-negative structural unemployment rate, in the case of $s = 1$.

[5] The solution for country 2 is similar. Therefore, we show only the case of country 1. By changing the country size of country 1 we can analyse the small-country and the large-country-case.

Therefore, the central bank's loss function (5) is minimized with respect to the common inflation π. This yields an expected inflation rate on which the private sector bases its wage contracts. Using π^e and taking the domestic inflation shocks into account provides the realized inflation rate π^* that results from the central bank's monetary policy reaction on domestic inflation shocks, limiting the central bank's loss.

$$\pi^e = E[\pi] = E[\pi_m] = E[\pi_{EMU}] = k \tag{8}$$

$$\pi^* = k - a\epsilon_1 - (1-a)\epsilon_2 \tag{9}$$

Equation (8) shows, that the private sector in the monetary union expects a union-wide inflation rate as well as domestic inflation rates equal to the central bank's target. This is because the central bank only has an inflation objective and inflation shocks are ex-ante expected to be zero. In response to domestic inflation shocks, the central bank will choose an optimum monetary policy leading to a union-wide inflation rate π^* of equation (9). A domestic inflation shock (higher inflation or lower inflation than the target) increases the central bank's loss. Hence, the central bank responds to rising or decreasing inflation with a restrictive or expansive monetary policy to maintain its objective inflation.

However, the effect of a domestic inflation shock on the average union-wide inflation depends on the relative size of the country where the shock occurs. A shock in a large (small) country affects the union wide inflation π_{EMU} relatively more (less) via domestic inflation π_m^D which will be answered by a relatively strong (moderate) monetary policy response by the central bank, leading to π^*.

Governments anticipate the central bank's monetary policy reaction and select ex-ante their optimum degree of labour market flexibility. For example country 1, the expected value of the government's loss function (6) is minimized with respect to s_1 and subject to the unemployment equation (7), the expected inflation rate equation (8), and the inflation rate determined by monetary policy (9).[6] The first derivation yields the ex-ante marginal loss of labour market flexibility of government 1 before an inflation shock occurs, given the information about inflation shocks and the expected central bank's

[6] Assuming that realized inflation equals common inflation rate, $\pi^* = \pi$.

monetary policy reaction. The ex-ante marginal cost function is set equal to zero and solved for s_1, which is optimum labour market flexibility s_1^* for government 1. The subscript $EURO$ indicates our baseline solution:

$$s^*_{1,EURO} = 1 - \frac{\gamma + \theta\left(\theta - \tilde{u}\right)}{\left(1-a\right)^2\left(\sigma^2_{\epsilon_1} + \sigma^2_{\epsilon_2}\right) + \theta^2 + \sigma^2_{\mu_1}} \tag{10}$$

Equation (10) reveals the determinants of optimum labour market flexibility:

- High political costs of labour market reform γ reduce optimum labour market flexibility as the utility of higher labour market flexibility is more likely to be offset by the political costs of flexibility.

- High structural unemployment $\tilde{u}$ and a larger effectiveness of labour market flexibility to reduce structural unemployment θ will result in high labour market flexibility.

- The variance of country specific idiosyncratic unemployment shocks $\sigma^2_{\mu_1}$ positively affects optimum labour market flexibility. The more the economy will potentially be affected by unemployment shocks, the more flexibility will be needed to cushion the effects of a shock on unemployment, as monetary policy does not react to domestic unemployment fluctuations.

- Relative country size a is negatively related to labour market flexibility. The larger a country, the more is the country's domestic inflation reflected by average union-wide inflation. As the central bank reacts relatively more to inflation in large countries, less labour market flexibility is needed to achieve a low unemployment rate in the case of an inflation shock. With less labour market flexibility, the government "saves" political costs of labour market flexibility.

- The variances of domestic inflation shocks $\sigma^2_{\epsilon_1}$ and $\sigma^2_{\epsilon_2}$ increase optimum labour market flexibility due to two transmission effects of national inflation shocks on unemployment – an indirect and a direct effect as explained below.

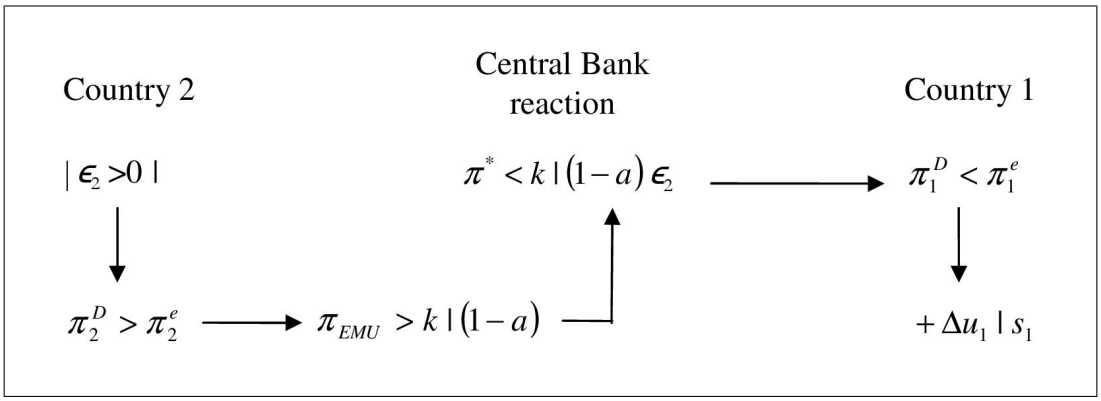
Indirect transmission

First, we assume a high variance of the domestic inflation shock in country 2 ($\sigma^2_{\epsilon_2}$).[7] If inflation in country 2, e.g. Germany, increases due to an inflation shock ϵ_2, country

[7] At this point, country size is not relevant.

1's (e.g. Portugal's) inflation is not directly affected. However, Germany's increased inflation lifts the euro area inflation rate and thereby the central bank's loss (see Figure 2). To maintain the inflation target k, the central bank will react with a restrictive monetary policy. Due to the common monetary policy, the restrictive monetary policy will be in place for all euro area countries. For Portugal, the restrictive monetary policy would create surprise deflation, which increases Portuguese unemployment via the Phillips-curve trade-off. Further, the deviation of inflation from expected inflation in Portugal, constitutes a loss for the Portuguese government.

Figure 2: Transmission of an inflation shock in country 2 to inflation and unemployment in country 1

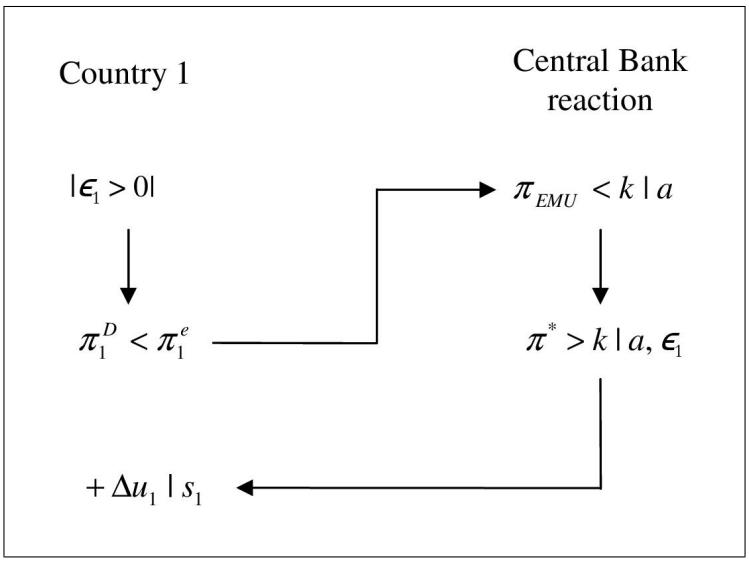


The transmission of the inflation shock in Germany to the Portuguese unemployment rate can be reduced or eliminated if Portugal has flexible labour markets. Then, monetary policy impulses triggered by Germany would not affect unemployment in Portugal as the trade-off between inflation and unemployment within the Portuguese economy is eliminated. Whether Portugal will choose high labour market flexibility (which is not free of cost), however, depends on its relative size within the monetary union. As Portugal is relatively small the inflation transmission will be more severe as the central bank reacts relatively more to inflation shocks in large Germany. The utility of high labour market flexibility in Portugal is likely to exceed its political costs. Therefore, a small country, such as Portugal, will desire a high degree of labour market flexibility. In contrast, if country 1 is large (e.g. France instead of Portugal), the negative unemployment effects are comparatively small. In the presence of reform costs, a large country 1 will prefer low labour market flexibility to avoid the political costs. Therefore, high inflation volatility in a large country increases the need for labour market flexibility in a small country.

Direct transmission

Second, a high variance of inflation shocks in country 1, e.g. Portugal, ($\sigma^2_{\epsilon_1}$) is assumed. In that case an inflation shock will directly change, e.g. reduce, Portuguese inflation (see Figure 3). For instance, Portuguese inflation falls below expected inflation ($\pi_1 < \pi^e$) which is a loss for the government and increases Portuguese unemployment via the Philips-curve trade-off given an inflexible Portuguese labour market. The central bank reacts to the inflation shock with expansive monetary policy as the union wide inflation rate deviates from the objective rate. Therefore, monetary policy will partly compensate the Portuguese negative inflation shock ϵ_1. Domestic and expected inflation rates converge again and the unemployment rise is lower than without the monetary policy reaction (see Figure 3).

Figure 3: Inflation shock in country 1 and the monetary policy response

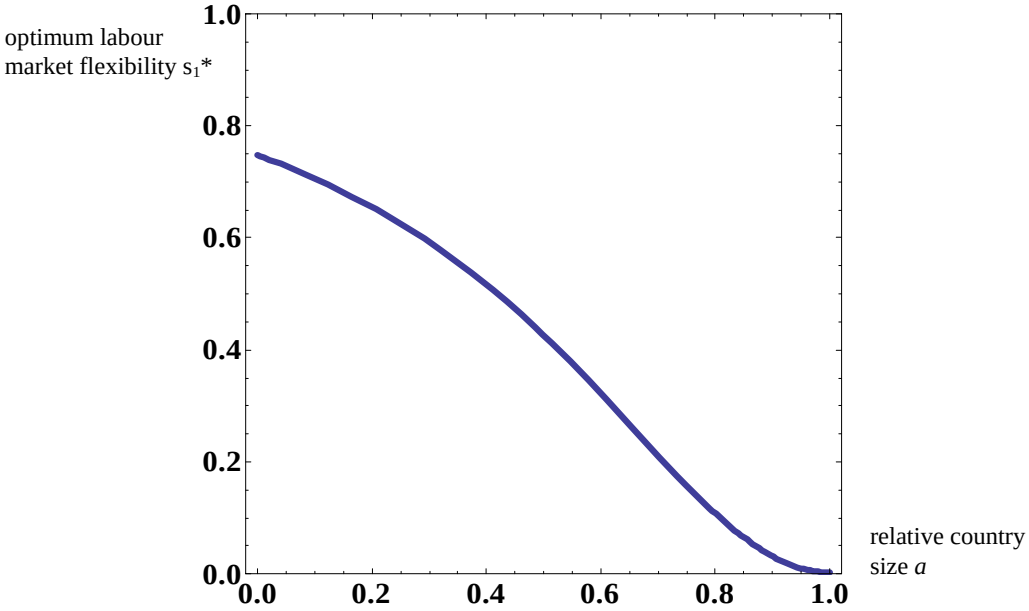


However, the degree of monetary policy response and hence shock compensation by the central bank depend on the relative size of Portugal within the monetary union. An inflation shock in Portugal will affect union wide inflation only marginally as the country is small. Therefore, the monetary policy response of the ECB to a reduced or increased inflation will also be very moderate. In contrast, an inflation shock in large Germany will be almost completely addressed by monetary policy. Therefore, a small country such as Portugal with a high inflation variance will choose high labour market flexibility to equalize inflation shocks, whereas a large country can rely mainly on the common monetary policy as adjustment mechanism.

Thus, given equal reform costs a small country will prefer higher labour market flexibility than the large member of a monetary union to avoid the transmission of inflation shocks in a large country to its labour markets and to substitute the loss of an autonomous monetary policy by labour market flexibility.

Figure 4 illustrates the negative relationship between country size and optimum labour market flexibility for a numerical example, based on equation (10). The x-axis shows the relative country size, with a country size $0 < a < 0.5$ characterizing a small country and $0.5 < a < 1$ a large country. The y-axis is optimum labour market flexibility. Structural unemployment $\tilde{u}$ is set at 5 percent, the weight of labour market flexibility in the loss function γ is set at one and efficiency of labour market flexibility to reduce structural unemployment θ at 0.05 to avoid non-negative figures of structural unemployment in the case of perfect labour market flexibility. Shock variances are assumed to be in this example $\sigma^2_{\epsilon_1} = 1$, $\sigma^2_{\epsilon_2} = 2$ and $\sigma^2_{\mu_1} = 1$.[8] In Figure 4, a small country (e.g. $a = 0.2$) would prefer a high labour market flexibility of around 0.65, while a large country (e.g. $a = 0.8$) chooses a low level of labour market flexibility of 0.1.

Figure 4: Country size and optimum labour market flexibility, baseline model



[8] A variation of variables' values does not significantly change our result.

1.4 Business cycles and optimum labour market flexibility in a monetary union

1.4.1 Domestic business cycles

In this section we analyse how domestic business cycles affect optimum labour market flexibility in the context of a common monetary policy. For this purpose, we resolve the assumption that inflation and unemployment shocks are not correlated across borders. The overall shock characteristics of the inflation shock ϵ_m and the unemployment shock μ_m remain unchanged $\epsilon_m \sim N\left(0, \sigma^2_{\epsilon_m}\right)$ and $\mu_m \sim N\left(0, \sigma^2_{\mu_m}\right)$.

We model domestic business cycles by a negative correlation between unemployment shocks μ_m and inflation shocks ϵ_m which is $\sigma_{\epsilon_m,\mu_m} < 0$. In a recession high unemployment is linked to low inflation, as additional unemployment reduces consumption, wage growth, demand and therefore inflation. In contrast, low unemployment, rising wages and more consumption are responsible for higher inflation during a boom. Taking that assumption into account, the model is solved from the perspective of the small country 1 to obtain optimum labour market flexibility (indicated with subscript BC for business cycles). In comparison to equation (10), equation (11) additionally includes the covariance between the inflation shock and the unemployment shock $\sigma_{\epsilon_m,\mu_m}$:

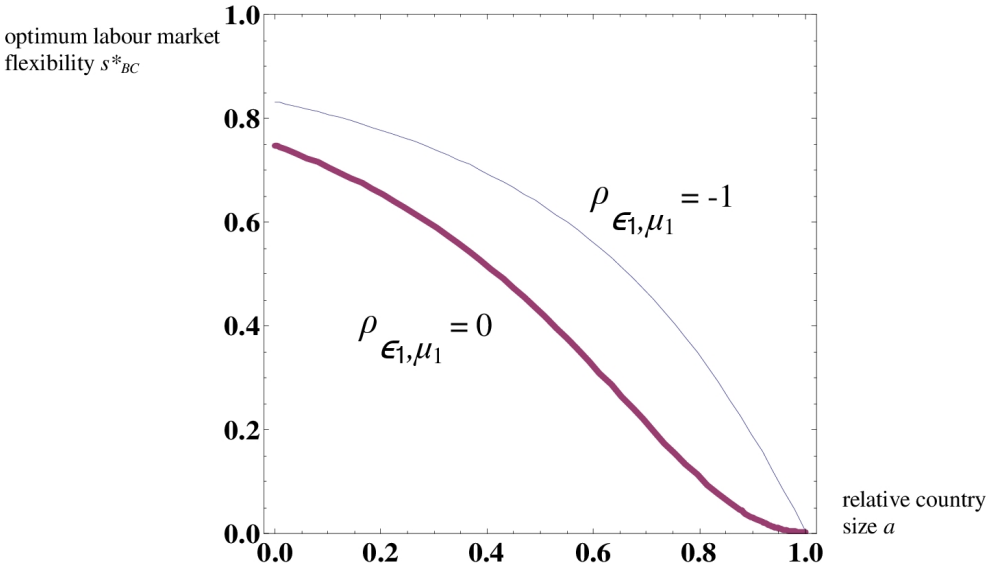
$$s^*_{1,BC} = 1 - \frac{\gamma + \theta\left(\theta - \tilde{u}\right)}{\left(1-a\right)^2\left(\sigma^2_{\epsilon_1} + \sigma^2_{\epsilon_2}\right) - 2\left(1-a\right)\sigma_{\epsilon_1,\mu_1} + \theta^2 + \sigma^2_{\mu_1}} \tag{11}$$

Business cycles modelled as negative correlation between inflation and unemployment shocks raise optimum labour market flexibility irrespective of country size because of rising unemployment volatility. While the inflation shock affects unemployment via the Phillips-curve relationship, unemployment is also affected by the unemployment shock itself. As we assume a negative correlation between inflation and unemployment shocks, both effects on unemployment have by assumption the same direction. The central bank only responds to the inflation shock with monetary policy dependent on country size, but does not compensate for the full unemployment variation.

Figure 5 shows the relationship between relative country size and optimum labour market flexibility dependent on the correlation between unemployment and inflation

shocks, indicated by the correlation coefficient $\rho_{\epsilon_1,\mu_1} \in (-1, 1)$. The bold line indicates $\rho_{\epsilon_1,\mu_1} = 0$, which is the baseline result of equation (10) in section 1.3.2. The thin line is the business cycle result for a perfect negative correlation of unemployment and inflation shocks $\rho_{\epsilon_1,\mu_1} = -1$ of equation (11). All other variable remain as assumed in the baseline model in Figure 4.

Figure 5: Country size and optimum labour market flexibility, domestic business cycles



1.4.2 Business cycle synchronization in a monetary union

The effectiveness of a common monetary policy is affected by the degree of business cycle synchronisation in the monetary union (Angeloni and Ehrmann, 2004). Unsynchronized business cycles with divergent inflation developments make monetary policy less optimal from the single countries' perspectives as national inflation development might cancel out in the average union-wide inflation. The average union wide inflation rate might remain around the target rate although some countries experience high inflation and other countries low inflation. Then, the monetary policy supports an economic divergence within the monetary union. Monetary policy will fit better to national inflation developments in a monetary union if business cycles are synchronized as average inflation reflects the national inflation in member countries.

To model business cycle synchronization, domestic business cycles are allowed to correlate across borders by a correlation of national inflation shocks $\sigma_{\epsilon_1,\epsilon_2} \neq 0$. A positive correlation indicates business cycle synchronisation and a negative correlation indicates unsynchronized business cycles. By doing so, we can analyse how the degree of business cycle synchronization, indicated by the correlation coefficient, affects optimum labour market flexibility in a monetary union. The optimum labour market flexibility for country 1 with correlated domestic business cycles (indicated by subscript $SYNC$) is given in equation (12). In comparison to equation (11), the covariance between both domestic inflation shocks (the degree of business cycle synchronisation) $\sigma_{\epsilon_1,\epsilon_2}$ is a determinant for optimum labour market flexibility.

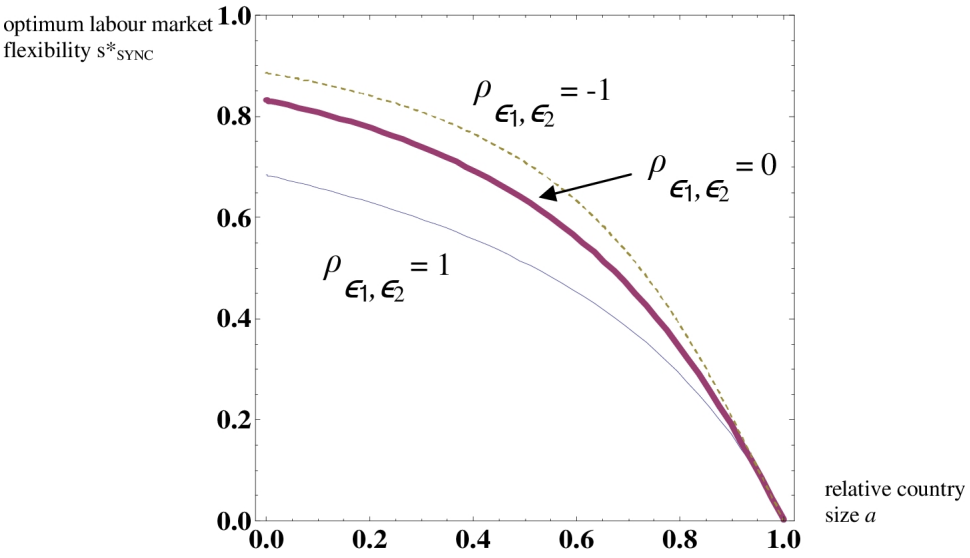
$$s^*_{1,SYNC} = 1 - \frac{\gamma + \theta\left(\theta - \tilde{u}\right)}{\left(1-a\right)^2\left(\sigma^2_{\epsilon_1} + \sigma^2_{\epsilon_2}\right) - 2\left(1-a\right)\sigma_{\epsilon_1,\mu_1} - 2\left(1-a\right)\sigma^2_{\epsilon_1,\epsilon_2} + \theta^2 + \sigma^2_{\mu_1}} \quad (12)$$

Unsynchronized business cycles $\sigma_{\epsilon_1,\epsilon_2} < 0$ have a positive effect on optimum labour market flexibility. If business cycles are unsynchronized, the effect of an inflation shock on unemployment in the small country will be further intensified by the monetary policy reaction on an adverse inflation shock in the large country (which has the opposite inflation development). If, for example, Portugal has low inflation during a recession, the optimal monetary policy reaction should be an expansive monetary policy. However, as Germany has high inflation during a boom, the central bank will pursue on average a restrictive monetary policy. Inflation in Portugal falls even more and unemployment rises further. Hence, in particular a small country in a monetary union requires additional labour market flexibility to keep unemployment low if business cycles are unsynchronized.

In contrast, synchronized business cycles $\sigma_{\epsilon_1,\epsilon_2} > 0$ reduce the need for labour market flexibility which is consistent with Mundell (1961) and Bean (1998). In the case of full business cycle synchronization, monetary policy will meet the demand of both countries. Too low inflation in Portugal during a recession will be compensated by expansive monetary policy in response to low inflation in Germany, which is also in a recession, and vice versa. Figure 6 shows the relationship between country size and optimum labour market flexibility for different degrees of business cycle synchronisation, indicated by correlation coefficients of national inflation shocks $\rho_{\epsilon_1,\epsilon_2} \in (-1, 1)$.

The bold line shows the reference value for optimum labour market flexibility with uncorrelated national business cycles $\rho_{\epsilon_1,\epsilon_2} = 0$. The thin line indicates $\rho_{\epsilon_1,\epsilon_2} = 1$, which is equivalent to perfect business cycle synchronisation, the dashed line reflects unsynchronized business cycles $\rho_{\epsilon_1,\epsilon_2} = -1$. All other variable remain as assumed in the baseline model in Figure 4.

Figure 6: Country size and optimum labour market flexibility, business cycle synchronisation



1.5 Economic Policy Implications

We have shown that a conservative common monetary policy, aiming for stable inflation in a monetary union, can be a source for different degrees in labour market flexibility. Our theoretical analysis is based on an augmented *Barro-Gordon* model of a two-country monetary union, where the central bank targets a union wide inflation rate, which is an average of national inflation rates weighted by country size, similar to the euro area. Based on this model, we show that small members of a monetary union need in particular flexible labour markets. First, they substitute lost autonomous monetary policy by labour market flexibility and second, they keep their autonomy from monetary policy reactions to inflation deviations in large countries. Business cycle synchronization reduces the need for labour market flexibility in a monetary union.

Within the euro area, a country's inflation affects all countries of the monetary union via the common monetary policy. Such effects are more likely to originate in large countries, as their inflation rates have a higher weight in average euro area inflation. Therefore, economic policy, especially in large countries of the euro area, need to pay attention to possible spill-over effects of national inflation via the common monetary policy. For instance prior the crisis in 2007, the austerity in German fiscal policy had compensated for high inflation in Southern European countries where expansive fiscal policy had accelerated inflation. As the euro area inflation rate had remained around the target of two percent, the European Central Bank was not forced to tighten monetary policy. As labour markets have remained inflexible in the euro area, these divergent inflation developments translated into economic divergences. Real exchange rates and current account balances between euro area countries diverged and laid the foundation of the current crisis.

To increase the overall degree of labour market flexibility in the euro area to foster a readjustment of current account balances, a realignment of real exchange rates and to prevent further divergence, it is necessary to reduce reform costs, in particular for large countries. This could be achieved for instance with a better communication of the need and benefits of labour market reforms for economic growth, employment, income and shock absorption. Otherwise, given the further existence of the euro area, labour market flexibility will be enforced during a crisis as currently observed in Greece, Portugal and Spain.

Acknowledgment

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Chapter 2

Current Account Balances and Structural Adjustment in the Euro Area

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Abstract In the past decade, a set of euro area countries has accumulated large current account deficits. After a brief relaxation of the euro area internal imbalances in the wake of the financial crisis, it appears as if this pattern arises anew when times normalize again and Germany still sticks to export-led growth. This issue has been labelled one of the most challenging economic policy issues for Europe inter alia by the European Commission and some other players on the EU level. In this paper, we analyse the role of private restructuring and structural reforms for the urgently needed sustainable readjustment of intra-euro area current account balances. A panel regression reveals a significant impact of structural reforms on intra-euro area current account balances. This implies that in particular structural reforms and wage restraints in notorious current account and budget deficit countries such as Greece are highly suitable to support long-term economic stability in Europe.

2.1 Introduction

Since the creation of EMU, the intra-euro area current account balances of euro area member states have diverged steadily and significantly. While Germany has seen rising trade surpluses against other euro area countries in the years 2002 to 2007, other countries like Spain, Italy and Portugal have accumulated large current account deficits.

Up to the present, this divergence of intra-euro area current accounts seems to persist and shows just slow signs of a temporary reversal in the wake of the financial crisis (de Grauwe, 2009b, Gros et al., 2005, Decressin and Stavrev, 2009). Only most recently after the financial crisis has severely hit the real economy, intra-euro area current account deficits and surpluses started to shrink slowly. However, the impact of national structural reforms and private market adjustment on intra-euro area current accounts has still not been analysed in the necessary depth. Our contribution tries to fill this gap.

In general, changes of the current account balance of whatever sign are no indication of malfunctioning as they 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. Furthermore, the European integration process certainly affected intra-euro area current account balances. In particular, Spain, Italy, Greece and Portugal have taken advantage of improved access to international financial markets in the wake of EMU. A rising expected rate of return (Blanchard and Giavazzi, 2002), convergence of interest rates (Fagan and Gaspar, 2007, Mendoza et al., 2007) and a reduced currency risk for lenders tends to accelerate domestic investment.

In contrast, some analysts interpret intra-euro area current account balances as the result of diverging competitiveness in the euro area (Arghyrou and Chortareas, 2006, European Commission, 2009). They argue that the real appreciation due to wage austerity in Germany and rising wages in Southern Europe distorted the international competitiveness of Spain, Greece, and Portugal (Blanchard, 2007). Absent labour market flexibility, a main mechanism to adjust competitiveness in a currency union (Mundell, 1961), can therefore been drawn upon as the main reason for such large and persistent current account deficits and surpluses in the euro area (Blanchard and Giavazzi, 2002, Blanchard, 2007, European Commission, 2009). However, this line of reasoning has been controversially discussed more recently. For instance, de Grauwe (2009d) argues that in the face of the crisis, flexibility represents a handicap for euro area countries and rigidities are virtuous. His main argument is that rigidities in wages, employment and social security allow countries to better deal with the fixed levels of debt imposed on households and firms. But the insolvency crisis surrounding Greece

and, to a lesser extent, also countries like Portugal and Spain highlighted the necessity of a grave austerity programme in order to be able to earn more from net exports than a country has to pay for interest on the debt burden. Otherwise a country cannot stabilize its debt. Greece is an excellent case in point because, for instance, its shipping industry which is heavily dependent on the business cycle heavily suffers from a competititveness problem which has been aggravated by the financial and economic crisis. Hence, going for structural reforms and a nearly 10 percent cut of real wages was the only way out from insolvency for Greece. This insight is also highly beneficial also for countries like Portugal which cannot keep their capital stock constant any more by the cash flow it generates.

Up to now, research on this issue of structural reforms and external balances in the euro area has been quite scarce. Kennedy and Sløk (2005) analyse the role of structural policy reforms for the solution of global current account imbalances for 14 OECD countries. They find a significant but small contribution of structural policy indicators to explain current account positions. In the same context, Mussa (2005) argues that structural reforms in industrial countries are desirable as they might boost long-term growth and hence import demand. In the euro area, structural reforms affect the adjustment capacity of the currency union as a whole. Therefore, external balances will more easily readjust in the wake of shocks in general such as the introduction of the single currency or of asymmetric shocks manifesting themselves in diverging country-specific competitiveness positions. This view goes far back to the seminal paper by Mundell (1961) on optimum currency areas as well as to more recent research, such as Pissarides (1997) or Blanchard (2007).

The remainder of the paper is organised as follows. Section 2 discusses the empirical pattern of the evolution of intra-euro area current account balances. Section 3 reviews the theoretical and empirical literature on the impact of structural reforms and private market adjustment on current account balances. In section 4, we estimate the individual impacts of private restructuring and structural reforms on euro area bilateral trade accounts in a dynamic panel for 11 euro area countries for the years 1991 to 2007. Section 5 concludes with some policy implications.

2.2 Current account balances within the euro area

After the start of EMU in 1999, unexpectedly large intra-euro area current account balances emerged. The emerging large gap between Germany (and some smaller countries) on the one hand and most other EMU members is increasingly regarded as the crucial issue for the macroeconomic and political stability of the euro area (European Commission, 2009). Accordingly, some analysts argue that intra-euro area current account balances are determined, at least partly, by asymmetric changes in the international competitiveness of euro area countries (Blanchard, 2007, European Commission, 2009). Therefore, we start with an assessment of international competitiveness as a determinant of the (speed of) adjustment of current account balances. Later on, we analyse how national policies and the international division of labour might have affected current account balances.[9]

2.2.1 The competitiveness approach

From the perspective of competitiveness driven intra-euro area balances, Germany holds a relatively strong competitiveness position, for instance, vis-á-vis Spain since German current account surpluses vis-á-vis Spain have been quite large recently. In this context, the real exchange rate is the most commonly used measure of cost and price competitiveness (Lipschitz and McDonald, 1992, Arghyrou and Chortareas, 2006). In a monetary union with a common currency, the real exchange rate only depends on changes in relative prices between countries. A country with low competitiveness needs to undergo a real depreciation and, hence, to deflate its general price level in relative terms to regain competitiveness. Domestic products have to become cheaper as compared to foreign goods. If this is the case, exports increase, imports decrease and the current account deficit is eliminated. Conversely, a country with a competitive economy could reduce its export surplus by a real appreciation, for instance by increasing wages. This would accelerate national inflation via higher costs and prices.

[9]Economic integration in general and Eastern enlargement of the European Union in particular created a wider European single market, thereby stimulating structural adjustment and economic specialization. Borbély (2006) in some cases applies methods quite similar to ours, but takes a different perspective analyzing trade specialization patterns in the enlarged European Union with a special focus on the new EU member states and the cohesion countries. From a sectoral trade point of view, she presents empirical findings on revealed comparative advantage and a broader picture of competitiveness on the single market. Empirically identifying the determinants of successful trade specialization and taking into account the role of foreign direct investment, she offers new insights into the dynamics of trade, innovation and integration. Thus, our study complements her work in increasing our understanding of the nature of international adjustment processes.

Competitiveness in the euro area would be re-balanced via flexible prices and wages.

The argument that a monetary union with heterogeneous members requires flexible markets goes back to the literature on optimum currency areas (OCA). The seminal paper by Mundell (1961) demonstrates that members of a monetary union need flexible labour markets to adjust to asymmetric shocks. Otherwise, membership in a common currency area is not beneficial. Sudden changes in relative prices necessitate a gradual readjustment in the enterprise sector to restore relative competitiveness. Note that in contrast to Mundell's case, the current pressing disequilibrium within EMU has not emerged suddenly through a shock, but gradually via persistent asymmetric wage growth rates. The argument is well known and runs as follows.

According to the trade theories of factor price equalisation, trade and/or labour migration act as transmission channels for relative wage adjustment. In a country characterized by an increasing price level competitiveness, decreases and exports tend to decline (trade channel). Competitiveness of the home country is regained by reductions of wages whereas in the partner country exports tend to rise and labour demand is boosted which, in turn, encourages wage increases. Additionally or alternatively, parts of the labour force migrate from the country in recession to the country finding itself in a boom (labour migration channel) . Labour movement will continue until relative wages and relative prices are re-balanced. Both mechanisms only work efficiently if wages are flexible and/or labour mobility is high.

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[10]This is the main mechanism through which U.S. states adjust to unemployment. In this context, Wasmer (2003) argues that higher labour mobility results from high labour market flexibility. US labour force faces low employment protection and invests therefore more in person specific human

wages are flexible and/or labour mobility is high.

However, adjustment of competitiveness differences lasts longer, if prices and wages are rigid (European Commission, 2008). Moreover, it is more costly in terms of unemployment because in cases of downward wage rigidity labour demand decreases (Blanchard, 2007). In contrast, the more competitive country faces a shortage of labour. In the long run, as unemployment increases, the pressure for adjustment in the less competitive country increases. (Blanchard, 2007, 7) calls this way of adjustment *competitive disinflation*, representing "[...] *a period of sustained high unemployment, leading to lower nominal wage growth until relative unit labour costs have decreased,* [and] *competitiveness has improved.*" Both the speed of this adjustment process and the level of unemployment during the adjustment process depend on the degree of nominal wage rigidity and the degree of price stickiness. Such a period of competitive disinflation has often been argued to have taken place in Germany, where real wages have remained widely constant since the turn of the millennium after unemployment had increased to historical levels.

In case of EMU, it is the common monetary policy and the low inflation policy of the ECB, which narrow the scope for a competitive disinflation process without any downward movements of the wage. Assuming that nominal wage cuts are unlikely, a country with lagging competitiveness that holds nominal wages constant can only realize real wage cuts by means of sizeable inflation. The lower inflation is, the smaller will be real wage cuts and competitiveness gains against other euro area countries [11], and the more the re-balancing process is postponed.

Seen on the whole, thus, downward wage flexibility is - given similar levels of productivity increases - crucial for balancing current account balances in the euro area via the competitiveness channel. This is even more valid as the common currency has reduced transaction costs for intra-euro area trade and has enhanced price transparency across borders (Badinger, 2007, European Commission, 2008). What is more, the process of globalisation and the rising competition from China and the Central and Eastern European Countries (CEECs) going along with the former, have further

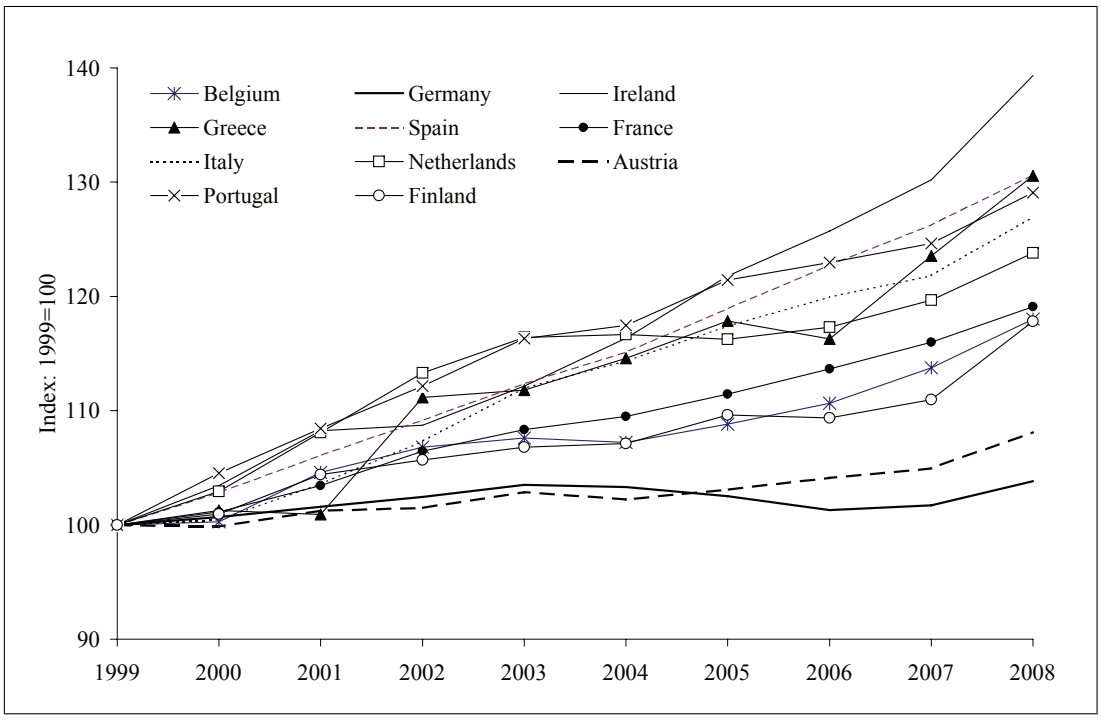
capital, which enables them to be mobile. In contrast, European workers tend to invest in firm specific human capital, which makes them less mobile.

[11] Here we simply assume no real wage cuts in competitor countries.

enhanced the pressure on competitive as well as on less competitive euro area countries.

Figure 7 displays the development of unit labour costs in the euro area from 1999 to 2007. While Germany and Austria almost kept the level of 1999, in Ireland, Portugal, Spain, Greece, Italy, and Netherlands unit labour costs have increased significantly up to 30% compared to 1999. This implies a real appreciation and a huge loss in competitiveness of the former countries which in turn has, according to the majority of studies (see section 2.3.1), significantly contributed to the build-up of intra-euro area current account imbalances. In view of the rather large unit labour cost growth differential, this pattern should hold even without imposing overly large values on export and import demand price sensitiveness in the euro area countries. It is important to keep in mind that these imbalances are driven by the private sector (trade unions and enterprises) rather than by the harmonized common macroeconomic policies (European Commission, 2009).

Figure 7: Unit labour costs in the euro area, 1999=100



Source: European Commission, AMECO

From this perspective, intra-euro area imbalances, which are steadily rising from 1999 to 2008, imply that there was neither wage competition nor wage harmonization within the euro area across this period. Apparently, relative wages have not adjusted to diverging competitiveness to a sufficient extent and have thus ultimately failed to correct the

rising current account imbalances. According to Altissimo et al. (2006) this is due to the fact that structural rigidities and in particular downward rigid prices and wages in the euro area have prevented any significant adjustment of real exchange rates in many euro area countries as one of the dominant textbook driving forces of the current account balance. Correspondingly, the European Commission (2006) comes up with the result that country-specific unit labour costs respond differently to positive and negative output gaps. During an economic downturn, the loss of competitiveness is typically higher in Portugal, Italy, Greece, France and Finland than in Germany and Austria. In general, this pattern has to be attributed to different degrees of real wage rigidity.

2.2.2 National inflation and wage policies

Despite a common monetary policy, national policies of fiscal policy, taxation, or wage determination remain heterogeneous across the euro area. This might have contributed to the emergence of different country-specific developments of income, consumption, investment and, thus, also of import demand. What is more, structural differences in wage growth and inflation between members of the euro area have persisted and have even increased in the last couple of years in the euro area for several reasons.

First, there are marked differences in inflation traditions and inflation expectations. The ECB's low inflation target seems to be anchored to a different extent in anticipated national inflation rates, which is reflected in divergent long-run expected inflation across different member countries of the euro area (Hofmann and Remsperger, 2005). Along with inflation differences having been lower more recently than in the past, wages and prices continued to rise in many Southern European countries despite a tighter monetary policy stance in the EMU centre. In this context, structural inflation differences just seemed to mirror the process of price level convergence within the euro area, as some EMU members such as Greece, Portugal and Slovenia continued to catch-up in terms of productivity, the well-known Balassa-Samuelson effect.

Second, differences in consumption and production structures across countries have an impact on national inflation. As countries are exposed differently to extra euro area trade, changes in the external value of the euro should have a country-specific impact

on imported inflation (Honohan and Lane, 2003, Hofmann and Remsperger, 2005). For example, since Ireland trades more with the UK than with Germany, a depreciation of the euro against the pound should raise import prices in Ireland more than in Germany. Furthermore, countries are asymmetrically exposed to common temporary shocks, such as the surge of raw material and oil prices due to different degrees of dependence on crude oil (Hofmann and Remsperger, 2005, European Commission, 2006). More technology intensive economies such as Germany tend to use relatively less oil per unit GDP than Southern European countries, which therefore have been hit more severely by an increase in raw material prices.

Third, structural differences among national euro area inflation rates might also be driven by idiosyncratic business cycles (Honohan and Lane, 2003, European Commission, 2006). For instance, after the turn of the millennium Spain and Ireland experienced a period of sustained growth while German growth still remained sluggish. As a result, the implementation of the common monetary policy and the country-specific real interest rate shocks resulting from it contributed to asymmetric economic developments (European Commission, 2008). Decreasing interest rates and persistent inflation rates reduced real interest rates and boosted demand in former high inflation countries such as Spain or Ireland (López-Salido et al., 2005). In contrast, relatively high real interest rates in Germany reduced investment demand and kept inflation low.

Fourth and probably most importantly, national inflation rates were driven by different degrees of national wage and productivity growth. In Germany, high unemployment, being partly a legacy of its unification, restrained real wage growth. Beyond EMU, German wage austerity since the mid 1990s represents a consistent response to low wage competition from the CEECs and East Asia. In addition, German productivity increased. In contrast, wage growth in Spain, Italy, Portugal and Greece remained high, for instance due to inflation indexation in Spain (López-Salido et al., 2005) and/or buoyant capital inflows. Productivity growth remained moderate. Furthermore, structural reforms in labour and complementary markets were implemented at different speeds and scopes (Belke et al., 2006b, de Grauwe, 2009b). This affected the differential between the country-specific inflation dynamics (Beck et al., 2009).

2.2.3 Division of labour and industry specialization

Beyond different degrees of price competitiveness and country-specific economic policies, some other factors are made responsible by analysts for the recent pattern of intra-euro area current account imbalances. One obvious candidate is the division of labour among euro area member countries, i.e. the degree and area of specialization of national industries. For instance, Amable and Verspagen (1995) and Ilzkovitz et al. (2008) emphasise the role of the so-called non-price competition which covers a large set of variables such as sectoral and geographical specialization of the export sector, production and technology structure, as well as the quality of products.

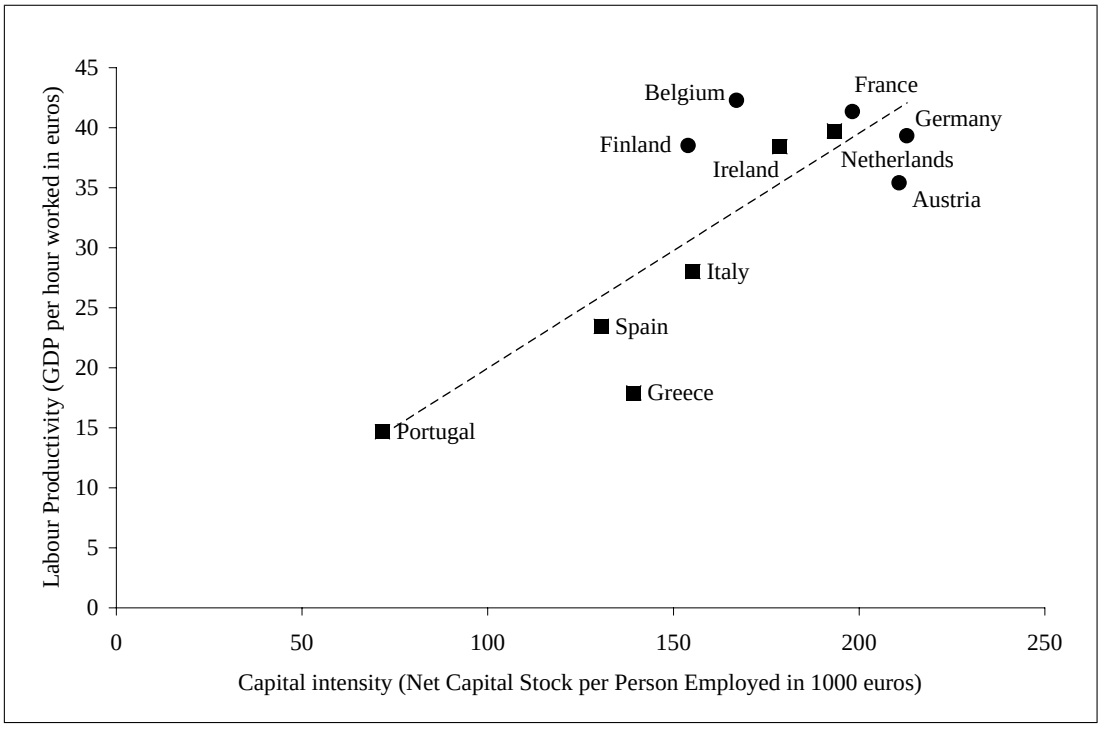
First, a clear pattern of specialization in specific goods and export markets is important for competitiveness. A country with a sectoral specialization in difficult-to-imitate goods has an advantage which gives - other things equal - ample room for higher relative wage growth and vice versa (Ilzkovitz et al., 2008). Additionally, the geographical specialization, i.e. the structure of a country's main export destinations, matters. Export specialization to dynamic (emerging) markets will boost overall exports relative to exports to mature markets.

Second, the production structure determines how and to what extent rising wage costs can be passed on to international markets and, thus, for the realisation of a country's current account imbalance. If a country is specialized in the production of labour intensive goods, the power to pass prices to international markets is low and international market shares are lost in response to higher wages. This is because rising wages are translated to a larger extent into rising production costs as wage costs account for a larger share of overall costs. Hence, wage growth in countries with more labour-intensive production such as Italy, Greece, or Portugal might accelerate the loss of market shares relative to countries with capital-intensive production such as Germany. This effect is particularly strong in the euro area, where a common monetary policy and integrated capital markets provide almost equal capital costs (European Central Bank, 2008).

As displayed in Figure 8, the capital intensity of production in the euro area differs significantly between Germany, Austria and France at the top and Greece, Spain and

Portugal at the bottom. Notably, the capital per worker ratio in Portugal is almost one third of the German one. Labour productivity of bottom group countries is much lower than in capital-intensive countries. Theoretically, low productivity growth needs to be accommodated by lower wage increases if competitiveness shall not be eroded. The squares denote those countries experiencing high relative unit labour cost growth since 1999. They indicate that in Greece, Italy, Spain and Portugal, relative wage growth was not accompanied by relative labour productivity gains. Productivity growth in Ireland was very likely influenced by the fast growth of the financial sector and therefore can be expected to be corrected nearly automatically in the years to come.

Figure 8: Capital intensity versus labour productivity in the euro area, 2007



Source: European Commission, AMECO, Note: Squares mark countries with relative high ULC growth since 1999.

Third, the nature of competition and the heterogeneity of goods matter for current account balances. Supply of diversified and/or high quality goods allow a country to claim higher prices in international markets as customers are willing to offer an extra pay for special characteristics of goods (Aiginger, 2000). In this case, firms are able to shift higher wage costs to international customers. Such kind of quality competition dominates in high-technology and high-skill industries (Aiginger, 2000). In contrast, low-technology and low-skill (labour-intensive) industries mostly compete via prices.

In the latter case, excessive wage growth is more harmful because competition with low labour cost countries, such as the new EU members or the East Asian emerging markets, is much fiercer. With rigid labour markets, unemployment tends to rise as a dire consequence and to become structural and persistent. In the euro area, Portugal, Spain, Greece, and to some extent also Italy for a long time relied mainly on low-tech and medium-tech exports (European Central Bank, 2005, Baumann and di Mauro, 2007). They have suffered from price competition from new EU member countries and East Asia (Bennett and Zarnic, 2008). Current account deficits have thus gradually increased in these cases.

2.2.4 The role of the non-tradable sector

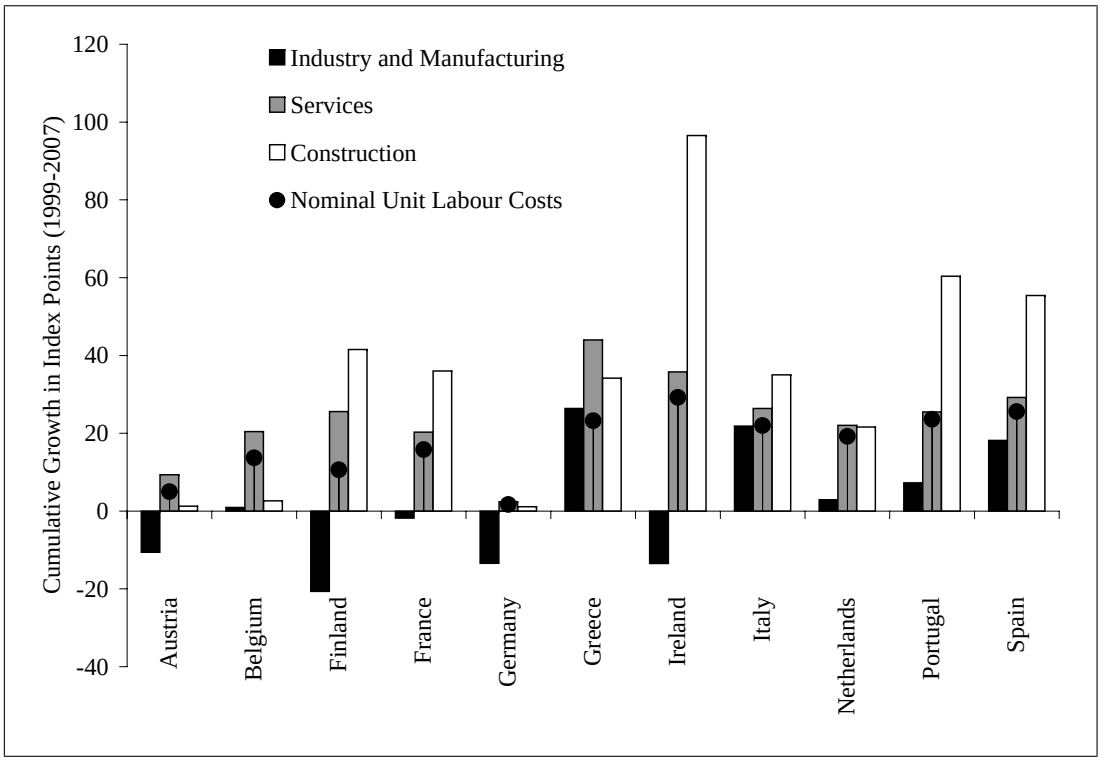
Although the divergences in euro area current account balances have become visible in the tradable sector, there is a need for adjustment also in the non-tradable sector, mainly for two reasons. First, non-tradable goods (i.e. services) such as logistics, IT, construction, personnel and financial services are used as inputs for the production of tradable goods. Rising prices in the non-tradable sector push up the costs in the tradable sector. Second, price increases in the non-tradable sector tend to fuel inflation (López-Salido et al., 2005) which reduces the purchasing power of wages in the tradable sector. In turn, the trade unions in the tradable sector claim a higher inflation compensation within the wage bargaining process. By this second-round effect the production costs of tradable goods increase and the competitiveness of the tradable sector shrinks. This corresponds to a kind of reversed Balassa-Samuelson setting where rising wages in the non-tradable sector trigger wage adjustment in the traded goods sector, which might reduce the current account balance.

Figure 9 supports this view and provides evidence that the non-tradable sector contributed significantly to the striking labour cost divergence in Europe. It displays the cumulative growth of sectoral unit wage costs[12] in percent from 1999 to 2007 for eleven core euro area countries subdivided by sector. We classify the industry and the manufacturing branch as tradable sectors, whereas services and construction are defined as non-tradable goods. The black dot indicates the cumulative nominal labour cost growth within the period. In countries whose current account deficit has widened since 1999,

[12]Unit wage costs as defined by the European Commission are equivalent to the compensation of employees in sector i divided by gross value added of sector i.

the growth of unit wage costs in services and construction exceeded those in industry and manufacturing by far. In contrast, in Germany and Austria unit wage costs in the service and construction sectors have increased only moderately which contributed to low overall unit labour cost growth as also argued by the European Commission (2006).

Figure 9: Nominal unit wage costs by major sectors and overall unit labour costs, cumulative changes in index points 1999-2007



Source: European Commission, AMECO

In sections 2.2.1 to 2.2.4, we have collected an array of potential determinants of intra-euro area current account imbalances. Moreover, we have identified certain areas in which either private adjustment or, as a substitute, government initiated structural reforms might lead to a re-balancing of the imbalances. Taking this as a starting point, we now turn to a deeper and more concrete analysis of the relation between structural reforms, market forces and the current account in order to deliver the theoretical underpinnings of our estimation equations in section 2.4.

2.3 Structural reforms, market forces, and the current account

The quite obvious significance of the lack of market-based adjustment mechanisms in general, but especially of labour market flexibility, for intra-euro area current account balances puts two questions on the agenda. First, how structural reforms, in particular on the labour market, affect the current account balance (section 2.3.1) and, second, how more labour market flexibility can be achieved. With respect to the latter, we first investigate how national governments can enhance labour market flexibility by structural reforms (section 2.3.2. Then, we investigate potential responses of the private sector to falling exports and rising import competition (section 2.3.3. This is for what we later on coin the notion of "market adjustment".

2.3.1 Structural reforms and the current account

There are at least two competing theories on how structural reforms, in particular on the labour market, might affect the current account balance. The first one is related to the intertemporal approach to the current account (Obstfeld and Rogoff, 1994). In our context, it would imply the following. Since structural reforms tend to be painful today but promise future gains, it would be rational for countries to borrow today in order to compensate for the current pain of structural reforms. Hence, the current account balance should decline in the short run. However, since future gains of structural reforms will be used to pay back the loans in the future, we should observe a reversal and a positive change of the current account in the future. However, returns of reforms in the future are uncertain.

A second argument concerning the sign of the impact of structural reforms on current account balances is propagated by (Kennedy and Sløk, 2005, 9). They argue that, in a first step, wages and prices decline as result of structural reforms. Hence, the country receives a price advantage and exports increase and imports decline. As a result, the current account balance improves in the short run. Profitability increases with a time lag and the internal interest rate increases. Investment goes up and foreign capital is attracted which, in turn, tends to reduce capital exports and, therefore, goods exports. In the long run, the current account surplus should thus decline. This theory therefore

refers to the competitiveness approach of current accounts (see section 2.2.1).

Bertola and Lo Prete (2009) analyse the effects of rising income growth and income risk as result of labour market deregulation. They argue in the same vein as Kennedy and Sløk (2005) that labour market deregulation should improve the current account balance of the reforming country without much delay, since forward-looking individuals increase their precautionary savings because of higher uninsurable risk. Another explanation for rising current account balances is that purchasing power shifts towards individuals with higher saving propensities.

Hence, the impact of structural reforms on the current account balance is a priori not clear. However, up to now the majority of available empirical results for developed countries (Kennedy and Sløk, 2005, Bertola and Lo Prete, 2009) points at a current account improving effect of structural reforms. In this paper, we would like to scrutinize this pattern for the case of intra-euro area current account imbalances.

2.3.2 Structural reforms

Governments might be trying to lower huge current account deficits. By doing this, structural reforms can play an important role in reducing intra-euro area balances by increasing labour market flexibility and improving labour market institutions. In particular, the adequate choice of labour market institutions is crucial for a good labour market performance because it affects the reservation wage[13] and the wage bargaining power of employees (Arpaia and Mourre, 2005, Nickell and Layard, 1999). High labour market flexibility increases the responsiveness of the labour market to competitiveness (section 2.2.1) and therefore the current account balance.

A radical straightforward reform strategy is to relax employment protection and to reduce unemployment benefits. First, less employment protection increases employers' flexibility when responding to changes in demand via lay-offs. This reduces workers' bargaining power and facilitates wage cuts in the face of recession. Second, lower unemployment benefits raise the incentive of unemployed labour force to accept jobs at a lower wage because the reservation wage as the implicit minimum wage is reduced.

[13] As defined as the lowest wage at which workers accept a particular type of job.

This in turn lowers prices for labour-intensive and low technology production as unit labour costs fall (see section 2.2.3).

Lower wages reduce production costs and prices, which might accelerate exports and shift demand from imports to domestic products. In particular, in a monetary union lower employment protection necessitates wage flexibility because monetary policy cannot address idiosyncratic shocks. The adjustment speed increases and unemployment can be avoided (Blanchard, 2007).

Nevertheless, reducing labour protection may not be the best response to current account deficits. The European Commission (2006) argues that given more flexible labour markets, volatility of unemployment rises with indeterminate effects on structural unemployment over the business cycle. Yet, structural reforms should assure an adjustment of current account balances by keeping unemployment low. In this context, Acemoglu and Shimer (2000) show that risk averse workers tend to accept lower wages in return for a higher employment probability which encourages enterprises to create low wage and low productivity jobs. Both, structural unemployment and overall productivity decline (see also Arpaia and Mourre (2005)). In contrast, more generous unemployment benefits can influence productivity positively by creating more capital-intensive jobs (Acemoglu, 2001).

To address these caveats, structural reforms could be supported by productivity improvement, for instance by active labour market policies such as better education and training to arrive at a skilled labour force. Unemployed labour could be re-trained for a changed labour market demand. This argument corresponds with the European Commission's flexicurity approach which asks member states to improve labour market flexibility (wages and mobility), to balance employment protection and security in the labour market, as well as active labour market policy (European Commission, 2007). Through this mechanism, rising productivity lowers production costs and improves the current account balance.

Beyond the pure labour market focus, also product market deregulation tends to increase adjustment pressure as the responsiveness of prices and wages to changes in the market environment increases (Bayoumi et al., 2004). The European single mar-

ket program has already increased competition by streamlining the regulations in the EU tradable sector and dismantling trade barriers such as tariffs and exchange rate fluctuations. However, competition in the non-tradable sector is still limited (European Commission, 2007) and national price levels have tended to diverge rather than to converge (Deutsche Bundesbank, 2009). The effect of product market deregulation is not overall clear. On the one hand, more intense competition could reduce prices and would hence lead to a current account improvement. On the other hand, product market deregulation might lower the entry-thresholds of foreign competitors to the domestic market, which could in turn worsen the current account balance (Kennedy and Sløk, 2005).

Even if needed quite pressingly, structural reforms nevertheless tend to be delayed by political reform costs and/or a relaxed budget constraint. Political reform costs are arising for instance from opposition by insiders and/or outsiders (Saint-Paul, 2004, Alesina et al., 2006). Employed labour force opposes labour market reforms as rents in form of a high reservation wage are lost. The government faces protests and strikes as most prominently experienced in France. In this context, as politicians are concerned about their re-election, the time asymmetry of reform costs and benefits matters. Costs of reforms (in terms of voters' discontent) arise immediately but benefits are reaped in the future, possibly after elections (Conesa and Garriga, 2003).

The upshot is that politicians tend to postpone reforms and try to fight rising unemployment resulting from low competitiveness or current account deficits by fiscal expansion. The opposition against additional government debt is less, as costs imposed by higher taxes or higher inflation are postponed after elections. This ability to postpone reforms via higher government expenditure is lower in times of economic downturns when the resources for fiscal expansion are depleted (Drazen and Grilli, 1993). Then political groups will more easily accept reforms as costs of non-reforming are more evident and room for fiscal expansion is small. Additionally, the common currency in the euro area disables the escape route of monetary expansion and devaluation to adjust current account deficits temporarily (Belke et al., 2006b, Bertola, 2008). Governments are forced to reform which refers to the "there is no alternative" (TINA) argument. In contrast, bail-outs of single EMU members and outright government bond purchases by the ECB would be equivalent of postponing national reform efforts.

2.3.3 Private sector adjustment

In contrast to the government, the private sector generally tends to adjust earlier to declining exports or rising import competition because of its tighter budget constraint. As declining exports and/or rising import competition translate into lower or negative profit margins, pressure by shareholders and capital lenders forces private enterprises to restructure. Usually, the main pillar of such private adjustment will be cutting unit labour costs, which may incorporate a larger capital stock, better technology, less employment and/or lower wages. With flexible labour markets, wage costs can easily be adjusted within the wage bargaining process. In contrast, inflexible labour markets force private enterprises to lay off workers. However, the current account balance should improve under both scenarios. There are several ways of restructuring.

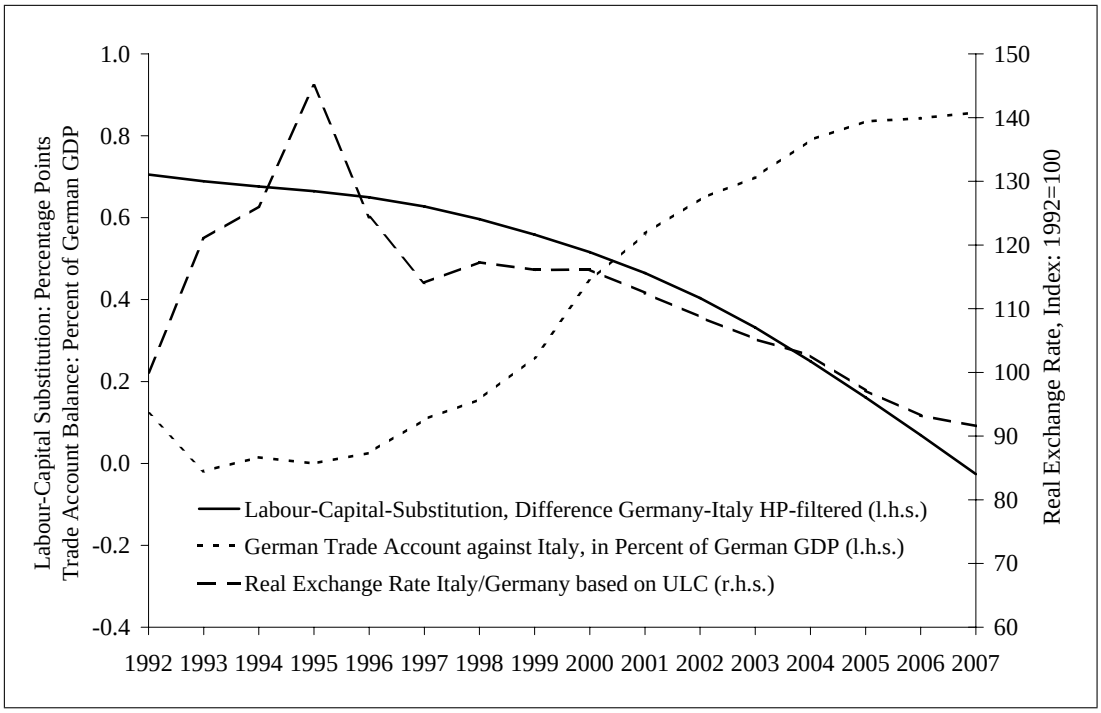
First, the private sector can increase productivity by substituting capital for labour. In this case, wage costs per unit of output, i.e. unit labour costs, typically decline but, at the same time, unemployment tends to increase. Figure 10 shows the difference in the degree of substitution of labour by capital, henceforth called labour-capital substitution, between Germany and Italy as well as the real exchange rate[14] and the bilateral trade balance between both countries since 1992. As shown by the downward-sloped smoothed bold line, Germany, for instance, substituted more capital for labour than Italy. This gap was especially large in the 1990s.

Germany suffered from a strong real appreciation of the Deutschmark in the late 1980s and during its unification boom which deteriorated the German trade balance. A faster speed of labour-capital substitution helped to restore the German economy, as indicated by the real depreciation and the improved trade account. After the introduction of the euro in 1999, relative labour-capital substitution continued which can best be interpreted as the response to an overvalued entry of the mark into the monetary union (European Commission, 2008). The rise of the German current account surplus continued until the financial crisis started in mid-2007 and even accelerated in 2008, when substantial competitiveness gaps within the euro area became apparent by rising

[14] As a real exchange rate variable we use a rate based on unit labour costs, which is highly correlated with a CPI based real exchange rate variable. In Figure 10, an appreciation corresponds to an increase of the index.

spreads on euro area countries' government bonds.

Figure 10: Labour-capital substitution and the real exchange rate, Germany versus Italy



Source: European Commission, AMECO and own calculation based on IMF, IFS and OECD, Economic Outlook

Second, one possibility to cut unit labour costs is by international outsourcing of labour-intensive production via FDI (offshoring)[15] and/or importing labour-intensive intermediates (Farrell, 2004). For instance, Daveri and Jona-Lasinio (2008) estimate that offshoring intermediate good(s) production contributed significantly to overall productivity growth in Italy. For Germany, Sinn (2004) coined the concept of a Bazaar economy, arguing that German manufacturers have extensively made use of offshoring and imports of intermediates, leading to unprecedented trade surpluses. Hence, the share of imported intermediate goods rose to over 50 percent of export values in 2007 (Sinn, 2007). Companies have increased their competitiveness by reducing firm unit labour cost at the cost of domestic manufacturing employment (Farrell, 2004, Sinn, 2007).[16]

[15]According to International Monetary Fund (2007, 164), offshoring or offshore outsourcing is defined by the movement of parts of production to less costly foreign locations.

[16]However, Welfens and Borbély (2009) partly reject the Sinn hypothesis, referring to an input-output analysis according to which the national outsourcing effect is in some cases economically more important than the international outsourcing effect.

To summarize, both private market adjustment and structural reforms have the potential to reduce intra-euro area balances via more flexible labour markets. Unit labour cost moderation at the firm level is the main driving force of the adjustment process. Both structural reforms and private market adjustment should lead to a rather similar outcome with respect to current account balances, but impose different costs in terms of political reform costs or unemployment. However, structural reforms influence the degree of labour market flexibility and therefore determine how current account balances will adjust by setting the "rules of adjustment". Flexible labour markets allow direct relative wage adjustment. In contrast, rigid labour markets force the private sector to adjust via labour-capital substitution and/or offshoring.[17]

2.4 Empirical analysis

Taking our analysis in sections 2.2 and 2.3 as a starting point, we now proceed by empirically testing for the impact of private market adjustment and structural reforms on the current account balances of the euro area member countries. For this purpose, we employ an up-to-date dynamic panel estimation framework. During this exercise, we also assess the empirical significance of potential interdependencies (complementarity vs. substitutability) within both processes towards more flexibility - structural reforms and private market adjustment. Because private market adjustment is probably endogenous with respect to structural reforms, we lay special emphasis on one direction of this interrelation, namely the question whether the degree of structural reforms has a specific impact on the relation among current account imbalances and private market adjustment. To be more specific, we test the following three hypotheses:

Hypothesis 1 *Structural reforms and private market adjustment affect current account balances.* This hypothesis suggests a significant impact of both measures in promoting current account balance adjustment as described in sections 2.3.2 and 2.3.3.

Hypothesis 2 *Structural reforms modify the characteristics of the current account adjustment process.* Here we test, whether structural reforms and private

[17]Note that negative employment effects in home country emerge in case of horizontal and vertical integration of multinational enterprises as well as in the case of outsourcing especially in the low-skilled sector. If labor markets are rigid in these segments, structural unemployment tends to emerge.

market adjustment are interdependent in a sense, i.e. are complements or substitutes with regard to their impact on the current account balance.

Hypothesis 3 *The effectiveness of structural reforms and private market adjustment has been affected by the start of European Monetary Union (EMU).* Here, we take the OCA literature as a starting point suggesting that EMU has reinforced the need for structural reforms and, hence, their effectiveness is higher from 1999 on.

2.4.1 Data and variables

We estimate the impact of private market adjustment and structural reforms on current account balances in the euro area based on a dynamic panel of bilateral yearly differences of 11 euro area countries.[18] As we measure current account balances in percent of GDP, we can use the full matrix. The sample period covers the period from 1991 to 2007. Since we work with annual data, we arrive at a maximum number of 1870 observations. Due to missing data, the sample in the end even becomes a little smaller.

Current account balances

As our research focuses on intra-euro area current account balances, we use bilateral *trade account balances* (TAB)[19], in percent of national GDP. As usual, structural reforms are assumed to promote exports and/or to decrease imports as the domestic competitiveness rises. Due to a lack of data, we cannot include trade in services or bilateral current account balances. We control for business cycle effects and nominal price effects by adding private consumption[20] and export price inflation.

Structural reforms

The measurement of structural reforms is not easy and its discussion fills many pages. We follow empirical papers on structural reforms such as Belke et al. (2006b) and use the (difference of the) Fraser Index of Economic Freedom of the World as indicator of the intensity of structural reforms.[21] The index measures economic freedom cardinally

[18] Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain.

[19] Bilateral current account data are generally not available.

[20] Here, we use the change in private consumption as the latter might have a direct impact on the trade balance and it is highly correlated with real GDP growth.

[21] For details of the computation of the index see Gwartney and Lawson (2003).

taking values in the range of 1 to 10, with higher values indicating a higher degree of economic freedom. An advantage of this index is the disaggregation according to different policy areas. However, the drawback is that annual data are only available from the year 2000 on. In our empirical investigation we decided to make use of the summary index (FI) as well as of the labour market sub-index ($FI - labor$).

a second step, we use the following two macroeconomic variables as proxies of structural reforms and assume that these macroeconomic indicators proportionally display the effects of accumulated previous structural reforms. The advantage of this method is twofold. First, these indicators are available for a longer period, and, second, the macro variables might serve as instrumental variables of some sort because private adjustment is endogenous with respect to the degree of structural reforms. Thereby, these macroeconomic variables might indicate long-term effects of structural reform.

As a first macro variable, we use *structural unemployment* as measured by the non-accelerating wage rate of unemployment ($NAWRU$) which is the unemployment rate consistent with constant wage inflation and which reflects structural imbalances in labour markets. However, calculations on structural unemployment depend on the estimation concept used. We include calculations of the $NAWRU$ from the European Commission. We assume that declining structural unemployment is due to (past) structural labour market reforms.

As a second macro variable, *social benefits* (SB) in percent of GDP are used as a proxy of cumulated past structural reforms of the welfare system, especially unemployment compensation. Large social benefits are associated with moral hazard and inefficient allocation of public transfers. Additionally, social benefits can act as an implicit minimum wage. A reduction of social benefits increases the pressure for wage moderation by boosting the incentive of unemployed to accept job offers at lower wages. Both, lower structural unemployment and lower social benefits are assumed to be correlated with an increase in current account balances.

To enhance the coherence and readability of our estimation results we finally multiply both macroeconomic proxies with (-1). After this transformation, higher realisations of $(-1) * NAWRU$ or $(-1) * SB$ proportionally correspond to a higher degree of

structural reforms. In accordance with Bertola and Lo Prete (2009), we expect both proxies to be positively correlated with the bilateral trade balance.

Private restructuring

To measure private restructuring we use six different proxies. First, private market adjustment, such as increasing productivity or wage moderation, target unit labour costs, which are seen as an important determinant of competitiveness and might therefore affect current account balances. Hence, we apply changes in *unit labour costs* (ULC) as a proxy of private restructuring of the enterprise sector. Second, we use the *nominal compensation rate* (NCR) which measures wage costs including fringe benefits.[22] Again, both indicators are multiplied by (-1). Third, we test for the impact of *productivity* ($PROD$) and, fourth, the degree of *labour-capital-substitution* ($LABCAP$) on the trade account. These latter two variables are of course not multiplied by the factor (-1) by the same logic as applied above.

Our fifth and the sixth measure of the extent of private restructuring consist of a proxy for offshoring and an indicator of technological competitiveness. In any case, it is rather difficult to find an undisputed proxy for emphoffshoring. Offshoring is in most cases measured at a highly disaggregated level. For example, International Monetary Fund (2007) and Daveri and Jona-Lasinio (2008) use input-output data for their analyses; Goerg et al. (2008) base their empirical analysis on plant level data. Neither data set fits for our analysis since data are not available for all countries during the observation period. Therefore, we use as fifth variable outward FDI in percent of GDP as a proxy of offshoring, based on the assumption that offshoring as proxy for private restructuring is associated with increasing outward FDI. This approach excludes offshoring that is not linked to FDI such as outsourcing of services to firms abroad or increasing imports of intermediate products.

Sixth, we measure *technological competitiveness* by making use of the Balassa index of Revealed Comparative Advantage (RCA) (Balassa, 1965), which accounts for a

[22] Compensation includes employer's contribution to statutory social security schemes or to private funded social insurance schemes and unfunded employee social benefits paid by employers (such as children's, spouse's or payments made to workers because of illness, accidental injury).

relative export share in an industry compared to all countries.[23] We calculate the RCA indicator for ten industries of each country and aggregate over industries by classifying all industries according to the kind of technology used. In so doing, we multiply the RCA variable by 1 for higher technology industries and by -1 in case of lower technology industries.[24] The differentiation in "higher technology (high and medium-high technology)" and "lower technology (low and medium-low technology)" follows (Baumann and di Mauro, 2007, 23). Our final ranking of countries with respect to the industrial specialisation is quite similar to that gained by Baumann and di Mauro (2007).

Control variables

To control for business cycle effects in bilateral trade data we use private consumption, as is standard in this type of literature. Additionally, private consumption accounts for differences in consumption of euro area countries that might have driven the current account balances. Since nominal trade account data are also influenced by nominal prices, we check for relative price developments by employing a variable measuring relative export price inflation. We have to drop import price inflation due to mulit-colinearity. Finally, a dummy variable accounts for a possible structural break at the start of EMU. The dummy is coded as one for all years in which a country is member of the EMU and is otherwise set to zero.

2.4.2 Empirical model

To analyse the impact of structural reforms and market adjustment on current account balances, we use three differently specified regression equations. In the following, we give some details about each of the three different specifications. Let us start with hypothesis one.

[23] The Revealed Comparative Advantage is calculated as written below, were m indicates sectors and i countries: $RAC_{m,i} = \frac{\frac{x_{m,i}}{\sum_{m=1}^{n} x_{m,i}}}{\frac{\sum_{i=1}^{j} x_{m,i}}{\sum_{i=1}^{j}\sum_{m=1}^{n} x_{m,i}}}$ with $m \in (1,n)$ and $i \in (1,j)$.

[24] Industry 9 (ITS-SITC Rev.3: "Commodities and Transactions, n.e.s.") is multiplied by 0 as it cannot be explicitly classified as a lower or higher technology branch.

We test the validity of our *first hypothesis* claiming that structural reforms and private market adjustment affect current account balances by means of the following regression equation:

$$C_{k,t} = \beta_0 + \beta_1 C_{k,t-1} + \beta_2 L_{k,t-1} + \beta_P P_{k,t} + \beta_G G_{k,t} + \beta_X X_{k,t} + \beta_d d_{k,t} + \epsilon_k + \mu_{k,t} \quad (13)$$

where $C_{k,t}$ denotes a vector of changes in bilateral trade account balances with $C_{k,t} = \frac{TAB_{i,j,t}}{GDP_{i,t}} - \frac{TAB_{i,j,t-1}}{GDP_{i,t-1}}$. The indices i and j identify the countries involved, t denotes time, and k is the cross-section index of country pairs. $P_{k,t}$ represents the vector of proxies for private market adjustment, $G_{k,t}$ stands for a vector of proxies for structural reforms, and $X_{k,t}$ captures a set of control variables. In our dynamic model setting, we also include the one-period lagged dependent variable as well as the level of the trade account balance (L) prevailing in the previous period to account for the degree of initial problem pressure. We expect that the higher a trade deficit turns out to be, the larger the probability of structural reforms or private restructuring is, as the need for adjustment is especially pronounced. The vectors $P_{k,t}$, $G_{k,t}$ and $X_{k,t}$ contain the change in the bilateral absolute differences between country i and j, with:

$$P_{k,t} = \Delta P_{i,t} - \Delta P_{j,t} \quad (14)$$

$$G_{k,t} = \Delta G_{i,t} - \Delta G_{j,t} \quad (15)$$

$$X_{k,t} = \Delta X_{i,t} - \Delta X_{j,t} \quad (16)$$

This variable transformation generates stationary time series to avoid spurious regression. Panel unit-root tests (Levin et al., 2002, Im et al., 2003) for the transformed variables reject non-stationary nature of all independent variables. The dummy variable d controls for the impact of EMU on competitiveness. We account for unobserved heterogeneity using cross-section fixed effects ϵ_k. $\mu_{k,t}$ is the white noise error term.

Hypothesis one is corroborated if the coefficient β_G of structural reforms reveals a positive sign on FI, $FI - labor$, $(-1)NAWRU$ and $(-1)SB$. This would indicate that structural reforms in a country tend to enhance bilateral trade balances. The estimated coefficients of private market adjustment, β_P, are expected to have a positive sign, too.

Let us now proceed with the specification of the regression equation related to our *hypothesis two*. The latter actually claims that structural reforms influence the private adjustment process. For this purpose, we scrutinize the interrelations between market adjustment and structural reforms via adding an interaction term $P_{k,t}G_{k,t}$. This yields:

$$C_{k,t} = \beta_0 + \beta_1 C_{k,t-1} + \beta_2 L_{k,t-1} + \beta_P P_{k,t} + \beta_G G_{k,t} + \beta_A P_{k,t} G_{k,t} + \beta_X X_{k,t} + \\ + \beta_d d_{k,t} + \epsilon_k + \mu_{k,t} \tag{17}$$

This specification enables us to test whether the relationship between the dependent variable $C_{k,t}$ and the independent variable $P_{k,t}$ is influenced by the third independent variable $G_{k,t}$ (Jaccard and Turrisi, 2003). Such interaction effects can be isolated by product terms of the independent variable $P_{k,t}$ (the so-called focal variable) and the second independent variable $G_{k,t}$ (moderator variable). Note, that the interpretation of regression coefficients changes in this case. With respect to our own estimation exercise the interpretation of regression coefficients can be summarized as follows (Jaccard and Turrisi, 2003): β_P captures the effect of $P_{k,t}$ on $C_{k,t}$ when $G_{k,t} = 0$, β_G estimates the effect of $G_{k,t}$ on $C_{k,t}$ when $P_{k,t} = 0$, and β_A indicates the number of units that β_P increases/decreases if $G_{k,t}$ grows by one unit.[25]

Generally, we cannot reject the hypothesis that structural reforms affect the private adjustment process if β_A becomes statistically significant. If the estimated coefficient of the interaction between structural reforms and private restructuring β_A has (not) the same sign as the estimated coefficient of private adjustment, β_P, then it indicates a complementary (substitutive) relationship between structural reforms and private restructuring. Let us now finally derive the regression framework to test our third hypothesis.

Our *third hypothesis* maintains that the effectiveness of private market adjustment and structural reforms to balance current accounts has been affected by membership of the respective country in EMU. We decided to test the former by adding an interaction term $P_{k,t}d_{k,t}$ which interrelates private market adjustment with the EMU dummy variable

[25]The contrary explanation is possible: β_A indicates the number of units that β_G increases/decreases if $P_{k,t}$ grows by one unit. However, we assume in our theory that structural reforms affect the private adjustment process.

or an interaction term $G_{k,t}d_{k,t}$ measuring the impact of EMU on the effectiveness of structural reforms in influencing current account balances. In this case, the regression equations boil down to be the following:

$$C_{k,t} = \beta_0 + \beta_1 C_{k,t-1} + \beta_2 L_{k,t-1} + \beta_P P_{k,t} + \beta_G G_{k,t} + \beta_{A1} P_{k,t} d_{k,t} + \beta_X X_{k,t} + \\ + \beta_d d_{k,t} + \epsilon_k + \mu_{k,t} \tag{18}$$

$$C_{k,t} = \beta_0 + \beta_1 C_{k,t-1} + \beta_2 L_{k,t-1} + \beta_P P_{k,t} + \beta_G G_{k,t} + \beta_{A2} G_{k,t} d_{k,t} + \beta_X X_{k,t} + \\ + \beta_d d_{k,t} + \epsilon_k + \mu_{k,t} \tag{19}$$

Based on these specifications, we estimate the effect of EMU membership on the impact of private market adjustment and structural reforms on current account balances. Positive signs of the estimated coefficients β_{A1} and β_{A2} indicate a rising importance of private market adjustment or of structural reforms for current account balances since the start of the EMU.

We estimate the three specifications (13), (17) as well as (18) or (19) based on a dynamic panel model by means of a System-GMM estimator (Arellano and Bover, 1995, Blundell and Bond, 1998) to account for possible endogenous variables, fixed effects and heteroskedasticity. In contrast to the Difference-GMM (Arellano and Bond, 1991), the System-GMM addresses poor performance of first-differenced-variable instruments. Our data set fits the requirement of a relatively small time dimension (max. 17 points in time) and many cross sections (110 country pairs) which has originally been raised in the context of the Arellano-Bond procedure. We hold the number of instruments at a minimum to enhance the discriminating power of post-estimation over-identification tests. However, time lags are large enough to account for long-term adjustment. All variables are assumed to be endogenous with respect to the dependent variable except the EMU dummy, which we treat as exogenous for obvious reasons. The presented results in the tables are derived from robust two-step estimations, which have been corrected for potential bias of standard errors due to small sample size (Windmeijer, 2005).

In order to arrive at a valid model specification the null hypotheses of the Arellano-Bond AR(2) correlation test[26] and the Hansen over-identification test (Hansen, 1982) have to be rejected. As we use a robust estimation, the Sargan over-identification test (Sargan, 1958) becomes inconsistent (Roodman, 2006, 12). Hence, we only report the empirical realisations of the Hansen test statistic. To check for the validity of our model specification, we also perform specifications, which include additional time dummies (Roodman, 2006). That improves the autocorrelation tests and the robustness of standard errors.[27] As the overall pattern of our results is untouched by this specification, only results based on specifications excluding deterministic time dummies are reported.

2.4.3 Estimation results

Test of hypothesis 1: Do structural reforms and private market adjustment affect current account balances?

Our estimation results related to our first hypothesis are reported in Table 2 for the Fraser summary index, in Table 3 for the Fraser labour market sub-index, in Table 4 for the macro variable structural unemployment and in Table 5 for the macro indicator social benefits.

In general, the estimated coefficients of the variables measuring the impact of *private market adjustment* on bilateral trade balances turn out to be of rather low significance. Only the coefficients of FDI (column 5), productivity (column 3), and the nominal compensation rate (column 7) are significant at the common levels. In contrast, the estimated coefficients of *structural reforms* turn out to be positive and significant in almost all estimations. Especially, a relative increase in the overall as well as in the labour market-specific Fraser Index and a reduction of structural unemployment relative to the partner country is linked to an improvement of the bilateral trade balance.

The estimated coefficients of the macroeconomic control variables are in accordance with theory and, thus, corroborate the robustness of our estimation results. For in-

[26] It is important to note that the absence of AR(2) is the necessary condition for unbiased and efficient estimation with GMM-SYS, but not of AR(1). First order residual autocorrelation in the starting equation is no problem since the estimators work with first differences. Hence, the significance of AR(1) autocorrelation does not limit the validity of our results.

[27] We use time dummies to make the assumption of no autocorrelation across individuals in the idiosyncratic disturbances more likely to hold (Roodman, 2006).

stance, a relative increase in private consumption and and relatively lower export prices reduce the (nominal value of the) bilateral trade balance. The estimated coefficients of the EMU dummy (Table 4 and 5) are in several cases significant and display a positive sign. This clear empirical pattern reflects that after the start of EMU, bilateral trade balances in the majority of countries declined more rapidly. In short, this mirrors the development of intra-euro zone current account balances since 1999 between Germany as a net creditor country and Spain, Italy, Portugal, France and Ireland as net debtor countries.

Overall, our results confirm our hypothesis that in general structural reforms and, only in some cases, also private market adjustment tends to increase the trade balance. The weaker evidence for private market adjustment might reflect the fact that private capital inflows (from Germany) and public capital inflows (from EU institutions) allowed to postpone private restructuring in the majority of euro area member countries. Hence, our results confirm empirical research of Kennedy and Sløk (2005) and Bertola and Lo Prete (2009).

Table 2: Regression results: impacts of private market adjustment and structural reforms (Fraser summary index) on bilateral trade balances (2001-2006)

dependent:	Δ bilateral trade balance						
	#	1	2	3	4	5	6
market adjustment	Δ (-1)*nominal compensation rate	-0.012 (0.517)					
	Δ (-1)*unit labour costs		-0.006 (0.005)				
	Δ productivity			-0.003 (0.008)			
	Δ labour capital substitution				-0.006 (0.037)		
	Δ FDI					**0.015*** (0.007)	
	Δ RCA						0.001 (0.001)
structural reforms	Δ Fraser Index (summary index)	**0.085**** (0.042)	**0.074**** (0.035)	**0.081**** (0.039)	**0.090**** (0.040)	-0.151 (0.189)	0.076 (0.050)
macro variables	Δ trade balance (t-1)	**-0.287***** (0.079)	**-0.264***** (0.082)	**-0.287***** (0.072)	**-0.288***** (0.078)	-0.017 (0.172)	**-0.377***** (0.076)
	trade balance (t-1)	**0.090**** (0.040)	**0.068**** (0.029)	**0.076*** (0.039)	**0.072*** (0.037)	-0.008 (0.038)	**0.161*** (0.081)
	Δ private consumption	-0.003 (0.006)	-0.002 (0.006)	-0.003 (0.006)	-0.007 (0.006)	-0.019 (0.015)	-0.006 (0.007)
	Δ export prices	0.006 (0.008)	0.001 (0.008)	0.007 (0.009)	0.008 (0.010)	**0.044*** (0.022)	**0.018*** (0.010)
	EMU dummy						
	constant	-0.011 (0.012)	-0.015 (0.010)	-0.010 (0.012)	-0.012 (0.012)	-0.019 (0.023)	-0.020 (0.019)
model specification	N	660	660	660	660	640	562
	instruments	23	23	23	23	18	23
	AR (2)	0.699	0.584	0.734	0.747	0.225	0.710
	Hansen (p-value)	0.580	0.486	0.549	0.343	0.849	0.053

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 3: Regression results: impacts of private market adjustment and structural reforms (Fraser labour market sub-index) on bilateral trade balances (2001-2006)

dependent:	Δ bilateral trade balance						
	#	7	8	9	10	11	12
market adjustment	Δ (-1)*nominal compensation rate	0.070					
	compensation rate	(0.478)					
	Δ (-1)*unit labour costs		-0.005				
			(0.005)				
	Δ productivity			-0.006			
				(0.008)			
	Δ labour capital				-0.003		
	substitution				(0.038)		
	Δ FDI					0.018	
						(0.011)	
	Δ RCA						0.000
							(0.001)
structural reforms	Δ Fraser Index	**0.016****	0.010	**0.013***	**0.018****	**-0.051***	0.008
	(labor market)	(0.007)	(0.007)	(0.007)	(0.008)	(0.028)	(0.010)
macro variables	Δ trade balance	**-0.250*****	**-0.241*****	**-0.266*****	**-0.274*****	-0.097	**-0.368*****
	(t-1)	(0.090)	(0.085)	(0.079)	(0.089)	(0.120	(0.077)
	trade balance	**0.075***	0.061	0.072	0.065	-0.018	**0.130****
	(t-1)	(0.043)	(0.039)	(0.048)	(0.042)	(0.044)	(0.065)
	Δ private consumption	-0.009	-0.008	-0.006	**-0.014***	-0.011	-0.013
		(0.006)	(0.006)	(0.005)	(0.008)	(0.011)	(0.009)
	Δ export prices	0.007	0.005	0.010	0.010	**0.026***	**0.019***
		(0.007)	(0.006)	(0.008)	(0.009)	(0.016)	(0.010)
	EMU dummy						
	constant	-0.013	-0.016	-0.010	-0.017	-0.011	-0.007
		(0.013)	(0.011)	(0.013)	(0.013)	(0.019)	(0.021
model specification	N	660	660	660	660	640	562
	instruments	23	23	23	23	23	23
	AR (2)	0.487	0.470	0.607	0.704	0.264	0.738
	Hansen (p-value)	0.853	0.731	0.729	0.242	0.933	0.063

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 4: Regression results: impacts of private market adjustment and structural unemployment on bilateral trade balances (1992-2007)

dependent:	Δ bilateral trade balance						
	#	13	14	15	16	17	18
market adjustment	Δ (-1)*nominal compensation rate	0.436 (0.309)					
	Δ (-1)*unit labour costs		0.000 (0.002)				
	Δ productivity			**0.011**** (0.005)			
	Δ labour capital substitution				-0.014 (0.012)		
	Δ FDI					-0.001 (0.003)	
	Δ RCA						-0.000 (0.001)
structural reforms	Δ (-1)*structural unemployment	**0.037*** (0.019)	**0.037**** (0.015)	**0.047**** (0.020)	**0.035***** (0.014)	**0.067*** (0.035)	0.029 (0.019)
macro variables	Δ trade balance	**-0.141***	**-0.189*****	**-0.164****	**-0.154****	**-0.187****	**-0.244*****
	(t-1)	(0.072)	(0.070)	(0.081)	(0.075)	(0.074)	(0.065)
	trade balance	0.016	0.022	0.023	0.017	0.019	**0.059*****
	(t-1)	(0.014)	(0.015)	(0.015)	(0.013)	(0.019)	(0.017)
	Δ private consumption	**-0.010*****	**-0.013*****	**-0.015*****	**-0.014*****	**-0.013*****	**-0.014*****
		(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)
	Δ export prices	**0.006*****	**0.008*****	**0.007*****	**0.008*****	**0.008****	0.004*
		(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
	EMU dummy	-0.015	**-0.023****	-0.019	-0.022	**-0.039***	-0.007
		(0.012)	(0.011)	(0.013)	(0.014)	(0.020)	(0.010)
	constant	0.003	**0.016***	0.007	0.010	0.026	0.009
		(0.008)	(0.008)	(0.010)	(0.009)	(0.016)	(0.007)
model specification	N	1643	1720	1720	1720	1396	1502
	instruments	26	30	30	27	28	25
	AR (2)	0.962	0.627	0.801	0.869	0.217	0.403
	Hansen (p-value)	0.638	0.526	0.400	0.647	0.216	0.630

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 5: Regression results: impacts of private market adjustment and social benefits on bilateral trade balances (1992-2007)

dependent:	Δ bilateral trade balance						
	#	19	20	21	22	23	24
market adjustment	Δ (-1)*nominal compensation rate	**0.568*** (0.309)					
	Δ (-1)*unit labour costs		0.001 (0.004)				
	Δ productivity			-0.001 (0.005)			
	Δ labour capital substitution				-0.014 (0.013)		
	Δ FDI					-0.002 (0.003)	
	Δ RCA						-0.000 (0.001)
structural reforms	Δ (-1)*social benefits	**0.012*** (0.007)	**0.013**** (0.006)	**0.012**** (0.006)	0.009 (0.007)	**0.027**** (0.013)	0.003 (0.007)
macro variables	Δ trade balance (t-1)	**-0.143*** (0.078)	**-0.192***** (0.070)	**-0.152*** (0.079)	**-0.137*** (0.078)	**-0.201***** (0.074)	**-0.251***** (0.061)
	trade balance (t-1)	0.017 (0.016)	0.026 (0.016)	0.021 (0.015)	-0.014 (0.015)	0.011 (0.023)	**0.066***** (0.015)
	Δ private consumption	**-0.008***** (0.003)	**-0.014***** (0.004)	**-0.016***** (0.003)	**-0.017***** (0.004)	**-0.017***** (0.004)	**-0.014***** (0.003)
	Δ export prices	**0.005***** (0.002)	**0.006**** (0.003)	**0.007***** (0.002)	**0.008***** (0.002)	**0.009***** (0.003)	**0.005*** (0.003)
	EMU dummy	-0.013 (0.009)	**-0.018*** (0.011)	-0.012 (0.010)	**-0.022*** (0.013)	**-0.027**** (0.013)	-0.003 (0.009)
	constant	0.000 (0.007)	0.007 (0.008)	0.004 (0.009)	0.007 (0.011)	0.015 (0.012)	0.003 (0.008)
model specification	N	1643	1720	1720	1720	1396	1520
	instruments	27	32	26	28	28	26
	AR (2)	0.943	0.615	0.854	0.962	0.188	0.367
	Hansen (p-value)	0.513	0.145	0.447	0.385	0.216	0.402

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Test of hypothesis 2: Reforms as a propagation mechanism fostering the impact of private adjustment on the current account balance?

The estimation results related to our second hypothesis are displayed in Tables 6 and 7 for structural unemployment and social benefits as our indicators of the degree of structural reforms. Estimations using Fraser Index variables do not deliver any significant interaction term and are not reported. The estimated coefficients of the interaction term between private market adjustment and structural reforms are reported in the grey highlighted rows. Some coefficients of the interaction terms are significant with a negative sign, suggesting a substitutive relationship. Since the estimated β_A in case of a negative sign of β_A indicates the number of units that β_P decreases if $G_{k,t}$ grows by one unit, a straightforward interpretation is that a higher degree of structural reforms diminishes the impact of private adjustment on the current account balance. In other words, less structural reforms require more private market adjustment and vice versa. An alternative interpretation is that private market adjustment mechanisms are not needed as pressingly any more if structural reforms, for instance in the area of social benefits, are conducted.

However, if we measure private market adjustment via FDI we find a complementary relationship (Table 7, column 35). In this case, we feel legitimized to conclude that structural reforms foster the effectiveness of FDI to increase the current account balance. Notably, the described pattern of results is not dependent on whether we consider an interaction with social benefits or with structural unemployment as an indicator of the reform intensity, which again stresses the robustness of our results.

Seen on the whole, thus, our estimation results indicate that we cannot reject our second hypothesis if we measure the degree of reforms by structural unemployment and, alternatively, by means of a social benefit variable. Structural reforms tend to influence the current account adjustment process. More specifically, we find mainly substitutive relationships between structural reforms and private market adjustment.

Table 6: Regression results: impacts of market adjustment and structural unemployment on bilateral trade balances including an interaction term (1992-2007)

dependent:	Δ bilateral trade balance						
	#	25	26	27	28	29	30
market adjustment	Δ (-1)*nominal compensation rate	**0.518*** (0.287)					
	Δ (-1)*unit labour costs		0.001 (0.002)				
	Δ productivity			**0.011*** (0.006)			
	Δ labour capital substitution				-0.011 (0.014)		
	Δ FDI					-0.001 (0.003)	
	Δ RCA						-0.001 (0.001)
structural reforms	Δ (-1)*structural unemployment	**0.044**** (0.022)	**0.039**** (0.017)	**0.058***** (0.017)	**0.033*** (0.017)	**0.081**** (0.037)	0.029 (0.021)
interaction term	(market adjustment* structural reforms)	**-0.574*** (0.314)	**-0.004*** (0.002)	0.004 (0.007)	**-0.030*** (0.016)	0.005 (0.005)	0.000 (0.001)
macro variables	Δ trade balance (t-1)	**-0.176***** (0.063)	**-0.187***** (0.067)	**-0.196***** (0.066)	**-0.211***** (0.075)	**-0.187**** (0.075)	**-0.241***** (0.066)
	trade balance (t-1)	0.014 (0.013)	0.022 (0.013)	0.021 (0.013)	0.018 (0.017)	0.018 (0.018)	**0.061***** (0.016)
	Δ private consumption	**-0.011***** (0.003)	**-0.013***** (0.004)	**-0.016***** (0.004)	**-0.016***** (0.005)	**-0.013***** (0.004)	**-0.014***** (0.004)
	Δ export prices	**0.006**** (0.002)	**0.008***** (0.003)	**0.007***** (0.002)	**0.008**** (0.003)	**0.008**** (0.003)	**0.004*** (0.002)
	EMU dummy	-0.021* (0.012)	**-0.022**** (0.011)	**-0.024*** (0.015)	-0.016 (0.013)	**-0.036*** (0.019)	-0.007 (0.009)
	constant	0.011 (0.009)	**0.013*** (0.008)	**0.016*** (0.009)	0.003 (0.008)	0.022 (0.016)	0.008 (0.008)
model specification	N	1643	1720	1720	1720	1396	1502
	instruments	32	36	32	50	34	30
	AR (2)	0.721	0.640	0.572	0.521	0.219	0.425
	Hansen (p-value)	0.497	0.594	0.412	0.215	0.254	0.806

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 7: Regression results: impacts of market adjustment and social benefits on bilateral trade balances including an interaction term (1992-2007)

dependent:	Δ bilateral trade balance						
	#	31	32	33	34	35	36
market adjustment	Δ (-1)*nominal compensation rate	**0.632**** (0.325)					
	Δ (-1)*unit labour costs		-0.001 (0.005)				
	Δ productivity			-0.001) (0.005			
	Δ labour capital substitution				-0.025 (0.017)		
	Δ FDI					-0.001 (0.003)	
	Δ RCA						-0.000 (0.001)
structural reforms	Δ (-1)*social benefits	0.009 (0.007)	**0.018**** (0.009)	**0.011*** (0.006)	0.009 (0.009)	**0.031**** (0.015)	0.003 (0.007)
interaction term	(market adjustment* structural reforms)	**-0.383**** (0.194)	-0.001 (0.003)	-0.005 (0.004)	**-0.008*** (0.004)	**0.012*** (0.007)	-0.001 (0.001)
macro variables	Δ trade balance (t-1)	**-0.147*** (0.080)	-0.132 (0.098)	**-0.182**** (0.072)	**-0.132*** (0.072)	**-0.209***** (0.072)	**-0.252***** (0.059)
	trade balance (t-1)	0.017 (0.017)	0.010 (0.033)	0.022 (0.016)	-0.009 (0.020)	0.012 (0.025)	0.065*** (0.015)
	Δ private consumption	**-0.007**** (0.003)	**-0.016***** (0.004)	**-0.015***** (0.003)	**-0.022***** (0.045)	**-0.016***** (0.004)	**-0.014***** (0.003)
	Δ export prices	**0.005***** (0.002)	**0.006**** (0.003)	**0.007***** (0.002)	**0.009***** (0.003)	**0.009**** (0.004)	**0.005*** (0.003)
	EMU dummy	-0.009 (0.009)	-0.010 (0.013)	-0.015 (0.011)	**-0.031**** (0.014)	-0.020 (0.016)	-0.002 (0.009)
	constant	0.001 (0.007)	0.004 (0.012)	0.009 (0.009)	0.014 (0.015)	-0.000 (0.017)	0.002 (0.008)
model specification	N	1643	1720	1720	1720	1396	1502
	instruments	30	25	30	29	34	30
	AR (2)	0.910	0.977	0.664	0.986	0.180	0.357
	Hansen (p-value)	0.610	0.201	0.286	0.462	0.208	0.511

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Test of hypothesis 3: Has the effectiveness of structural reforms and private market adjustment been affected by EMU?

The estimation results based on regression equations designed to check the validity of our third (EMU) hypothesis are reported in the Tables 8 and 9.[28] Again, the rows referring to the significance of interaction terms are highlighted in gray. The estimated coefficients for the interaction between private market adjustment and the EMU dummy are almost entirely insignificant. This suggests that EMU had virtually no influence on the impact of private adjustment on current account balances. Only if the degree of market adjustment is measured by the RCA variable, the interaction terms (column 48, Table 8, and column 60, Table 9) become significant and reveal a negative sign, indicating that the effectiveness of increasing share of high technology goods to improve current accounts has dropped since the start of the EMU. That might

[28] As the Fraser Index is available at annual frequency not earlier than from 2000 on, we can, again, only provide estimation results for structural unemployment and social benefits.

be a hint, that price competition has become more important since start of the EMU.

These weak results gained for private market adjustment are in strong contrast to those based on the degree of structural reforms, at least if the latter is proxied by structural unemployment. The coefficients for the interaction of structural unemployment with the EMU dummy are clearly negative and mostly significant. This suggests that in some cases since the start of EMU the effectiveness of structural reforms to improve current accounts declined in most euro area countries. This could indicate that - as was often argued with respect to EMU - the so-called *up-front costs* of structural reforms might be larger within a currency union. This holds especially in large, relatively closed countries for which changes in the nominal exchange rate are not so effective in alleviating the necessary "crowding-in" effect. Removing restrictions in financial markets tend to stimulate demand more than labour market reforms and hence allow an easier and quicker "crowding-in" of reforms (Duval and Elmeskov, 2006, 6-7).

However, using the social benefit variable instead of structural unemployment as a proxy of structural reforms, the estimated coefficients of the interaction term reveal a positive sign but at low significance levels. This conveys weak evidence in favour of a higher effectiveness of structural reforms after the start of EMU in fostering the adjustment of trade balances (Table 9, column 41). Seen on the whole, however, the evidence of either a positive or a negative impact of EMU on the effectiveness of reforms in improving current account balances appears to be overall weak.

2.4.4 Robustness checks

In macroeconomic applications with a low number of cross-sections a finite sample problem emerges: the estimation results based on the System-GMM estimator might depend on the specific choice of instruments. Therefore, we check our results as a complement by means of bias-corrected dynamic fixed effect least square dummy variable estimations (LSDV) with a boot-strap variance-covariance matrix (Bruno, 2005). This method uses the Anderson-Hsiao estimator to correct biased standard errors to avoid the Nickell bias (Nickell, 1981). This method might lead to a potentially better finite-sample performance than the System-GMM estimator used in the previous section.

Table 8: Regression results: impacts of market adjustment and structural unemployment on bilateral trade balances including EMU interaction (1992-2007)

dependent:	Δ bilateral trade balance												
	#	37	38	39	40	41	42	43	44	45	46	47	48
market adjustment	Δ (-1)*nominal compensation rate	**0.693****						**0.547***					
		(0.315)						(0.317)					
	Δ (-1)*unit labour costs		0.005						0.005				
			(0.004)						(0.004)				
	Δ productivity			0.010						0.005			
				(0.007)						(0.007)			
	Δ labour capital substitution				-0.002						-0.019		
					(0.017)						(0.017)		
	Δ FDI					0.001						0.003	
						(0.004)						(0.007)	
	Δ RCA						-0.000						0.002
							(0.001)						(0.001)
structural reforms	Δ (-1)*structural unemployment	**0.053****	**0.067*****	**0.064****	**0.065****	0.065	**0.042****	**0.048***	**0.050*****	**0.048*****	**0.045****	**0.083****	0.030
		(0.023)	(0.026)	(0.029)	(0.027)	(0.041)	(0.020)	(0.028)	(0.019)	(0.019)	(0.023)	(0.040)	(0.025)
interaction term	(market adjustment* EMU dummy)							0.349	0.000	0.009	0.038	-0.001	**-0.005*****
								(0.474)	(0.005)	(0.010)	(0.031)	(0.007)	(0.002)
interaction term	(structural reforms* EMU dummy)	**-0.045***	**-0.064****	**-0.071****	**-0.058***	-0.064	**-0.061****						
		(0.026)	(0.030)	(0.035)	(0.030)	(0.041)	(0.025)						
macro variables	Δ trade balance (t-1)	**-0.168****	**-0.195*****	**-0.181*****	**-0.168****	**-0.189*****	**-0.253*****	**-0.139***	**-0.189****	**-0.157***	**-0.143****	**-0.194*****	**-0.247*****
		(0.071)	(0.070)	(0.070)	(0.067)	(0.072)	(0.065)	(0.078)	(0.081)	(0.092)	(0.071)	(0.072)	(0.073)
	trade balance (t-1)	0.016	0.017	0.019	0.016	0.011	**0.053*****	-0.001	0.021	0.023	0.015	0.015	**0.056*****
		(0.015)	(0.014)	(0.012)	(0.012)	(0.023)	(0.018)	(0.027)	(0.014)	(0.015)	(0.012)	(0.019)	(0.017)
	Δ private consumption	**-0.011*****	**-0.013*****	**-0.016*****	**0.014*****	**-0.014*****	**-0.015*****	**-0.013*****	**-0.012*****	**-0.015*****	**-0.015*****	**-0.012*****	**-0.014*****
		(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
	Δ export prices	**0.005****	**0.008****	**0.009*****	**0.007*****	**0.010*****	**0.007****	0.003	**0.006*****	**0.007*****	**0.009*****	0.006	**0.007****
		(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)
	EMU dummy	-0.021	**-0.025****	-0.018	**-0.023***	-0.028	**-0.019***	-0.023*	**-0.023***	-0.017	**-0.021***	**-0.038***	-0.018
		(0.014)	(0.013)	(0.015)	(0.014)	(0.018)	(0.010)	(0.013)	(0.012)	(0.016)	(0.013)	(0.020)	(0.011)
	constant	0.006	0.016	0.010	0.014	0.022*	**0.016***	0.008	0.012	0.007	0.011	0.025	0.009
		(0.009)	(0.009)	(0.009)	(0.010)	(0.013)	(0.008)	(0.010)	(0.008)	(0.010)	(0.010)	(0.016)	(0.009)
model specification	N	1643	1720	1720	1720	1396	1502	1643	1720	1720	1720	1396	1502
	instruments	34	30	40	30	29	30	27	30	38	30	36	30
	AR (2)	0.790	0.605	0.693	0.764	0.194	0.353	0.966	0.660	0.863	0.954	0.207	0.410
	Hansen (p-value)	0.300	0.245	0.145	0.194	0.351	0.352	0.528	0.462	0.674	0.567	0.137	0.237

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 9: Regression results: impacts of private market adjustment and social benefits on bilateral trade balances including EMU interaction (1992- 2007)

dependent:	Δ bilateral trade balance												
	#	49	50	51	52	53	54	55	56	57	58	59	60
market	Δ (-1)*nominal	**0.388***						**0.468****					
adjustment	compensation rate	(0.223)						(0.238)					
	Δ (-1)*unit labour costs		0.001						0.002				
			(0.004)						(0.004)				
	Δ productivity			0.001						-0.001			
				(0.006)						(0.006)			
	Δ labour capital				-0.023						-0.019		
	substitution				(0.014)						(0.017)		
	Δ FDI					-0.000						0.010	
						(0.002)						(0.008)	
	Δ RCA						0.001						0.003**
							(0.001)						(0.002)
structural	Δ (-1)*social benefits	**0.022***	0.010	0.007	0.005	0.014	0.005	**0.014***	0.010	**0.013***	0.009	0.013	0.008
reforms		(0.011)	(0.008)	(0.007)	(0.008)	(0.012)	(0.009)	(0.008)	(0.006)	(0.007)	(0.006)	(0.015)	(0.008)
interaction	(market adjustment*							-0.041	0.005	0.007	0.009	-0.10	-0.005***
term	EMU dummy)							(0.549)	(0.007)	(0.008)	(0.019)	(0.009)	(0.002)
interaction	(structural reforms*	0.011	0.018	0.023	0.019	**0.038***	0.004						
term	EMU dummy)	(0.021)	(0.018)	(0.015)	(0.015)	(0.020)	(0.020)						
macro	Δ trade balance	**-0.136***	**-0.190****	**-0.161***	-0.135	**-0.206*****	**-0.247*****	**-0.175****	**-0.189****	-0.149	**-0.101****	**-0.207*****	-0.227***
variables	(t-1)	(0.078)	(0.095)	(0.094)	(0.092)	(0.074)	(0.068)	(0.089)	(0.083)	(0.092)	(0.075)	(0.073)	(0.077)
	trade balance	0.004	0.026	0.021	0.016	0.012	**0.062*****	0.012	0.022	0.021	0.018	0.007	0.040**
	(t-1)	(0.025)	(0.019)	(0.013)	(0.016)	(0.023)	(0.016)	(0.032)	(0.017)	(0.018)	(0.013)	(0.023)	(0.017)
	Δ private consumption	**-0.013*****	**-0.013*****	**-0.012*****	**-0.016*****	**-0.014*****	**-0.012*****	**-0.010*****	**-0.013*****	**-0.016*****	**-0.016*****	**-0.014*****	-0.010***
		(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.030)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
	Δ export prices	**0.004***	**0.007*****	**0.007*****	**0.007*****	**0.009*****	0.004	0.003	**0.007*****	**0.007*****	0.007	**0.009****	0.008**
		(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)
	EMU dummy	-0.018	**-0.018***	-0.012	-0.020	**-0.025***	-0.010	-0.008	**-0.021***	-0.011	-0.018	-0.020	-0.017
		(0.012)	(0.011)	(0.012)	(0.013)	(0.014)	(0.010)	(0.013)	(0.012)	(0.012)	(0.012)	(0.014)	(0.013)
	constant	0.001	0.008	0.005	0.006	0.015	0.006	0.002	0.010	0.003	0.006	0.016	0.005
		(0.009)	(0.009)	(0.011)	(0.011)	(0.012)	(0.009)	(0.012)	(0.009)	(0.010)	(0.010)	(0.012)	(0.010)
model	N	1643	1720	1720	1720	1396	1502	1643	1720	1720	1720	1396	1502
specification	instruments	33	31	32	31	31	31	33	32	30	30	32	37
	AR (2)	0.966	0.658	0.824	0.981	0.192	0.410	0.744	0.664	0.887	0.881	0.178	0.546
	Hansen (p-value)	0.468	0.167	0.279	0.367	0.218	0.156	0.315	0.272	0.388	0.195	0.245	*0.042*

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

As examples, we display the corresponding results for the Fraser Summary Index in Table 10 and for social benefits in Tables 11 and 12.[29] Overall, the LSDV results confirm our results gained using the System-GMM estimation procedure (see Tables 2, 5, and 7). The signs of the estimated coefficients generally remain the same. While private market adjustment seems to have virtually no impact on current account balances, relative structural reforms, in contrast, tend to improve the bilateral trade balance. The substitutive relationship between structural reforms and market adjustment is only weakly confirmed by this estimation procedure. Finally, we again find little evidence of an interaction between structural reforms or market adjustment with the EMU dummy. Hence, we do not report these results.

Second, we check for nonlinearities in the effect of structural reforms on the current account balance. Thereby, we use squared values of the empirical realisations of our structural reform variable.[30] Non-linearities might emerge either because the underlying relationships are non-linear (the so-called "Calmfors-Driffill hump" (Calmfors et al., 1998, Belke et al., 2006b, Duval and Elmeskov, 2006, Nicoletti and Scarpetta, 2005)) because of the possibility that a given reform may have different impact on labour markets depending on the initial policy stance in the area considered (Duval and Elmeskov, 2006, 13) or because the sequencing of goods and labor market reforms plays a significant role (policy complementarity, Alesina et al. (2008). Another rationale might be that some factors, such as capital and labor, may face non-linear adjustment costs and irreversibilities in case of no reforms and, hence, reforms - by lowering fixed costs of adjustment - also lead to non- linear effects and reform shifts may take various periods to affect current account imbalances. By using the Fraser Index values or social benefits as indicator for structural reforms, the coefficients of the structural reform and the private adjustment variables and their squares are not statistically significant at conventional critical values. However, coefficients for structural reforms become significant if we use structural unemployment as proxy for structural reforms. That indicates a non-linear relationship between structural unemployment and current account balances (Table 13). As the interaction terms are overall not significant, we do not report the

[29] Our results based on equations containing the Fraser labour market sub-index and the variable "structural unemployment" as an indicator of structural reforms confirm our results gained earlier with System-GMM and are available on request.

[30] Figures are squared. However, the sign remains the same to keep the relationship.

respective tables.

Third, we add the bilateral change in GDP per capita as a control variable. By this, we account for the wealth effect on the current account balance as proposed by the inter-temporal current account approach (see section 2.3.1). According to the latter, low-income countries are associated with current account deficits and high-income countries with current account surpluses. A relative increase in GDP per capita should therefore lead to an improved current account. Tables 14 and 15 provide the results of the System-GMM estimations of the GDP (per capita) augmented equation to test our hypotheses one and two for the case of structural unemployment as our macroeconomic proxy of structural reform. Again, this estimation specification confirms our baseline results. However, any significance of interaction effects between structural reforms and market adjustment disappears. Relative GDP per capita is in general insignificant, a result which casts some doubt on its role in explaining the intra-euro area current account balances observed more recently within the euro area.

Table 10: Corrected LSDV Regression results: impacts of private market adjustment and structural reforms (Fraser summary index) on bilateral trade balances (2001-2006)

dependent:	Δ bilateral trade balance						
	#	61	62	63	64	65	66
market adjustment	Δ (-1)*nominal compensation rate	**1.966*** ** (0.268)					
	Δ (-1)*unit labour costs		0.008 (0.008)				
	Δ productivity			-0.002 (0.005)			
	Δ labour capital substitution				**-0.139*** ** (0.020)		
	Δ FDI					**0.007*** (0.002)	
	Δ RCA						**0.002*** ** (0.000)
structural reforms	Δ Fraser Index (summary index)	**0.126*** ** (0.007)	**0.112*** (0.061)	**0.115*** ** (0.030)	**0.094*** ** (0.028)	0.070 (0.070)	**0.099*** ** (0.029)
macro variables	Δ trade balance (t-1)	**-0.069*** ** (0.008)	**-0.072*** ** (0.033)	**-0.071*** ** (0.011)	**-0.067*** ** (0.009)	-0.018 (0.031)	**-0.067*** ** (0.004)
	trade balance (t-1)	**-0.546*** ** (0.011)	**-0.545*** ** (0.031)	**-0.546*** ** (0.014)	**-0.556*** ** (0.014)	**-0.783*** ** (0.030)	**-0.596*** ** (0.013)
	Δ private consumption	**-0.035*** ** (0.003)	**-0.027*** ** (0.009)	**-0.032*** ** (0.001)	**-0.038*** ** (0.002)	**-0.036*** ** (0.011)	**-0.033*** ** (0.002)
	Δ export prices	**0.008*** ** (0.003)	0.007 (0.008)	**0.009*** ** (0.004)	**0.012*** ** (0.001)	**0.028*** ** (0.009)	0.007*** **(0.002)**
model specification	N	660	660	660	660	640	562

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 11: Corrected LSDV Regression results: impacts of private market adjustment and social benefits on bilateral trade balances (1992-2007)

dependent:	Δ bilateral trade balance						
	#	67	68	69	70	71	72
market adjustment	Δ (-1)*nominal compensation rate	0.196 (0.354)					
	Δ (-1)*unit labour costs		0.001 (0.001)				
	Δ productivity			0.000 (0.000)			
	Δ labour capital substitution				**-0.026**** (0.013)		
	Δ FDI					**0.003**** (0.001)	
	Δ RCA						0.000 (0.001)
structural reforms	Δ (-1)*social benefits	**0.037***** (0.012)	**0.034***** (0.005)	**0.034***** (0.014)	0.020 (0.027)	**0.061***** (0.004)	**0.027***** (0.005)
macro variables	Δ trade balance (t-1)	**-0.109***** (0.011)	**-0.108***** (0.002)	**-0.107***** (0.017)	**-0.109***** (0.019)	**-0.060***** (0.006)	**-0.103***** (0.017)
	trade balance (t-1)	**-0.137***** (0.022)	**-0.136***** (0.006)	**-0.136***** (0.018)	**-0.135***** (0.014)	**-0.327***** (0.007)	**-0.179***** (0.010)
	Δ private consumption	**-0.025***** (0.003)	**-0.023***** (0.002)	**-0.024***** (0.004)	**-0.024***** (0.004)	**-0.028***** (0.001)	**-0.023***** (0.002)
	Δ export prices	**0.008*** (0.004)	**0.008***** (0.001)	**0.008**** (0.003)	**0.009**** (0.004)	**0.017***** (0.001)	**0.008***** (0.002)
	EMU dummy	**-0.026*** (0.016)	**-0.029***** (0.010)	**-0.029**** (0.012)	**-0.029**** (0.014)	**-0.052***** (0.004)	**-0.023***** (0.007)
model specification	N	1652	1730	1730	1730	1396	1512

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 12: Corrected LSDV Regression results: impacts of market adjustment and social benefits on bilateral trade balances including an interaction term (1992-2007)

dependent:	Δ bilateral trade balance						
	#	73	74	75	76	77	78
market adjustment	Δ (-1)*nominal compensation rate	0.192 (0.162)					
	Δ (-1)*unit labour costs		0.001 (0.001)				
	Δ productivity			0.000 (0.000)			
	Δ labour capital substitution				**-0.026**** (0.011)		
	Δ FDI					**0.003***** (0.001)	
	Δ RCA						0.000 (0.000)
structural reforms	Δ (-1)*social benefits	**0.037***** (0.010)	**0.035***** (0.005)	**0.034***** (0.005)	0.020 (0.023)	**0.061***** (0.011)	**0.026***** (0.003)
interaction term	(market adjustment* structural reforms)	**-0.299***** (0.082)	-0.002 (0.002)	-0.001 (0.005)	0.011 (0.024)	**-0.002***** (0.000)	0.000 (0.035)
macro variables	Δ trade balance (t-1)	**-0.110***** (0.003)	**-0.108***** (0.002)	**-0.107***** (0.002)	**-0.109***** (0.006)	**-0.060***** (0.008)	**0.103***** (0.008)
	trade balance (t-1)	**-0.138***** (0.009)	**-0.136***** (0.006)	**-0.136***** (0.006)	**-0.136***** (0.023)	**-0.328***** (0.010)	**-0.179***** (0.022)
	Δ private consumption	**-0.025***** (0.001)	**-0.023***** (0.002)	**-0.024***** (0.002)	**0.024***** (0.005)	**-0.027***** (0.003)	**-0.023***** (0.004)
	Δ export prices	**0.008***** (0.001)	**0.008***** (0.001)	**0.008***** (0.001)	0.008 (0.010)	**0.017***** (0.002)	0.008 (0.006)
	EMU dummy	**-0.025***** (0.006)	**-0.027***** (0.009)	**-0.029***** (0.010)	**-0.024***** (0.005)	**-0.050***** (0.012)	**-0.023***** (0.008)
model specification	N	1652	1730	1730	1730	1396	1512

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 13: Regression results: impacts of private market adjustment and non-linear structural unemployment on bilateral trade balances (1992-2007)

dependent:	Δ bilateral trade balance						
	#	79	80	81	82	83	84
market adjustment	Δ (-1)*nominal compensation rate	**-0.388*** (0.205)					
	Δ (-1)*unit labour costs		0.000 (0.002)				
	Δ productivity			0.000 (0.003)			
	Δ labour capital substitution				-0.008 (0.012)		
	Δ FDI					0.001 (0.001)	
	Δ RCA						-0.001 (0.001)
structural reforms	Δ (-1)*structural unemployment2	**0.020*** (0.012)	**0.025*** (0.13)	**0.026**** (0.010)	**0.029***** (0.010)	0.036 (0.026)	0.014 (0.011)
macro variables	Δ trade balance (t-1)	**-0.138*** (0.079)	**-0.188**** (0.083)	**0.150*** (0.087)	**0.188*** (0.085)	**-0.213***** (0.070)	**-0.245***** (0.071)
	trade balance (t-1)	0.017 (0.014)	0.023 (0.015)	0.021 (0.015)	0.017 (0.015)	0.020 (0.020)	**0.057***** (0.017)
	Δ private consumption	**-0.012***** (0.003)	**-0.012***** (0.003)	**-0.013***** (0.003)	**-0.014***** (0.004)	**-0.013***** (0.004)	**-0.011***** (0.003)
	Δ export prices	**0.005**** (0.002)	**0.007***** (0.002)	**0.006***** (0.002)	**0.007***** (0.002)	**0.007**** (0.002)	**0.005**** (0.002)
	EMU dummy	-0.010 (0.013)	-0.018 (0.012)	-0.019 (0.013)	-0.020 (0.014)	**-0.035*** (0.018)	-0.009 (0.011)
	constant	0.002 (0.009)	0.011 (0.009)	0.006 (0.010)	0.009 (0.010)	0.022 (0.013)	0.008 (0.008)
model specification	N	1643	1720	1720	1720	1396	1502
	instruments	26	26	26	26	26	26
	AR (2)	0.968	0.656	0.898	0.871	0.161	0.417
	Hansen (p-value)	0.582	0.189	0.307	0.309	0.071	0.281

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 14: Regression results: impacts of private market adjustment and structural unemployment on bilateral trade balances and testing for GDP per capita (1992-2007)

dependent:	Δ bilateral trade balance						
	#	85	86	87	88	89	90
market adjustment	Δ (-1)*nominal compensation rate	0.035 (0.432)					
	Δ (-1)*unit labour costs		0.002 (0.004)				
	Δ productivity			0.008 (0.007)			
	Δ labour capital substitution				0.010 (0.023)		
	Δ FDI					0.009 (0.006)	
	Δ RCA						0.001 (0.001)
structural reforms	Δ (-1)*structural unemployment	**0.050*** (0.026)	**0.040**** (0.020)	**0.071***** (0.025)	**0.071**** (0.028)	0.061 (0.064)	0.003 (0.025)
macro variables	Δ trade balance (t-1)	0.101 (0.137)	0.088 (0.133)	0.040 (0.141)	0.113 (0.155)	0.214 (0.147)	0.033 (0.181)
	trade balance (t-1)	**0.037*** (0.019)	**0.030**** (0.015)	**0.038***** (0.014)	**0.039**** (0.016)	0.003 (0.030)	**0.055***** (0.018)
	Δ private consumption	**-0.014*** (0.007)	-0.004 (0.008)	**-0.013*** (0.007)	-0.012 (0.011)	-0.010 (0.013)	0.005 (0.013)
	Δ export prices	0.006 (0.004)	0.010* (0.005)	0.006 (0.004)	0.010 (0.007)	**0.029***** (0.013)	0.003 (0.006)
	Δ GDP per capita	-0.003 (0.007)	-0.002 (0.008)	-0.006 (0.009)	0.000 (0.009)	0.015 (0.013)	-0.005 (0.009)
	EMU dummy	-0.005 (0.011	-0.016 (0.010)	-0.004 (0.010)	-0.009 (0.012)	**-0.035*** (0.018)	-0.017 (0.011)
	constant	0.003 (0.009)	**0.015*** (0.008)	0.007 (0.009)	0.010 (0.010)	0.025 (0.018)	0.008 (0.007)
model specification	N	1643	1720	1720	1720	1396	1502
	instruments	23	23	23	23	23	23
	AR (2)	0.424	0.426	0.504	0.388	0.289	0.523
	Hansen (p-value)	0.282	0.450	0.554	0.543	0.393	0.241

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 15: Regression results: impacts of market adjustment and structural unemployment on bilateral trade balances including an interaction term and testing for GDP per capita (1992-2007)

dependent:	Δ bilateral trade balance						
	#	91	92	93	94	95	96
market adjustment	Δ (-1)*nominal compensation rate	**-0.396**** (0.195)					
	Δ (-1)*unit labour costs		0.001 (0.002)				
	Δ productivity			-0.000 (0.004)			
	Δ labour capital substitution				-0.011 (0.012)		
	Δ FDI					0.001 (0.001)	
	Δ RCA						-0.001 (0.000)
structural reforms	Δ (-1)*structural unemployment	**0.047*** (0.028)	**0.038*** (0.020)	**0.054***** (0.016)	**0.045**** (0.018)	**0.080*** (0.043)	0.013 (0.018)
interaction term	(market adjustment* structural reforms)	-0.333 (0.343)	-0.002 (0.002)	-0.001 (0.005)	-0.016 (0.015)	0.003 (0.004)	0.001 (0.001)
macro variables	Δ trade balance (t-1)	**-0.171**** (0.070)	**-0.178**** (0.076)	**-0.176**** (0.069)	**-0.195***** (0.071)	**-0.214***** (0.074)	**-0.237***** (0.071)
	trade balance (t-1)	0.017 (0.014)	**0.023*** (0.014)	0.020 (0.012)	**0.023*** (0.013)	0.012 (0.020)	**0.055***** (0.016)
	Δ private consumption	**-0.019***** (0.003)	**-0.017***** (0.004)	**-0.017***** (0.004)	**-0.016***** (0.004)	**-0.014***** (0.004)	**-0.016***** (0.004)
	Δ export prices	**0.006**** (0.002)	**0.008***** (0.002)	**0.007***** (0.002)	**0.007***** (0.002)	**0.009**** (0.003)	**0.005**** (0.002)
	Δ GDP per capita	**0.005*** (0.003)	**0.006*** (0.003)	0.004 (0.003)	0.004 (0.003)	0.005 (0.005)	**0.006**** (0.003)
	EMU dummy	-0.015 (0.013)	-0.016 (0.012)	-0.015 (0.012)	-0.015 (0.011)	**-0.051**** (0.020)	-0.009 (0.009)
	constant	0.009 (0.010)	0.010 (0.009)	0.009 (0.009)	0.006 (0.008)	**0.037**** (0.187)	0.008 (0.007)
model specification	N	1643	1720	1720	1720	1396	1502
	instruments	34	34	34	34	34	34
	AR (2)	0.730	0.697	0.711	0.607	0.164	0.471
	Hansen (p-value)	0.316	0.403	0.502	0.307	0.060	0.725

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

2.5 Economic policy implications

This paper has assessed the adjustment process in the euro area in the light of rising intra-euro area current account balances. For this purpose, we investigated in particular the impact of structural reforms and private market adjustment on intra-euro area balances. Our estimation results for euro area countries confirm only in some cases a small significant impact of private market adjustment on bilateral trade balances. In contrast, structural reforms overall tend to improve intra-euro area current accounts, with labour market flexibility turning out to be a crucial determinant in this process. Hence, we clearly confirm the empirical results of Kennedy and Sløk (2005) as well as Bertola and Lo Prete (2009) for the euro area and have to reject the hypothesis that structural reforms will first lead to a worsening of the current accounts balance. We also find substitutive relationships among market adjustment and structural reforms. The latter imply that, without structural reforms, private market adjustment such as relative wage cuts is necessary to improve current accounts. However, there is some evidence that in euro area countries the effectiveness of structural reforms to foster the

adjustment of current accounts has diminished since the start of EMU.

Overall, thus, our empirical results strongly support the potential benefits of structural labour market reforms in countries with large intra-euro area current account deficits. Referring to our empirical results, we therefore tend to join Gros (2009) and Gros et al. (2005) and argue in contrast to de Grauwe (2009c,d) that the only way out of the dilemma is to stick to the reform path already taken by the stronger reformer countries as, e.g. Germany, within the euro area. It is apparent that Germany is the country least affected by the crisis in Europe. The German export led model might not have prevented (possibly only temporarily) a sharp fall in GDP, but it seems to have provided a much more stable background for its consumers and workers than the housing bubble led economies of, for instance, Greece, Portugal and Spain. Obviously, the countries suffering most durably from the financial and economic crisis are those which relied too much on private and public debt in order to stimulate domestic demand. But, as the recent experience with Greece has clearly shown, the chickens come home to roost and those countries are presented the bill which, however, most probably will be passed on to other EU countries as well. Hence, re-gaining competitiveness is certainly no zero-sum game for Europe, especially with an eye on sound public finances, technological progress, innovation and general competitiveness vis-á-vis the rest of the world (Borbély, 2006).

Given the substantial intra-euro area current account imbalances, reforms should be implemented as soon and steady as possible. The necessary adjustment process will be painful but then pass through to a timely economic recovery and less long-term unemployment. The alternative would be a long-lasting period of high and painful unemployment as experienced by Germany after its reunification. In this context, reform pressure and enacting reforms are unlikely to lead to a race to the bottom with respect to wage cuts, leading to a deflationary spiral. Instead, intra-euro area current account balances would diminish and the international competitiveness of Europe as a whole would rise, as the competition among wage setters and politicians is reinforced. This in turn could also strengthen, for instance, the role of the euro as a reserve currency vis-á-vis the dollar. Moreover, this scenario neither calls for further steps towards political union nor for a coordination or centralization of wage policies at a supranational level. Finally, it clarifies that any notion of a European Economic Government should

include the fight against euro area internal imbalances and to go for fiscal consolidation. Political union which turns to be a transfer union would be counter-productive - not least because in this case, the former hard-currency countries would finally leave the euro area.

Sustaining wage rigidities in under-performing euro area countries in order to stimulate domestic demand would not prevent these countries from turning into deflation. Instead, it would finally lead to lower domestic demand and higher current account balances within the euro area by destroying domestic employment. This, in turn, is likely to strengthen economic nationalism and therefore the likelihood of a break-up of the euro area. The recent example of Greece is highly illuminating in this respect. Hence, in order to safeguard the European integration process, we should believe in markets (again) and put the emphasis of our political efforts on shaping incentives to enact structural reforms.

Appendix - Data Sources

Table 16: Data availability and data sources

Data	**Source**
FDI	IMF, IFS.
GDP	OECD, Economic Outlook Database and IMF, World Economic Outlook Database.
GDP per capita	IMF, World Economic Outlook Database.
INV	OECD, Economic Outlook Database.
labour-capital substitution	European Commission, AMECO Database.
structural unemployment	European Commission, AMECO Database.
nominal compensation rate	OECD, Economic Outlook Database.
private consumption	OECD, Economic Outlook Database.
productivity	OECD, Economic Outlook Database.
social benefits	OECD, Economic Outlook Database.
bilateral trade balances, trade data for RCA	OECD, ITCS International Trade by Commodities Statistics, Rev. 3, Vol. 2007 Release 1.
export price inflation	OECD, Economic Outlook Database.

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Working Shares

Holger Zemanek:

- Research idea (jointly)
- Drafting of the paper
- Review of literature
- Theoretical argumentation (Sections 2.2 and 2.3)
- Empirical analysis and data mining (Section 2.4)
- Writing and editing of the paper

Ansgar Belke:

- Research idea (jointly)
- Ideas to improve the empirical analysis (Section 2.4)
- Editing of the paper
- Revision of implications (Section 2.5)

Gunther Schnabl:

- Research idea (jointly)
- Editing of the paper
- Revision of implications (Section 2.5)

A signed version has been submitted to Universität Leipzig, Wirtschaftswissenschaftliche Fakultät.

Chapter 3

Asymmetric International Risk Sharing and Labour Market Flexibility in the Euro Area

Abstract This paper analyses the implications of diverging intra-euro area current account balances on consumption smoothing via the capital markets in the euro area. It can be shown that the asymmetry in foreign asset and liability holdings increases consumption volatility, in particular in net debtor countries, compared to a symmetric case. A panel econometric analysis for the euro area confirms this hypothesis. Hence, income and consumption stabilization via the capital market is limited in the euro area. This implies that more labour market deregulation is necessary in the euro area in order to facilitate a labour market based adjustment of prices and wages in the face of asymmetric shocks.

3.1 Introduction

Labour market flexibility is essential in a monetary union that real exchange rates can realign after an asymmetric shock (Mundell, 1961). According to Mundell (1973) and Belke and Baumgärtner (2002) capital markets and fiscal policy can substitute for labour market flexibility and mitigate income and consumption volatility in the face of an asymmetric shock. As labour markets have remained rigid in the euro area (European Commission, 2008, 2010, Zemanek, 2010) and fiscal policy is constrained by high public deficits and debt levels, the euro area seems to have to rely mainly on macroeconomic stabilization via capital markets, the so-called international (financial)

risk sharing (European Commission, 2008).[31]

In the last decade, persistent unidirectional intra-euro area capital flows from northern European countries to southern European countries have led to an accumulation of foreign assets in the saving surplus countries, in particular in Germany. In contrast, Greece, Portugal and Spain accumulated large stocks of foreign liabilities. This asymmetric foreign asset and liability distribution created an asymmetric international risk sharing pattern, where only few euro area countries benefit from international risk sharing (while others have to pay for it). The aim of this paper is to shed theoretically and empirically light on asymmetric international risk sharing pattern in the financial markets of the euro area.

International risk sharing via financial markets was first proposed by Mundell (1973) as an automatic stabilization mechanism in a monetary union. Mundell (1973) argued that a monetary union would accelerate capital market integration by stimulating international cross-border capital asset holdings. Portfolio diversification provides a risk sharing mechanism between countries as income and consumption effects of an asymmetric shock or adverse business cycles are compensated by alternating foreign and domestic capital income and capital valuation. Consumption in the participating countries is smoothed over time.

To allow for an equal consumption smoothing in countries of a monetary union, the approach implicitly assumes a symmetric distribution of cross-border assets and liabilities. However, in contemporary Europe the German stock of net foreign assets and the large stocks of net foreign liabilities in southern Europe question the assumption of the textbook risk sharing via financial markets. Therefore, we augment the international risk sharing approach by an asymmetric foreign asset and liability distribution, which is an important innovation for the literature on international risk sharing.

Our empirical analysis follows the literature testing for international risk sharing. Atkeson and Bayoumi (1993) as well as Melitz and Zumer (1999) have tested international risk sharing within the US and between OECD countries to draw implications for the

[31]Following the literature, we use the term international risk sharing as a synonym for business cycle stabilization via capital markets (Sørensen et al., 2007, Kose et al., 2007).

European Monetary Union (EMU). Later research on international risk sharing has analysed its determinants, such as financial globalisation (Sørensen et al., 2007, Kose et al., 2007, Stavrev, 2007, Demyanyk et al., 2008). We show that an asymmetric foreign asset and liability distribution reduces the degree of international risk sharing in the euro area, in particular for countries with large net foreign liabilities.

3.2 Capital flows and asymmetric foreign assets and liability distribution in the euro area

3.2.1 Intra-euro area capital flows

While Germany has experienced rising current account surpluses against euro area countries since the introduction of the euro up to the recent crisis, other countries such as Greece, Spain, Italy and Portugal have perpetuated large current account deficits (European Commission, 2010, Zemanek et al., 2010). Divergent current account balances within the euro area reflect private intra-euro area capital flows from surplus countries to deficit countries. Blanchard and Giavazzi (2002) labelled intra-euro area capital flows 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.

The European integration process can be seen as one main driver of rising intra-euro area asset and liability positions. Spain, Italy, Greece and Portugal have taken advantage of improved access to the European financial market following the creation of EMU. The expected rate of return for investments increased in these countries while short-term and long-term interest rates converged towards low German rates since the mid 1990s (Fagan and Gaspar, 2007, Mendoza et al., 2007). Macroeconomic conditions in southern Europe improved due to EMU economic convergence rules and the abolition of exchange rate risk for lenders and borrowers. Borrowing constraints declined as a result of financial deepening and accelerating intra-euro area capital flows (de Santis and Lührmann, 2006).

Differences in real GDP growth between euro area countries enhanced intra-euro area capital flows (de Santis and Lührmann, 2006). Whereas the average annual real GDP

growth rate for the years 1999-2008 was 1.5 percent for Germany, Spain grew on average by 3.5 percent, Greece by almost 4 percent and Ireland by 5.5 percent. Modigliani (1970) argued that private saving rises with growing income suggesting rising capital outflows from a country with high GDP growth, such as Spain or Ireland. However, in line with the theories of Tobin (1967) and Summers (1981), Spanish and Irish citizen might have anticipated or expected continuing future income growth and therefore have increased present consumption and investment in exchange for future income. High relative GDP growth then goes along with capital inflows to finance present consumption and investment, as observed for capital flows from Germany to Greece or Spain.

Finally, intra-euro area capital flows have been accelerated by the common monetary policy (Schnabl and Zemanek, 2011). Fuelled by ECB interest rate cuts, buoyant capital inflows and excessive credit growth in the private sector fuelled housing and construction booms in Spain and Ireland and consumption booms in Greece and Portugal (European Commission, 2010). For instance, wage growth in the construction sector exceeded productivity gains by far in Portugal, Spain, Ireland, Greece and France (Zemanek, 2010). Wage increases in the service sector, strongly rising public sector wages and pro-cyclical fiscal policy boosted national inflation in these countries above the euro area average. In contrast, Germany and other euro area saving surplus countries experienced low inflation rates which held average euro area inflation close to the ECB's target value of two percent. 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). In addition, interest rate cuts beyond the natural rate increased credit growth (Hoffmann and Schnabl, 2011).

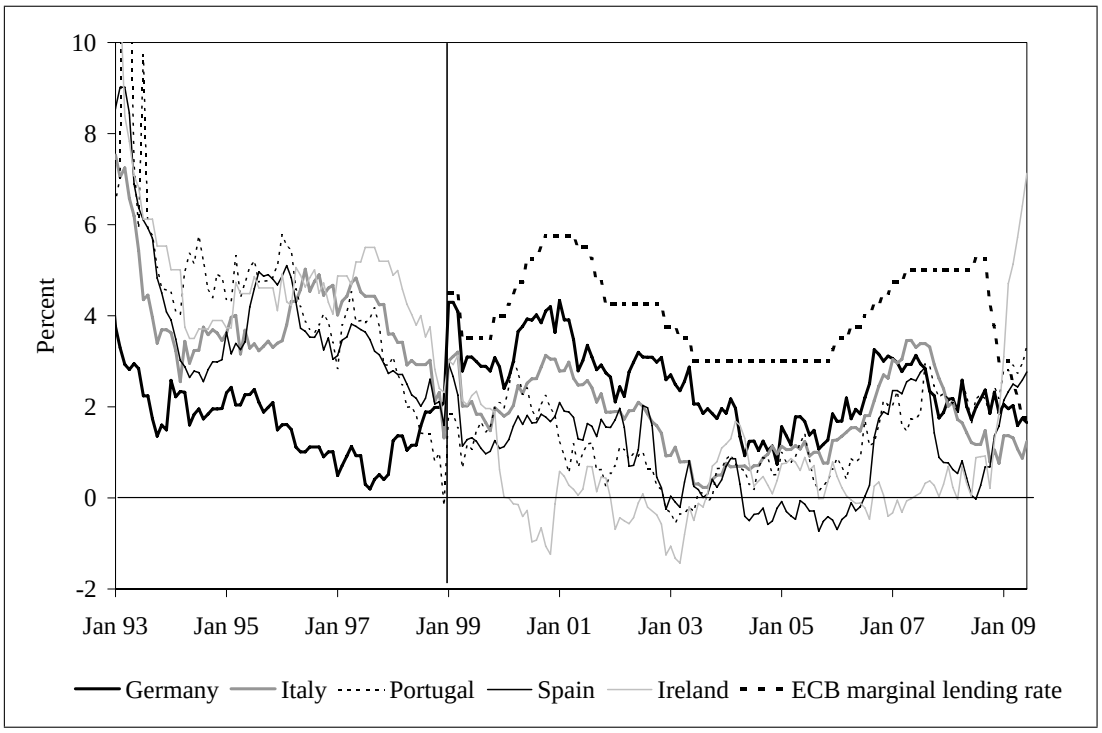
The development of (ex-post[32]) real interest rates of euro area countries and the ECB marginal lending rate are shown in Figure 11.[33] Germany, which had had the lowest real interest rates of euro area countries before 1999, has exhibited high real interest rates relatively to other euro area countries since the start of the EMU in 1999. In contrast, countries with high real interest rates before 1999 saw a strong decline, such as Spain, Ireland, Portugal, and Italy. Given a negative relationship between real in-

[32]Ex-post real interest rates are calculated based on realized CPI inflation rates. In contrast, ex-ante real interest rates are calculated based on inflation expectations.

[33]To keep the figure clear, only major contributing countries are selected.

terest rates and growth, the common monetary policy triggered asymmetric business cycles in the euro area. Germany became the "sick man of Europe" during the early years of EMU, while Ireland, Portugal, Spain, Italy, Greece and France experienced significant higher real GDP growth, prolonging unidirectional intra-euro area capital flows. That becomes visible in Figure 12, which shows the divergence of intra-euro area trade account balances.[34]

Figure 11: Ex-post real interest rates of Germany, Italy, Ireland, Portugal and Spain



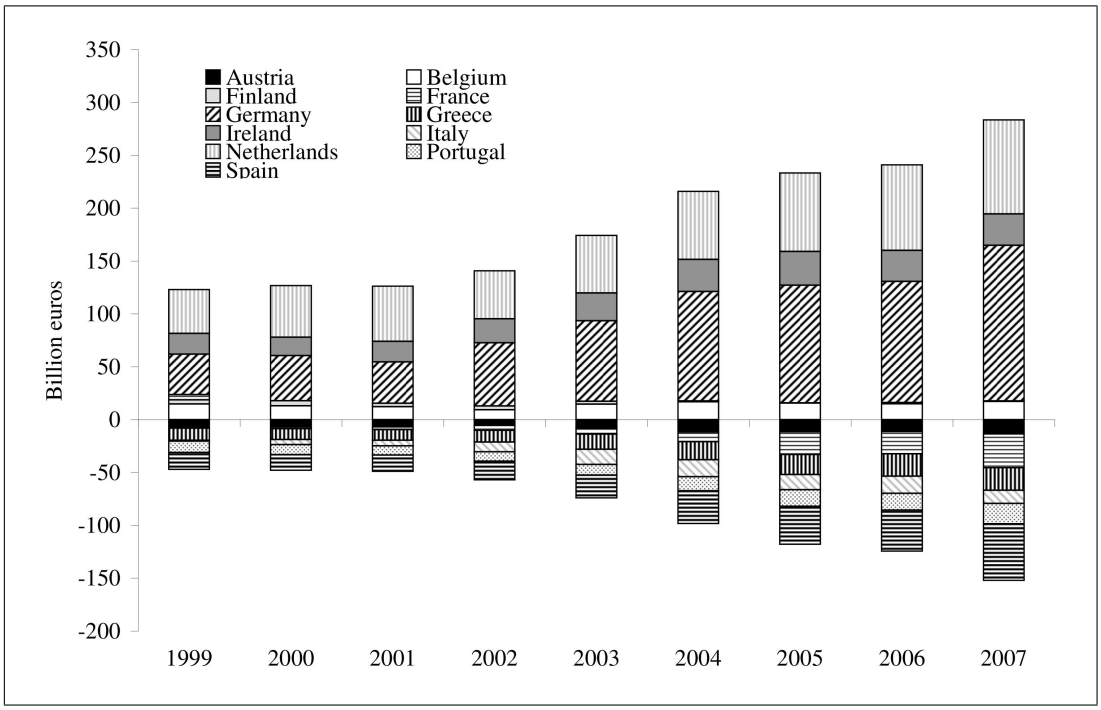
Source: International Monetary Fund, 2009

3.2.2 Asymmetric foreign asset and liability distribution in the euro area

After a decade of unidirectional capital flows, the result has been not only the divergence of intra-euro area current account balances, but also an uneven distribution of net foreign asset and foreign liability positions in the euro area. Capital exporting countries, in particular Germany, have built up large net foreign assets or reduced their net foreign liabilities (such as Finland). In contrast, Greece, Portugal, Spain, Italy, Ireland, and France have substantially increased net foreign debt. This becomes evident

[34]Figure 12 shows bilateral trade balances, as bilateral data are not available for current accounts or financial accounts.

Figure 12: Intra-euro area trade account balances



Source: IMF, Direction of Trade Statistics

in Table 17 which shows the net international investment positions (IIP) in percent of GDP for the EMU 12 countries since 1998. Germany, the Netherlands and Finland are those countries, which have seen a significant rise of their net IIP since 1998, with Germany, Netherlands and Luxembourg having relatively large net asset positions.

Although data on IIP include investment in and from countries other than EMU 12 countries, they provide first evidence for an asymmetric foreign asset and liability distribution in the euro area.[35] Data on foreign bank claims by the Bank for International Settlement[36] confirm an asymmetric foreign asset and liability distribution. Figure 13 shows net outstanding liabilities of Spanish banks in Germany in relation to Spanish GDP. Until 2004, net liabilities remained relatively stable. However, since then, German banks have intensively accumulated claims in Spain, outrunning claims of Spanish Banks in Germany. The outbreak of the financial crisis in 2007 stopped and reversed the trend. This asymmetric distribution of foreign assets and liabilities across the euro area has affected the ability of the euro area to absorb asymmetric shocks.

[35]Data on IIP against single countries are not available.

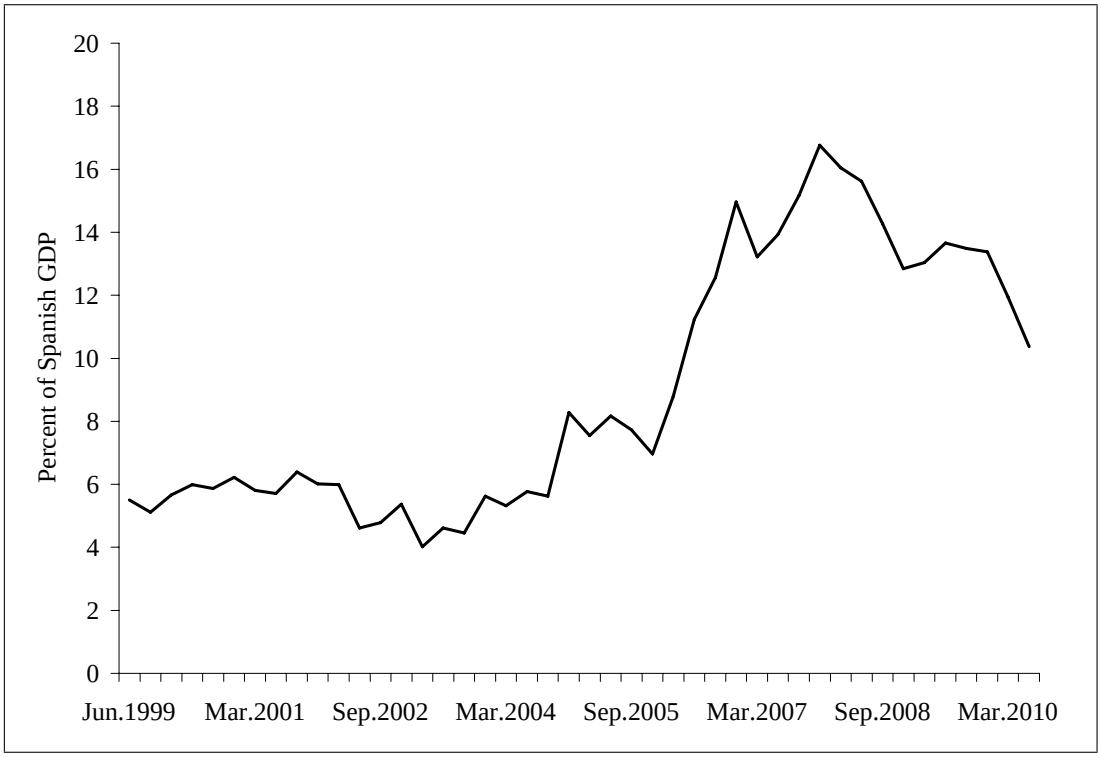
[36]BIS Quarterly Review, Table 9B: Consolidated foreign claims of reporting banks - immediate borrower basis, December 2010. Data on ultimate risk basis are only available from 2005.

Table 17: Net international investment position in percent of GDP of EMU 12 countries

	1998	2002	2008	Δ 1998-2008*
Austria	-19.6	-21.1	-14.4	5.2
Belgium	38.7	41.3	31.4	-7.3
Finland	-76.9	-40.6	-4.1	72.7
France	9.0	3.0	-18.1	-27.1
Germany	0.4	5.6	25.3	24.9
Greece	-26.9	-58.8	-69.7	-42.8
Ireland		-20.0	-54.1	-34.1
Italy	-1.6	-5.9	-20.2	-18.6
Luxembourg		79.1	75.0	-4.1
Netherlands	-3.8	-27.0	10.5	14.3
Portugal	-25.0	-62.5	-91.9	-67.0
Spain	-21.6	-46.8	-75.7	-54.1

Source: Datastream, 2010. Note: * Percentage points, difference for Ireland and Luxembourg 2002-2008. The euro countries Cyprus, Malta, Slovakia, Slovenia and Estonia are not considered as they are EMU members for a too short time period.

Figure 13: Net outstanding liabilities of Spanish banks in Germany



Source: Bank for International Settlement, IMF. Note: Net figures are calculated by claims of German banks in Spain minus claims of Spanish banks in Germany.

3.3 Asymmetric international risk sharing in the euro area

3.3.1 Shock adjustment in a monetary union and international risk sharing

The fixation of nominal exchange rates and a common monetary policy in a monetary union shift the burden of adjustment to asymmetric shocks or economic development to the real exchange rate. In this process the adjustment channel is the labour market as Mundell (1961) put forward in his seminal paper on optimum currency areas. Mundell (1961) argued that labour markets need to be flexible in a monetary union to assure that wages and prices can adjust and real exchange rates align in the case of an asymmetric shock. First, wages can be the adjustment channel. In a country which is affected by a negative asymmetric demand shock and rising unemployment, wages need to decrease to lower the price level. This is ceteris paribus equivalent to a real depreciation against all other countries of the monetary union. Additionally, rising wages in the country affected by the positive asymmetric shock contribute to a real exchange rate appreciation, which moderates the boom.

Second, labour force can migrate from a country affected by a negative asymmetric shock to the booming economy with labour shortage. That would increase labour supply in the booming country while labour supply in the recession country falls. This process re-equilibrates the labour markets in both countries. The respective adjustment of wages fosters a business cycle convergence. However, labour market flexibility, i.e. (downward) wage flexibility and labour mobility, remains low in Europe (Bayoumi and Eichengreen, 1992, European Commission, 2008, 2010). Thus, euro area labour markets and euro area real exchange rates cannot properly readjust in the case of asymmetric shocks. This poses the question concerning alternative stabilizing mechanisms to smooth income and consumption over time in the presence of asymmetric shocks or idiosynchratic business cycles.

First, fiscal policy can compensate for reduced (increased) private spending by more (less) public spending in a recession (boom) (Belke and Baumgärtner, 2002, von Hagen and Wyplosz, 2008). Fiscal policy could be organized either on national or suprana-

tional level (see Chapter 4). A supra-national fiscal policy would lead to an quasi-automatic business cycle smoothing. However, the competence for fiscal policy has remained with national governments in the euro area (European Commission, 1993) and high public deficits and public debt levels after the crisis limit the scope for expansive fiscal policy in the face of recession. Therefore, the use of fiscal policies to counterbalance asymmetric shocks is constrained in the euro area.

Intra-industry trade can be a second (automatic) stabilization mechanism. Given strong intra-industry trade linkages, booming countries import additional consumption and investment goods from the recession country where domestic demand is low and spare capacities are available. Rising exports compensate for declining domestic demand. In fact, buoyant German exports contributed to German growth and compensated for low domestic investment and consumption prior to the crisis. However, differences in product specialisation or technology or aspects of non-price competitiveness such as different product quality question the capacity of intra-industry trade to absorb asymmetric shocks in the euro area (European Central Bank, 2005, Baumann and di Mauro, 2007).[37]

A third stabilizing mechanism can be capital markets within a monetary union as discussed by Mundell (1973) in his late research on optimum currency areas. Mundell argued that cross-country capital asset holdings[38] will increase in a monetary union, supported by capital market integration, as the devaluation risk of nominal exchanges rates disappears (McKinnon, 2000). If each country is holding claims on output of all other members of a monetary union, asymmetric shocks or adverse business cycles will be commonly shared by anti-cyclically fluctuating capital income and capital valuation. Income effects of asymmetric shocks and adverse business cycles are mitigated and consumption is smoothed over time in all countries of a monetary union.

In general, this international risk sharing mechanism by Mundell (1973) has two channels through which consumption is smoothed in the case of an asymmetric shock. First, investment income is a direct channel. Dividends or profits surge in a boom, while they

[37] In the context of international trade, the role of multi-national corporations may affect the risk-sharing effects, as intra-firm trade accounts for an increasing share of international trade (OECD, 2010).

[38] Capital assets are bonds, equities, real estates as well as bank credit.

shrink in a recession. In a boom (recession), a country has to pay more (less) dividends on its foreign liabilities, but receives less (more) investment income from its investments in the recession (boom) country. Second, capital valuations are an indirect income distribution channel. In a boom (recession), equity, bond and real estate prices rise (fall) in their value. An investor's portfolio with domestic and foreign assets will not change in value if rising (falling) prices of foreign assets compensate falling (rising) prices of domestic assets. The wealth effect of business cycle fluctuations on consumption is smoothed over time.

The concept of consumption smoothing can be visualised by a numerical example. We assume a monetary union of two countries which are of equal size, called Spain and Germany with the same initial output of 100 units. Both countries hold foreign assets of each other at the value of 200 percent of the respective other country's output. Thus, foreign assets are each 200 units worth. The annual interest rate of these assets is assumed to be 10 percent. If there is no asymmetric shock or adverse business cycle, net investment income, payable (20 units) and receivable (20 units), cancel out in both countries. If we assume that consumption consists of output and net investment income, consumption will be 100 in each country.

Now, we assume adverse business cycles. In the case of a recession in Spain (output falls to 98), while Germany is in a boom (output rises to 102), Spanish assets in Germany will rise in value and profits are supposed to rise. German assets in Spain are devalued and profits decline. For simplicity, we assume that the value of foreign assets changes by the same rate as the output in the country where they are invested. The interest rate is assumed to remain constant. Therefore, Germany will only receive an investment income of 19.6 units on its assets of 196 units in Spain and Spain will get an investment income of 20.4 units on its assets of 204 units invested in Germany.

Net investment income of Germany becomes negative, as it pays net 0.8 units to Spain. Therefore, German consumption is only 101.2 (output 102 minus 0.8) compared to its output of 102. In contrast, Spanish consumption of 98.8 is larger than its current output of 98 due to its net investment income of 0.8 units. Germany implicitly transfers some of its additional income in the boom to Spain. In contrast, Germany would re-

ceive net investment income, if we assume a reversed business cycle situation.

The consumption smoothing effect of a symmetric international risk sharing, where both countries hold the same share of foreign assets (net foreign assets are zero), is equal for both countries. While, in our example, output fluctuates by 4 units between boom (102) and recession (98), consumption in both countries alternates only 2.4 units (98.8 - 101.2). The relative output volatility is 4 percent of trend output (100) while consumption volatility is only 2.4 percent of trend consumption (100). Thus, symmetric international risk sharing reduces the impact of asymmetric output shocks as well as unsynchronized business cycles, at least partly, and smoothes consumption over time. Table 18 summarizes the results for a symmetric international risk sharing. Absolute volatility indicates the change of output or consumption over the business cycle in units, while relative volatility gives the change relative to the trend.

Table 18: Symmetric international risk sharing, numerical example

	Output	**Consumption**	
		Spain	Germany
Boom	102	101.2	101.2
Recession	98	98.8	98.8
Absolute volatility	4	2.4	2.4
Relative volatility (% of trend)	4%	2.4%	2.4%

Note: Germany and Spain hold assets of each other, worth 200 percent of GDP. Annual yield is assumed to be 10 percent. Values are units of GDP or consumption, if not labeled otherwise.

This international risk sharing argument was one argument in favour of the monetary union in Europe during the discussion prior to EMU (European Commission, 1990). It advocated the optimistic view that EMU would lead to more integration in the euro area capital markets, which would endogenously reduce the negative effects of adverse business cycles or asymmetric shocks (European Commission, 1990, Frankel and Rose, 1998). This argument has also been put forward by the European Commission at the beginning of the current crisis (European Commission, 2008).

3.3.2 Asymmetric international risk sharing

The textbook case of international risk sharing by Mundell (1973) implicitly assumes a symmetric cross-country holding of financial assets. However, as we have shown in

section 3.2.2, intra-euro area capital flows have led to a substantial asymmetry in foreign asset and liability distribution. Thus, international risk sharing in the EMU has become asymmetric.

To analyse the effects of asymmetric international risk sharing, we set up a model of consumption smoothing for a two-country monetary union with variable shares of foreign assets. Business cycles of both countries are assumed to be perfectly adverse. Consumption in both countries (which are indicated by subscript 1 and 2) is based on output Y and net investment income, only. We abstract from long-term output growth and saving. During a boom (denoted by superscript B), output will increase by $Y^B - Y^0$ above the trend (denoted by superscript 0) and falls in a recession (denoted by superscript R) by $Y^0 - Y^R$ below trend output. If both countries have foreign assets, the international risk sharing mechanism will distribute output between both countries. First, each country has capital income from its foreign assets in the other country. Capital income depends on yield r and the size of its foreign assets, measured as share a of foreign output with $a > 0$. For instance, capital income for country 1 is ra_1Y_2. Second, countries have to pay interest on foreign liabilities, which for country 1 is equivalent to ra_2Y_1. Therefore, consumption C in country 1 in a boom can be expressed in our simplified model as:

$$C_1^B = Y_1^0 + \left(Y_1^B - Y_1^0\right) + a_1 r Y_2^R - a_2 r Y_1^B \tag{20}$$

and in a recession:

$$C_1^R = Y_1^0 + \left(Y_1^R - Y_1^0\right) + a_1 r Y_2^B - a_2 r Y_1^R \tag{21}$$

Assuming r to be equal over the business cycle simplifies the model without changing the interpretation.

We calculate the consumption volatility over the business cycle relative to trend consumption $\frac{C^B - C^R}{C^0} = \frac{\Delta C^{B-R}}{C^0}$ to analyse the consumption smoothing effect based on equations (20 and 21) which yields for country 1:

$$\frac{\Delta C_1^{B-R}}{C_1^0} = \frac{\left[\left(Y_1^0 + \left(Y_1^B - Y_1^0\right) + a_1 r Y_2^R - a_2 r Y_1^B\right) - \left(Y_1^0 + \left(Y_1^R - Y_1^0\right) + a_1 r Y_2^B - a_2 r Y_1^R\right)\right]}{Y_1^0 + a_1 r Y_2^0 - a_2 r Y_1^0} \tag{22}$$

Assuming for simplicity that both countries have the same size and business cycles ($Y_1^B = Y_2^B$, $Y_1^R = Y_2^R$, $Y_1^0 = Y_2^0$), and setting $Y_1^B - Y_1^R = x$, equation (22) reduces to:

$$\frac{\Delta C_1^{B-R}}{C_1^0} = \frac{x - xr\left(a_1 + a_2\right)}{Y_1^0 + Y_1^0 r\left(a_1 - a_2\right)} \tag{23}$$

For country 2, the equation is equivalent. In equation (23) the first part of the nominator (x) is the absolute domestic income volatility over the business cycle. The second part $rx\left(a_1 + a_2\right)$ is the redistribution of output between both countries due to international risk sharing. The difference between the absolute domestic income volatility and the redistribution due to changing capital income is the absolute consumption volatility over the business cycle. Relative consumption volatility, as stated in the equation (23) depends positively on output variation x, negatively on output variation relative to trend output x/Y^0, and negatively on the asset yield r. Increasing shares of foreign asset holdings a_1 and a_2 reduce relative consumption volatility, and therefore, increase consumption smoothing.

However, the effects of a_1 and a_2 on consumption smoothing are different, depending on the type of the international investment position. This can be shown by calculating the first derivations of $\frac{\Delta C_1^{B-R}}{C_1^0}$ and $\frac{\Delta C_2^{B-R}}{C_2^0}$ with respect to a_1. The first derivation shows the effect of a change in country 1's own stock of foreign assets on its consumption smoothing. The derivation of $\frac{\Delta C_2^{B-R}}{C_2^0}$ with respect to a_1 reveals the effects on consumption smoothing in country 2 if country 1 changes its share of foreign assets in country 2's output (a_1). For $Y_1^0 = Y_2^0$ it holds that:

$$\frac{\delta\left(\frac{\Delta C_1^{B-R}}{C_1^0}\right)}{\delta a_1} < \frac{\delta\left(\frac{\Delta C_2^{B-R}}{C_2^0}\right)}{\delta a_1} \tag{24}$$

as

$$-\frac{4rx + r\left(4a_2 rx\right)}{\left(1 - a_1 r - a_2 r\right)^2 Y_1^0} < -\frac{r\left(4a_2 rx\right)}{\left(1 - a_1 r - a_2 r\right)^2 Y_2^0} \tag{25}$$

Equation (25) shows that a build-up of net foreign liabilities in either country 1 or country 2, thus a decrease of either a_1 or a_2 away from equality, reduces consumption smoothing in country 1 and country 2. The size of the effect on each country is different and depends which country has net foreign liabilities as the derivations in equation (25) are different. For example Spain, country 1, reduces its stock of foreign assets in Ger-

many (country 2) whose stock remains constant. Thus, a_1 falls below a_2 constituting a net liability position for Spain and a net asset position for Germany. International risk sharing between both countries becomes asymmetric. Given equation (25), Spanish and German consumption volatility will increase compared to symmetric risk sharing – consumption smoothing is reduced. The reason is the reduced net investment income. However, Spanish consumption smoothing will be more reduced relatively to Germany as Spanish consumption reduces due to a net investment payment to Germany at every stage of the business cycle. Spanish consumption will become relatively more volatile than German consumption.

That relationship is displayed in Figure 14, which shows the graphical solution of equation (23) by using the same values as used for the symmetric example of Table 18: $Y = 100$, $r = 0.1$ and $Y^B - Y^R = x = 2$. The y-axis shows the relative consumption volatility depending on the share of foreign asset holdings of country 1 in country 2 (a_1) at the x-axis and assuming a fixed foreign asset holding of country 2 in country 1 (a_2). The dashed line shows relative consumption volatility for country 1 (CV1) dependent on a_1, given $a_2 = 2$ (IIP of country 2 is 200 percent); the solid line shows relative consumption volatility for country 2 (CV2) dependent on a_1, given $a_2 = 2$. In the case of symmetric international risk sharing with a_1 and a_2 being 2 (both countries have an equal share of foreign assets of 200 percent of foreign output, thus net IIP=0), relative consumption alternates by 2.4 percent in both countries over the business cycle (point A), although output fluctuates by 4 percent. Consumption is smoothed to the same degree in both countries as in Table 18.

However, if country 1 (Spain) has a share of foreign assets of only 50 percent, consumption in country 2 (Germany) will slightly more alternate by 2.6 percent over the business cycle (point B), compared to the symmetric case. In contrast, Spain's consumption volatility increases to 3.5 percent (point C), which is close to an output variation of 4 percent. Table 19 summarizes the results for the asymmetric example. Overall, asymmetric international risk sharing reduces consumption smoothing in all countries of a monetary union compared to a symmetric case. However, consumption volatility in countries with net foreign liabilities rises in particular. At the current distribution of foreign assets and liabilities as shown in Table 17, Germany is expected to benefit more from international risk sharing with less volatile consumption than

southern European countries with high foreign liabilities.

Figure 14: Graphical solution of asymmetric international risk sharing

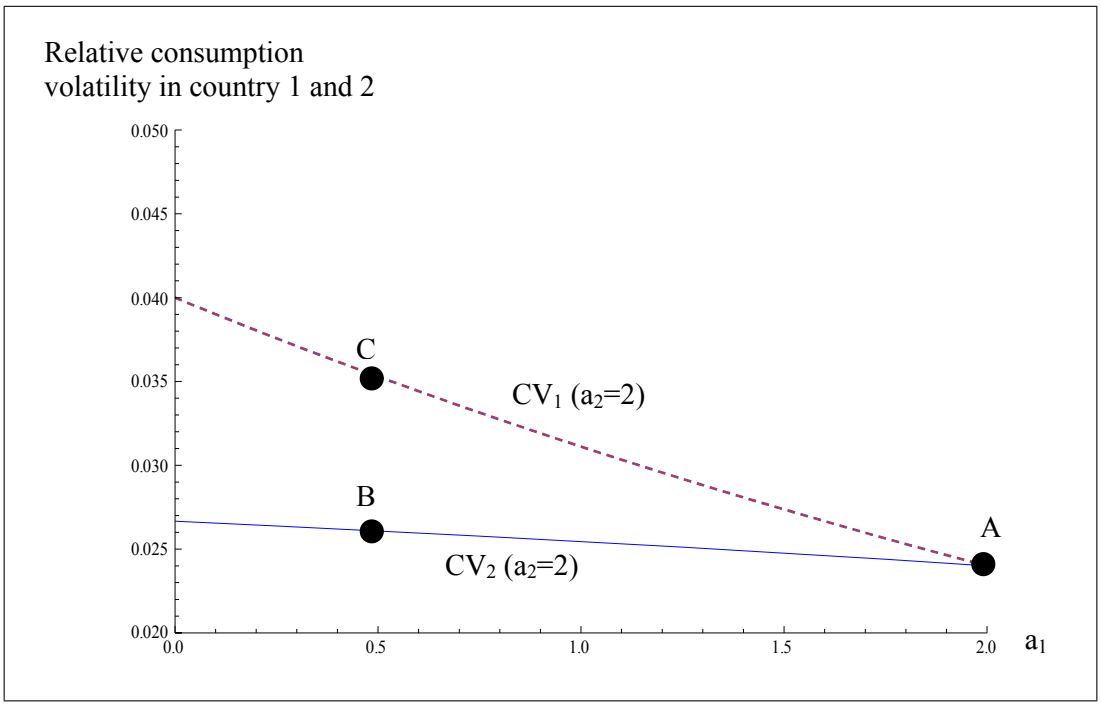


Table 19: Asymmetric international risk sharing, numerical example

	Output	**Consumption**	
		Spain	Germany
Boom	102	86.5	116.5
Recession	98	83.5	113.5
Absolute volatility	4	3	3
Relative volatility (% of trend)	4%	3.5%	2.6%

Note: Germany holds Spanish assets worth 200 percent of Spanish GDP. Spain holds German assets worth 50 percent of German GDP. Annual yield is assumed to be 10 percent. Values are units of GDP or consumption, if not labelled otherwise.

3.4 Empirical analysis

Based on our analysis in section 3.3, we test the empirical significance of asymmetric international risk sharing and its effect on consumption smoothing in a panel econometric framework for the euro area. In this context, we test the following three hypotheses:

Hypothesis 1 Consumption smoothing differs significantly between euro area countries, revealing that international risk sharing is asymmetric in the euro area.

Hypothesis 2 The foreign asset and liability distribution determines asymmetric international risk sharing in the euro area.

Hypothesis 3 Asymmetric international risk sharing reduces overall euro area consumption smoothing compared to a symmetric case.

3.4.1 Model and data

The empirical analysis follows Sørensen et al. (2007), Kose et al. (2007) and Stavrev (2007). International risk sharing is measured by the correlation of GDP growth and consumption growth of a single country relative to the euro area. The idea is to analyse how a deviation of a country's GDP growth from the average GDP growth of the euro area systematically affects the deviation of consumption growth relative to the euro area. This can be shown in the following baseline estimation relationship:

$$\left(\Delta C_{i,t} - \Delta C_t^{EMU}\right) = \beta \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) \tag{26}$$

$\Delta C_{i,t}$ is the consumption per capita growth rate, $\Delta Y_{i,t}$ is GDP per capita growth rate for a specific country i in time t.[39] The superscript EMU indicates euro area consumption per capita growth or euro area GDP per capita growth, respectively. The Coefficient β models the value of uninsured risk (Sørensen et al., 2007). Uninsured risk is defined as the percentage of GDP volatility which is not be smoothed by international risk sharing. Therefore, the coefficient β measures inversely consumption smoothing. If β is zero, the relative deviations of per capita GDP growth in country i $(\Delta Y_{i,t} - \Delta Y_t^{EMU})$ will not systematically affect relative per capita consumption growth $(\Delta C_{i,t} - \Delta C_t^{EMU})$. This case represents perfect consumption smoothing. In reverse, β will be 1 if there is no consumption smoothing via the capital market. Relative deviations of GDP growth are perfectly correlated with relative deviations in consumption growth. Hence, β is expected to be in the range of 0 and 1, depending on the degree of consumption smoothing.

To evaluate *hypothesis one*, that consumption smoothing differs between euro area countries, we estimate the following standard panel estimation equation, with β_{EMU} representing overall uninsured risk for euro area countries, a constant α, country-

[39] $\Delta C_{i,t} = ln\left(C_{i,t}\right) - ln\left(C_{i,t-1}\right)$ and $\Delta Y_{i,t} = ln\left(Y_{i,t}\right) - ln\left(Y_{i,t-1}\right)$

specific fixed effects ρ_i, and the white noise error term $\mu_{i,t}$. The coefficient β_{EMU} indicates average uninsured risk for the euro area:

$$\left(\Delta C_{i,t} - \Delta C_t^{EMU}\right) = \alpha + \beta_{EMU}\left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) + \rho_i + \mu_{i,t} \tag{27}$$

To discriminate between country differences in consumption smoothing, we include a threshold dummy variable D_i. Variable D_i is a country specific dummy for each country i, which is 1 for the specific country i and 0 for all other 11 countries.[40] Following Melitz and Zumer (1999) and Sørensen et al. (2007), we split the coefficient β_{EMU} of equation (27) into a country specific effect and a remaining effect. Thereby, $\beta_{T,i}$, with T defining the threshold dummy approach, is country specific uninsured risk of country i and β_1 is the average uninsured risk of all countries but country i:

$$\beta_{EMU} = \beta_1 + \beta_{T,i} D_i \tag{28}$$

Inserting equation (28) into (27) yields:

$$\begin{aligned}\left(\Delta C_{i,t} - \Delta C_t^{EMU}\right) = \alpha + \beta_1\left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) + \beta_{T,i}\left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) D_i + \\ + \rho_i + \mu_{i,t}\end{aligned} \tag{29}$$

Equation (29) includes the interaction term $\left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) D_i$. The interpretation of coefficients changes (Hardy, 1993, Jaccard and Turrisi, 2003, 81-82), which allows to differentiate between single countries while using the explanatory power of the full data set. The coefficients are interpreted as follows:

- β_1 is the value of uninsured risk if D_i is zero, yielding the average uninsured risk for all countries but country i.
- $\beta_{T,i}$ is the number of units that β_1 changes if D_i becomes one, thus, the value of uninsured risk that a country i differs from the average of all countries but country i.
- The sum $\beta_1 + \beta_{T,i}$ is the uninsured risk for country i.

[40] D_i are similar to the dummy variables related to country specific fixed effects ρ_i. However, while ρ_i captures the country specific fixed effect related to the constant α, D_i indicates the country specific effect on uninsured risk β.

Given that interpretation, we cannot reject our first hypothesis that consumption smoothing differs between euro area countries, if there is a significant coefficient $\beta_{T,i}$ for at least one country.

In a similar way, we test the validity of *hypothesis two* that the foreign asset and liability distribution determines asymmetric international risk sharing in the euro area. As no intra-euro area data on foreign assets and liabilities are available, we use the net international investment position (IIP) in percent of GDP as a proxy for mutual foreign asset and liability distribution within the euro area. We assume that overall uninsured risk β_{EMU} in equation (27) is determined by the net IIP ($IIP_{i,t}$). Therefore, we again separate β_{EMU} in one part, which is affected by the net IIP β_{IIP} and the remaining uninsured risk β_2:

$$\beta_{EMU} = \beta_2 + \beta_{T,i} IIP_{i,t} \tag{30}$$

Inserting equation (30) into (27), the estimation equation becomes:

$$\begin{aligned} \left(\Delta C_{i,t} - \Delta C_t^{EMU}\right) = \alpha + \beta_2 \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) + \\ + \beta_{IIP} \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) IIP_{i,t} + \rho_i + \mu_{i,t} \end{aligned} \tag{31}$$

In this specification, we interact relative GDP growth with the respective net IIP ($IIP_{i,t}$). The interpretation of coefficients changes in a similar way as above (Jaccard and Turrisi, 2003). The coefficient β_2 indicates the value of uninsured risk if the net IIP is zero. This is the level of risk sharing for a hypothetic symmetric foreign asset and liability distribution $IIP_{i,t} = 0$. In contrast, β_{IIP} shows whether risk sharing will be affected by a net IIP unequal zero. According to our analysis in section 3.3, we expect a negative coefficient β_{IIP}. Net foreign liabilities increase uninsured risk, reducing a country's consumption smoothing within the euro area. In contrast, net foreign assets reduce the uninsured risk. As our sample period includes a substantial change of net IIPs over time, the average coefficients β_2 and β_{IIP} for the full time period might bias the interpretation. Therefore, we estimate additional to the full sample (Q1/1996-Q3/2009) several sub-samples. These are a "pre-EMU" sub-sample (Q1/1996-Q4/1999), an EMU sub-sample (Q1/1999-Q3/2009) and two "late-EMU"

sub-samples (Q1/2002-Q3/2009) and (Q1/2004-Q2/2009).

We test the validity of *hypothesis three* that asymmetric risk sharing reduces the overall euro area consumption smoothing compared to a symmetric case by comparing coefficients β of equation (31) and equation (27). While β_2 of equation (31) represents a hypothetic symmetric international risk sharing, β_{EMU} of equation (27) represents the asymmetric case. We test for statistical significance by using a t-test with H0 : $\beta_2 < \beta_{EMU}$. According to our theoretical analysis, we expect that coefficient β_2 (uninsured risk for a symmetric foreign asset/liability distribution) is significantly lower than β_{EMU} (uninsured risk for an asymmetric foreign asset/liability distribution). Additionally, we recursively estimate β_2 and β_{EMU} over time and present their development over time to provide a dynamic picture of consumption smoothing in the euro area.

The empirical analysis is based on a panel of quarterly data for twelve euro area countries.[41] Our data set covers the period from Q1/1996 to Q3/2009. We exclude Cyprus, Malta, Slovakia, Slovenia and Estonia because they have been euro area members for a short period relative to other countries. No adjustment for seasonality is necessary as we use year-over-year growth data. As data are not available for the full sample length for all EMU 12 countries (unbalances panel), the maximum number of observations is 632. The Appendix shows the data availability for each country. Data sources for consumption[42] and nominal GDP are the Eurostat Database on Quarterly National Accounts and for population figures the Eurostat Database on Population. The latter are only available in an annual frequency and are assumed to be stable during the year. IIP data are compiled from Datastream.

As the euro area includes large and very small countries there is the concern, that euro area aggregate growth rates of Y_t^{EMU} or C_t^{EMU} are basically driven by large countries. In that case, consumption smoothing of a small country such as Luxembourg or Portugal can be over- or underestimated. We test for the influence of large countries in our sample by calculating the correlation coefficients of national consumption and GDP

[41] The respective countries are Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.

[42] We use final consumption, which includes public consumption. Therefore, we implicitly account for fiscal policy.

growth rates with the respective euro area growth rates. These values range from 0.53 to 0.93 for GDP growth and 0.42 to 0.89 for consumption growth. However, those correlation coefficients of national GDP and consumption growth rates with euro area GDP and consumption growth rates are only to a low degree correlated with country size measured by population (the correlation coefficient for GDP is 0.12 and -0.03 for consumption) as shown in Figures 15 and 16.

Figure 15: Correlation of GDP growth in country i with EMU 12 GDP growth and population

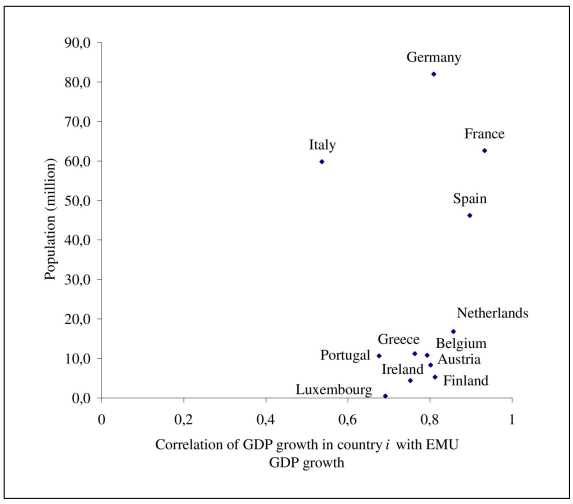
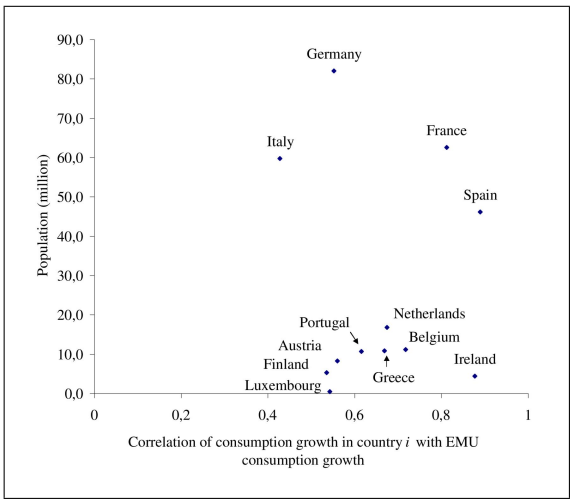


Figure 16: Correlation of consumption growth in country i with EMU 12 consumption growth and population



For all estimations, we estimate a standard least square dummy variable ($LSDV$) estimator with country fixed effects, as suggested by the Hausman-Test (Hausman, 1978) with robust standard errors. Panel unit-root tests (Levin et al., 2002, Maddala and Wu, 1999, Choi, 2001) reject non-stationarity of the time series (Table 20).

Table 20: Panel Unit Root test results (Q1/1996-Q3/2009)

	Panel Unit Root Test		
	Levin/Lin/ Chu t*	**ADF-Fisher chi-square**	**PP-Fisher chi-square**
Consumption $(\Delta C - \Delta C^{EMU})$	0.000	0.000	0.000
Output $(\Delta Y - \Delta Y^{EMU})$	0.000	0.000	0.000
Interaction term $IIP * (\Delta Y - \Delta Y^{EMU})$	0.000	0.002	0.000

Note: Entries are p-values. Lag selection has been conducted using the modified Hannan-Quinn criterion, an individual intercept is not allowed. A variation of the lag selection criteria as well as estimating the regression equation without intercept and trend or without trend does not significantly change the results.

3.4.2 Estimation results

Results concerning our *hypothesis one* based on equation (29), that consumption smoothing differs between euro area countries, are shown in Table 21. Eight out of twelve coefficients $\beta_{T,i}$ for country specific threshold dummies reach the common levels of statistical significance. Therefore, we conclude, that the degree of consumption smoothing is different in euro area countries. This suggests that international risk sharing is asymmetric in the euro area. Spain, France, Italy, the Netherlands and Austria have a statistically significant positive coefficient $\beta_{T,i}$. These countries have a significantly higher uninsured risk ($\beta_1 + \beta_{T,i}$) and a therefore a lower degree of consumption smoothing than the average of the respective remaining eleven EMU countries (β_1). In particular, for Spain and Italy there is indication for a very low consumption smoothing within the euro area which could be due to high levels net foreign debt. These countries need a high degree of labour market flexibility as the international risk sharing does not smooth income and consumption in the case of asymmetric shocks.

On the other hand, Luxembourg, Finland and Greece have a negative coefficient which indicates, based on the underlying assumptions, that these countries have a relatively high consumption smoothing. For Greece the results suggest high consumption smoothing although the country has high net foreign debt. However, results for Greece have to be interpreted with caution as only 35 observations are available for Greece. Overall, we cannot reject our hypothesis one.

The results for *hypothesis two* based on equation (31) that the foreign asset and liability distribution affects international risk sharing are shown in Table 22 for different time periods. The coefficients β_2, which measures average consumption smoothing for net IIP=0, decrease over time. That indicates that consumption smoothing between EMU countries has increased over time. The coefficients β_{IIP} show the impact of the foreign asset and liability distribution on consumption smoothing. While coefficient β_{IIP} for the full sample Q1/1996-Q3/2009 (column 14) is not significant, indicating on average no relevance of the net IIP for consumption smoothing, β_{IIP} is statistical significant in the pre-EMU sample and all EMU samples. The net IIP has a positive impact on consumption smoothing prior to EMU (column 13), suggesting a consumption smoothing

Table 21: LSDV estimation results, discriminating for country specific uninsured risk

Sample	Q1/1996-Q3/2009					
#	1	2	3	4	5	6
Country	Belgium	Germany	Ireland	Greece	Spain	France
β_1	0.526***	0.527***	0.487**	0.544***	0.518***	0.530***
	(0.130)	(0.131)	(0.178)	(0.131)	(0.130)	(0.128)
$\beta_{T,i}$	0.206	0.202	0.131	-0.533***	0.424***	0.273*
	(0.131)	(0.131)	(0.178)	(0.131)	(0.130)	(0.128)
Constant	0.003**	0.003**	0.003**	0.004***	0.002**	0.003**
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
R-square	0.41	0.42	0.42	0.42	0.42	0.41
Observations	632	632	632	632	632	632
Sample	Q1/1996-Q3/2009					
#	7	8	9	10	11	12
Country	Italy	Luxembourg	Netherlands	Austria	Portugal	Finland
β_1	0.469***	0.663***	0.524***	0.524***	0.522***	0.554***
	(0.126)	(0.073)	(0.130)	(0.131)	(0.133)	(0.138)
$\beta_{T,i}$	0.477***	-0.562***	0.313**	0.235*	0.204	-0.283*
	(0.126)	(0.073)	(0.130)	(0.131)	(0.133)	(0.138)
Constant	0.003***	0.002***	0.003**	0.003**	0.002**	0.003**
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
R-square	0.45	0.50	0.42	0.42	0.42	0.42
Observations	632	632	632	632	632	632

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

enhancing effect of net foreign liabilities and a negative effect of net foreign assets.

The coefficients β_{IIP} are negative in the EMU samples (columns 15-17) and rise in their absolute values since 1999. Since the introduction of the euro, net foreign liabilities have on average contributed to reduce consumption smoothing. This result supports our theoretical finding that countries with net foreign assets (liabilities) have a lower (higher) degree of consumption volatility. In the sample Q1/2004-Q3/2009, consumption smoothing increases (decreases) on average by 0.005 units per each percentage points of net IIP assets (liabilities) per GDP. That seems to be small. However, net IIP positions have reached high levels (negative as well as positive) for single countries (see Table 22).

The negative (positive) effect of net foreign liabilities (net foreign assets) on consumption smoothing has increased over time, which seems to mirror the build-up of intra-euro area imbalances and the diverging net IIP in the euro area. Therefore, we cannot reject our second hypothesis. The foreign asset and liability distribution affects consumption smoothing in the euro area – net foreign assets increase consumption smoothing, net foreign liabilities reduce consumption smoothing of a euro area country. In the light of these results, Germany, Luxembourg, the Netherlands and Belgium can rely over proportionally on international risk sharing in the case of an asymmetric shock. Spain, Greece, Portugal, Ireland and Italy do only under proportionally benefit from risk sharing via capital markets. Given a restricted fiscal policy due to already high public debt levels, these countries need a high degree of labour market flexibility to adjust to asymmetric shocks.

Hypothesis three, that asymmetric international risk sharing reduces overall euro area consumption smoothing cannot be rejected, either. The levels of uninsured risk β_2 in Table 22 (which assume a symmetric foreign asset and liability distribution) are significantly lower in EMU samples (columns 15 – 17) than β_{EMU} in Table 23 (which account for an asymmetric foreign asset and liability distribution). Based on a t-test with $H0 : \beta_2 < \beta_{EMU}$, the t-statistic for sample Q1/1999-Q3/2009 (column 15 vs. 20) is 2.68, for sample Q1/2002-Q3/2009 (column 16 vs. 21) 3.34 and for sample Q1/2004-Q3/2009 (column 17 vs. 22) is 3.37. The critical value for 5 percent significance for a one-sided t-test is about 2.58. Thus, we cannot reject the $H0$; β_2 is in all three samples

significantly lower than β_{EMU}.

That result is confirmed by recursive estimations. We estimate equations (27) and (31) forty-two times. We start with the full sample, where β_{IIP} is statistically insignificant, and reduce the sample size in every step by starting one quarter ahead until Q4/2006, while the sample end remains always Q3/2009. Therefore, we constantly increase the weight of more recent data where β_{IIP} is negative and statistical significant. Figure 17 shows the development of β_{EMU} and β_2 over time and the corresponding p-values below. It clearly shows, that uninsured risk in the case of an asymmetric foreign asset and liability distribution (indicated by β_{EMU}) is larger rather than in the hypothetic symmetric case where net IIP are zero (indicated by β_2). Unidirectional intra-euro area capital flows and increasing, divergent net IIP seem to have limited average consumption smoothing in the euro area and make therefore on average a higher degree of labour market flexibility necessary.

Figure 17: Development of β_{EMU} and β_2 over time based on recursive LSDV estimations (variable start quarter - end quarter Q3/2009)

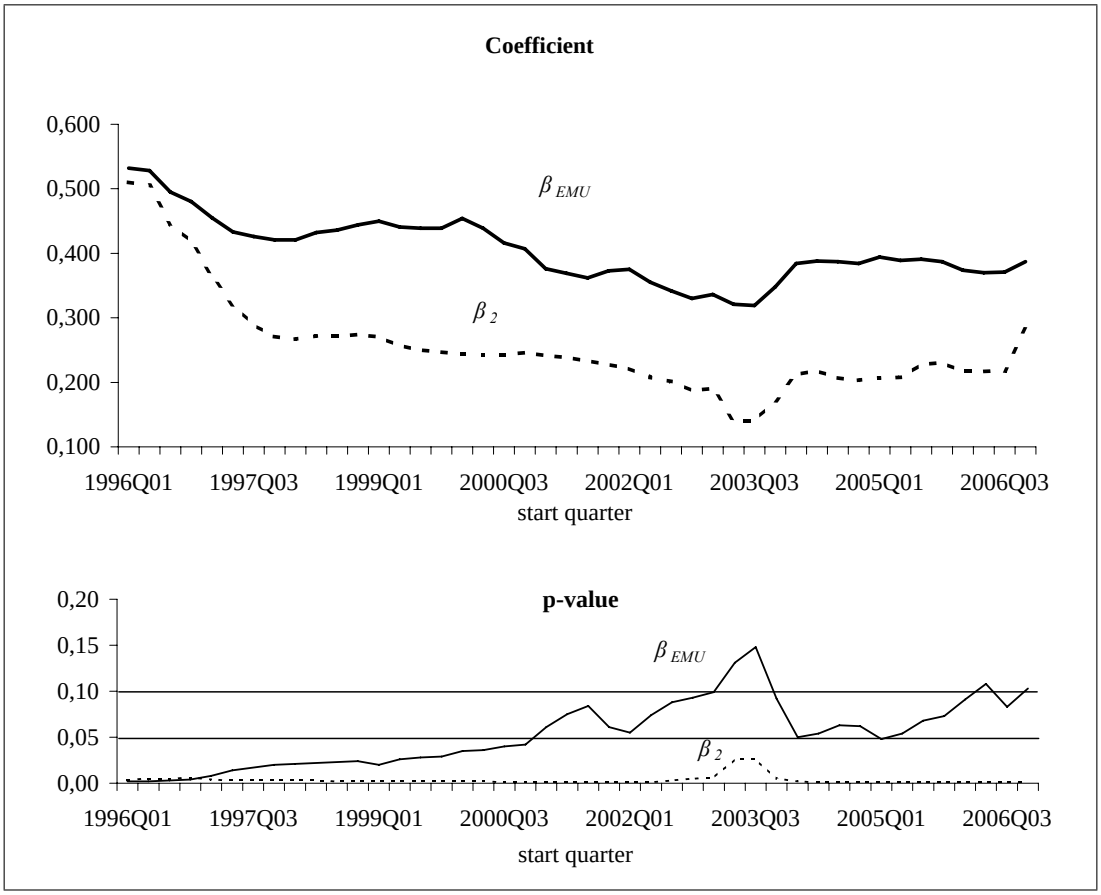


Table 22: LSDV estimation results for β_2, controlling for net IIP

Sample	Q1/1996-Q4/1998	Q1/1996-Q3/2009	Q1/1999-Q3/2009	Q1/2002-Q3/2009	Q1/2004-Q3/2009
#	13	14	15	16	17
β_2	0.851***	0.510***	0.270***	0.221***	0.212***
	(0.051)	(0.140)	(0.067)	(0.046)	(0.051)
β_{IIP}	0.007***	-0.003	-0.003*	-0.004***	-0.005***
	(0.002)	(0.003)	(0.002)	(0.001)	(0.000)
Constant	0.000**	0.002***	0.005***	0.006***	0.007***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
R-square	0.83	0.43	0.23	0.23	0.38
Observations	105	551	446	333	240

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 23: LSDV estimation results of β_{EMU}

Sample	Q1/1996-Q4/1998	Q1/1996-Q3/2009	Q1/1999-Q3/2009	Q1/2002-Q3/2009	Q1/2004-Q3/2009
#	18	19	20	21	22
β_{EMU}	0.669***	0.532***	0.450**	0.375*	0.384**
	(0.103)	(0.127)	(0.164)	(0.175)	(0.174)
Constant	-0.000	0.003***	0.004**	0.004***	0.004***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
R-square	0.68	0.41	0.30	0.19	0.20
Observations	124	632	508	372	267

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

3.4.3 Robustness checks

We first test for robustness of our results by adjusting our empirical specification for a time trend in international risk sharing (Sørensen et al., 2007). We include the time trend to check whether the estimated downward trend of uninsured risk has been affected by the net IIP effect or spuriously by other international market developments over time such as increasing financial globalisation.

In order to account for a time trend, we add to equations (29, 31, and 27) the interaction term $\left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right)(t - \bar{t})$ (Sørensen et al., 2007). The variable t is the current quarter and $\bar{t}$ the middle quarter of the respective sample. Quarters are consecutively numbered. Therefore, the respective coefficient β_t captures the average year-by-year change in international risk sharing. Panel regression equations (29, 31, and 27) change to:

$$\begin{aligned}\left(\Delta C_{i,t} - \Delta C_t^{EMU}\right) = \alpha + \beta_1 \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) + \beta_t (t - \bar{t}) \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) \\ + \beta_{T,i} \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) D_i + \rho_i + \mu_{i,t}\end{aligned} \tag{32}$$

$$\begin{aligned}\left(\Delta C_{i,t} - \Delta C_t^{EMU}\right) = \alpha + \beta_2 \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) + \beta_t (t - \bar{t}) \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) \\ + \beta_{IIP} \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) IIP_{i,t} + \rho_i + \mu_{i,t}\end{aligned} \tag{33}$$

$$\begin{aligned}\left(\Delta C_{i,t} - \Delta C_t^{EMU}\right) = \alpha + \beta_{EMU} \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) + \\ + \beta_t (t - \bar{t}) \left(\Delta Y_{i,t} - \Delta Y_t^{EMU}\right) + \rho_i + \mu_{i,t}\end{aligned} \tag{34}$$

Estimation results change only partly when we control for the time trend as shown in Tables 24, 25 and 26. Concerning *hypothesis one*, the time trend becomes statistically significant for Ireland as well as for Luxembourg. For specifications concerning *hypothesis two*, we find a significant time trend for the whole sample (Q1/1996-Q3/2009) and that levels of significance of coefficients for uninsured risk β_{EMU} and β_2 are reduced in the EMU samples. The negative coefficients for the time trend β_t suggest that uninsured risk has decreased steadily on average in these samples. *Hypothesis three* has to be rejected in this specification due to low significance of coefficients. Therefore,

Table 24: LSDV estimation results, discriminating for country specific risk sharing and adjusting for a time trend in international risk sharing

Sample	Q1/1996-Q3/2009					
#	23	24	25	26	27	28
Country	Belgium	Germany	Ireland	Greece	Spain	France
β_1	0.502***	0.503***	0.408**	0.517***	0.492***	0.503***
	(0.139)	(0.139)	(0.168)	(0.140)	(0.140)	(0.138)
β_t	-0.006	-0.006	-0.008*	-0.006	-0.006	-0.006
	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)
$\beta_{T,i}$	0.123	0.114	0.255	-0.492***	0.420***	0.211**
	(0.120)	(0.120)	(0.181)	(0.146)	(0.129)	(0.072)
Constant	0.003**	0.003**	0.003***	0.003***	0.002**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
R-square	0.43	0.44	0.45	0.44	0.44	0.43
Observations	632	632	632	632	632	632

Sample	Q1/1996-Q3/2009					
#	29	30	31	32	33	34
Country	Italy	Luxembourg	Netherlands	Austria	Portugal	Finland
β_1	0.467***	0.636***	0.496***	0.499***	0.499***	0.528***
	(0.136)	(0.058)	(0.141)	(0.140)	(0.141)	(0.145)
β_t	-0.003	-0.006*	-0.006	-0.006	-0.006	-0.006
	(0.004)	(0.003)	(0.005)	(0.004)	(0.004)	(0.004)
$\beta_{T,i}$	0.317***	-0.555***	0.327**	0.209	0.145	-0.290*
	(0.075)	(0.058)	(0.135)	(0.123)	(0.122)	(0.134)
Constant	0.003***	0.002***	0.003**	0.003**	0.002**	0.003**
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
R-square	0.45	0.51	0.43	0.43	0.43	0.44
Observations	632	632	632	632	632	632

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

financial globalization might have contributed to falling levels of uninsured risk over time. Still, the significance of coefficients $\beta_{T,i}$ and β_{IIP} support our hypotheses 1 and 2. Additionally, we check whether country size, measured in GDP, affects international risk sharing. Small countries might be able to accumulate in particular large foreign assets or liabilities relative to their GDP. However, coefficients of GDP or interaction coefficients between GDP and the difference of GDP growth are very small and do not significantly change our results.

Table 25: LSDV estimation results for β_2, controlling for net IIP and adjusting for a time trend in international risk sharing

Sample	Q1/1996-Q4/1998	Q1/1996-Q3/2009	Q1/1999-Q3/2009	Q1/2002-Q3/2009	Q1/2004-Q3/2009
	35	36	37	38	39
β_2	0.901***	0.451***	0.251*	0.029	0.093
	(0.101)	(0.078)	(0.144)	(0.160)	(0.370)
β_t	0.009	-0.010***	0.001	0.007	0.003
	(0.009)	(0.003)	(0.005)	(0.006)	(0.009)
β_{IIP}	0.007**	-0.002	-0.003*	-0.005***	-0.006***
	(0.003)	(0.002)	(0.001)	(0.001)	(0.000)
Constant	0.001	0.003***	0.005***	0.006***	0.007***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
R-square	0.83	0.50	0.23	0.27	0.38
Observations	105	551	446	333	240

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

Table 26: LSDV estimation results of β_{EMU} and adjusting for a time trend in international risk sharing

Sample	Q1/1996-Q4/1998	Q1/1996-Q3/2009	Q1/1999-Q3/2009	Q1/2002-Q3/2009	Q1/2004-Q3/2009
#	40	41	42	43	44
β_{EMU}	0.596***	0.505***	0.472***	0.169	-0.285
	(0.098)	(0.137)	(0.150)	(0.174)	(0.850)
β_t	-0.024*	-0.006	-0.002	0.007	0.018
	(0.012)	(0.004)	(0.002)	(0.005)	(0.024)
Constant	0.001	0.003***	0.004**	0.004***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
R-square	0.68	0.43	0.30	0.20	0.22
Observations	124	632	508	372	267

Robust standard errors are reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% level.

We can summarize our empirical analysis for the euro area as follows:

- consumption smoothing differs significantly between euro area countries. Therefore, we can conclude that international risk sharing is asymmetric in the euro area.
- The foreign asset and liability distribution, measured by net IIP, is an important determinant for different country specific consumption smoothing.
- Average euro area consumption smoothing has been limited by unidirectional capital flows and increasing, divergent net IIP rather than being contributed to international risk sharing in the euro area. However, this result is not robust with respect to the inclusion of a time trend.

3.5 Economic policy implications

We have analysed how an asymmetric net foreign asset and liability distribution changes international risk sharing and effects consumption smoothing in the euro area. That analysis is very topical after a decade of unidirectional capital flows in particular from Germany to the southern euro area countries. This development resulted in a divergence of current account balances, and net international investment positions within the euro area and thereby contributed to the European debt crisis. Based on a theoretical and empirical analysis, it is found that an asymmetric foreign asset and liability distribution reduces consumption smoothing in the monetary union as a whole as well as in all member countries. Countries with high net foreign liabilities are shown to be in particular exposed to consumption volatility and crisis.

Hence, the international risk sharing mechanism does not work in the euro area as assumed by Mundell (1973) and as argued by the European Commission (2008). Without labour market flexibility, limited fiscal flexibility and poorly working international risk sharing via the capital market, the capability of the euro area to cope with asymmetric shocks seems to be very limited. That is an alarming result for the euro area in general and in particular for euro area countries currently facing real adjustment needs. For instance Spain with a net foreign debt position will not participate in the current German boom, as did Germany in the past Spanish boom.

Based on the seminal theory of optimum currency areas (Mundell, 1961), the deregulation of labour markets throughout the euro area would be the straight-forward solution to enhance the monetary union's adjustment ability in the face of asymmetric shocks. In particular, Greece, Spain, and Portugal would not only benefit from flexible labour markets in terms of an improved adjustment capability to cure their current account deficits. It would also facilitate the economic recovery after the crisis, which is a necessary prerequisite to regain capital market confidence and lower risk premiums on government bonds. Therefore, the sustainable way to improve the internal adjustment capability of the euro area and to safeguard the euro is to implement consequent labour market reforms.

Appendix - Data Sources

Table 27: Data availability and data sources

Data:	**Source:**	**Availability:**
Nominal GDP, quarterly	Eurostat	Q1/1995 - Q3/2009 Ireland: Q1/1997-Q/2009 Greece: Q1/2000-Q/2009
Consumption, quarterly	Eurostat	Q1/1995 - Q3/2009 Ireland: Q1/1997-Q/2009 Greece: Q1/2000-Q/2009
Population, annually	Eurostat	1995-2009
International Investment Position (IPP), annually, Assets-Liabilities	IMF International Financial Statistics, via DataStream	1995-2008 (quarterly data were created by linear interpolation) Ireland: 2001-2008 Greece: 1998-2008 Luxembourg: 2002-2008 Portugal: 1996-2008

Note: y-o-y growth figures used in the empirical analysis start four quarters later.

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Chapter 4

Fiscal Stabilization and the Incentive for Structural Reforms in the Euro Area

Abstract This paper analyses national and supranational fiscal stabilization policies and the incentives for structural reforms based on a principal agent model. The issue has become topical during the European sovereign debt crisis. The quasi-defaults of Greece and Portugal have their origins in persistent public deficits, delayed structural reforms on labour markets and a postponed adjustment of intra-euro area current account imbalances. The weak Stability and Growth pact and extraordinary low interest rates are identified as reasons for delayed reforms in the euro area prior to the crisis. The rescue packages for Greece, Portugal and Ireland are argued to further postpone necessary labour market reforms to achieve an adjustment of competitiveness in the euro area.

4.1 Introduction

The financial crisis and the European debt crisis have revived the discussion on whether independent national fiscal policies or a supranational fiscal policy is the better policy option for euro area countries to cope with asymmetric shocks. The supporters of a supranational fiscal policy argue that national fiscal policies have failed to stabilize euro area countries before and during the crisis and therefore need to be substituted by a fiscal policy on EU level (Plender, 2009, Dullien and Schwarzer, 2009, Dullien, 2011). In contrast, supporters of national fiscal policies argue that the Stability and Growth pact has to be reformed and tightened to prevent more public debt crises in the euro area. They highlight the need for more labour market flexibility and structural reforms in the euro area (European Commission, 2008), which would ensure a (labour)

market based adjustment in the case of an asymmetric shock.

In general, the adjustment mechanisms to asymmetric shocks in a monetary union have to be flexible prices and wages (Mundell, 1961) when monetary policy autonomy is lost. To substitute for labour market flexibility or to attenuate sudden income changes during real exchange rate adjustment, fiscal policy can be used to mitigate sharp declines of income and consumption, in particular during recessions. This fiscal stabilization can either be achieved based on a credit financed anti-cyclical national fiscal policy or a supranational fiscal policy (European Commission, 1993, Persson and Tabellini, 1996, de Grauwe, 2009a, von Hagen and Wyplosz, 2008). In both cases, anti-cyclical public consumption smoothes overall consumption over time until the reason for fiscal stabilization has vanished or the real adjustment process is completed.

In the euro area, however, labour markets are still inflexible (Bayoumi and Eichengreen, 1992, European Commission, 2008, 2010) and labour market reforms continue to be postponed (Calmfors, 2001, Duval and Elmeskov, 2006, Belke et al., 2006b). This prevents a swift real exchange rate alignment to cope with current account imbalances. If the real exchange rate realignment keeps to be postponed after an asymmetric shock, any fiscal policy to stabilize a specific consumption level will become sooner or later unsustainable (Belke and Baumgärtner, 2002). Either national public debt levels become unsustainable or supranational fiscal redistribution becomes unidirectional. Therefore, given rigid labour markets in the euro area, fiscal policy should only be used for temporary stabilization needs such as in the case of unsynchronized business cycles.

In contrast, if asymmetric economic developments are persistent because of diverging competitiveness, structural labour market reforms need to be implemented to ensure the adjustment of real exchange rates and a convergence of current account positions. However, it may depend on the fiscal stabilization approach, either national fiscal policies or supranational fiscal policy and their implementation, whether labour market reforms are implemented or not. As labour market reforms comprise political costs, politicians might have the incentive to use fiscal policy to alleviate the effects of non-reforming instead of financing reforms (Rodrik, 1996, Hsieh, 2000). By doing so, politicians assure their re-election or prevent opposition of insiders who would loose their rents in the case of flexible labour markets (Saint-Paul, 2004, Alesina et al., 2006).

Thus, moral hazard might inhibit structural reforms and the initial reason for further fiscal policy intervention persists until rising debt levels become unsustainable.

In this paper, we analyse the incentive of supranational fiscal stabilization and national fiscal policies for structural reforms based on a principal agent model. It is shown that structural reforms to achieve more labour market flexibility in the euro area has been delayed due to the weak Stability and Growth Pact and extraordinary low interest rates prior to the crisis. Moreover, fiscal rescue packages for Greece, Portugal and Ireland are argued to further postpone necessary labour market reforms in the euro area.

4.2 Adjustment to asymmetric shocks and fiscal stabilization in the euro area

4.2.1 Real exchange rate adjustment and automatic stabilizers in a monetary union

The irrevocable fixation of nominal exchange rates and the common monetary policy in the euro area have shifted the burden of adjustment in the face of asymmetric shocks to the real exchange rate (Mundell, 1961). Therefore, the labour markets need to be sufficiently flexible to assure a swift realignment of real exchange rates. First, wages could be the transmission channel. In a country affected by a negative asymmetric demand shock and rising unemployment, wages need to decrease to lower the national price level, which leads to a real depreciation and assures the economic recovery. Additionally, rising wages in the country affected by the positive asymmetric shock contribute to real exchange rate appreciation, which moderates the boom and inflation pressure.

Second, labour force could migrate from a country affected by a negative asymmetric shock to the booming economy with labour shortage. That would increase labour supply in the booming country while labour supply in the recession country falls. This process re-equilibrates the labour markets in both countries. However, labour market flexibility, (downward) wage flexibility and labour mobility, remains low in Europe (Bayoumi and Eichengreen, 1992, European Commission, 2008, 2010). Euro area real exchange rates and euro area labour force cannot properly readjust in the case of

asymmetric shocks. This poses the question concerning alternative automatic stabilizing mechanisms to smooth income and consumption over time in the presence of asymmetric shocks.

Despite the drawbacks of rigid labour markets, theoretically, several automatic stabilizing mechanisms allow euro area countries to smooth income and consumption over time in the presence of asymmetric shocks. First, capital markets are an internal stabilizing mechanism within a monetary union (Mundell, 1973). Cross-country foreign capital asset holdings[43], i.e. capital market integration, increase in a monetary union as exchange rate risk and the devaluation risk of nominal exchanges rates disappears (McKinnon, 2000). This allows for portfolio diversification. Volatile income and consumption in a country due to an asymmetric shock or unsynchronized business cycles can be mitigated by alternating foreign capital income and foreign capital valuation. A country in a boom (recession) with rising (falling) profits pays (receives) a net foreign capital income to (from) the country in a recession (boom). The same mechanism applies for (relative) valuation effects. However, diverging and asymmetric net foreign asset and liability positions of euro area countries reduce the effectiveness of the capital market stabilization (see chapter 3).

Intra-industry trade can be a second (automatic) stabilization mechanism. Given strong intra-industry trade linkages, booming countries import additional consumption and investment goods from the recession country where domestic demand is low and spare capacities are available. Rising exports compensates for declining domestic demand. In fact, the German export contributed to German growth and compensated for low domestic investment and consumption prior the crisis. However, differences in product specialisation, technology or aspects of non-price competitiveness such as different product quality question the efficiency of intra-industry trade to timely absorb asymmetric shocks in the euro area (European Central Bank, 2005, Baumann and di Mauro, 2007).[44]

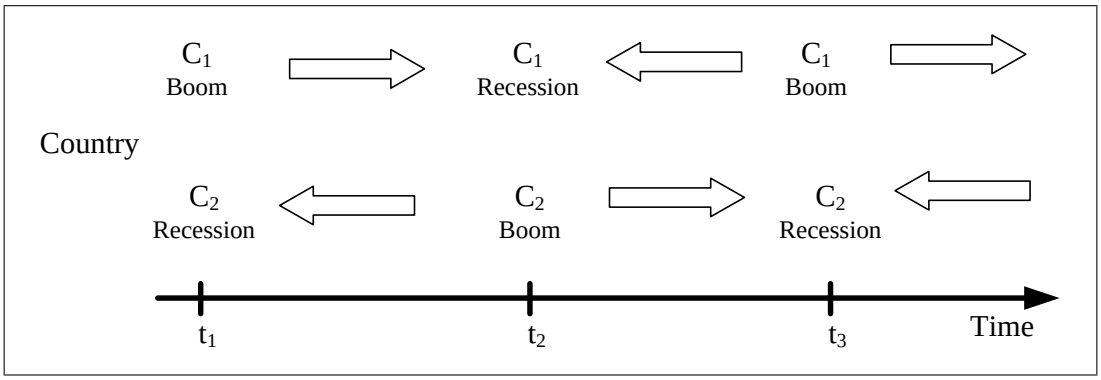
A third stabilizing mechanism is an anti-cyclical fiscal policy, which compensates lower (increased) private spending by more (less) public spending in a recession (boom).

[43] For instance, bonds, equities as well as bank credit.

[44] In the context of international trade, multi-national corporations can affect the risk-sharing, as intra-firm trade accounts for an increasing share of international trade (OECD, 2010).

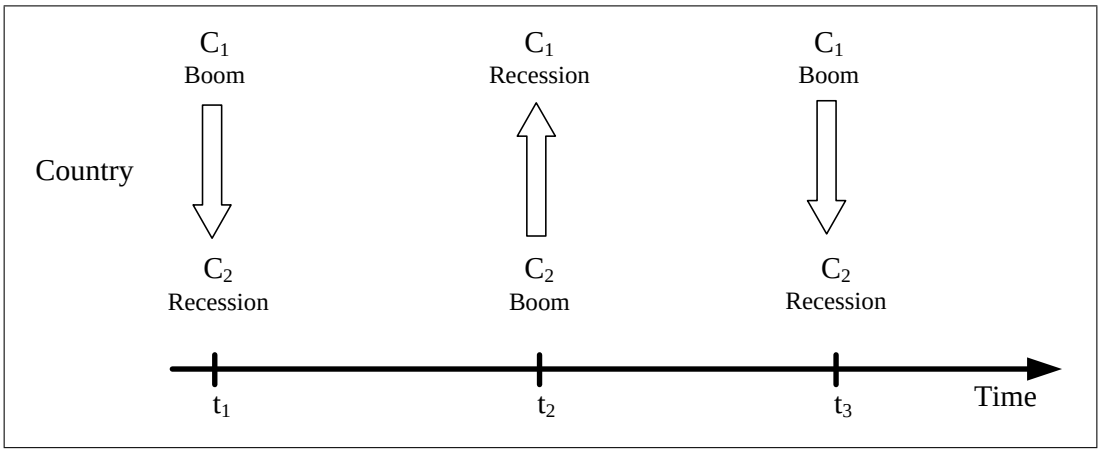
This can be achieved by a credit financed anti-cyclical national fiscal policy or a supranational fiscal policy (see e.g. Persson and Tabellini (1996), Belke and Baumgärtner (2002), von Hagen and Wyplosz (2008)). An anti-cyclical national fiscal policy varies public spending by public savings or public debt and redistributes resources intertemporally. Figure 18 shows a stylized national fiscal anti-cyclical stabilization pattern for a two-country monetary union with countries C_1 and C_2 over time t. (Unsynchronized) business cycles are absorbed and smoothed within each country by saving for and borrowing from the future as indicated by capital flows (block arrows), in this case borrowing and repayment or saving. For instance, country 2 finances rising public spending during a recession in t_1 by public debt (arrow pointing to the left), which has to be repaid in t_2. However, country 1 saves capital in the boom in t_1 that can be used in t_2 (arrow pointing to the right).

Figure 18: National fiscal stabilization of asymmetric shocks



In contrast, a supranational fiscal stabilization collects, for instance, fluctuating tax revenues of euro area countries via a supranational authority and (automatically) redistributes them back to countries to achieve equally smoothed tax revenues and spending in all euro area countries. A recession country receives additional tax revenues from booming countries to compensate shortfalls in private spending by more public spending. Figure 19 shows the functioning of a supranational fiscal stabilization analogous to Figure 18. Block arrows again indicate public capital flows, in this case transfers flows. In t_1, country 1 is in a boom and transfers some of its tax revenue to country 2, where reduced tax revenues during a recession are compensated. In contrast, country 2 transfers tax revenue to country 1 in t_2, as country 2 is in a boom and country 1 in a recession.

Figure 19: Supranational fiscal stabilization of asymmetric shocks

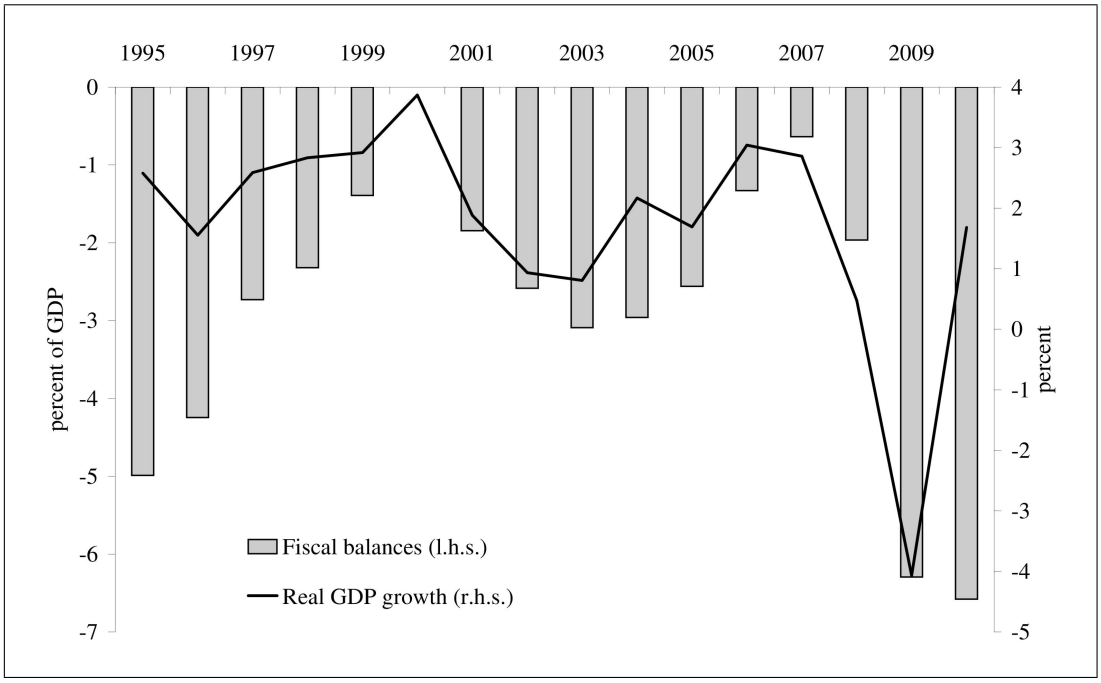


In the euro area, the EU economic framework constitutes national fiscal stabilization as the main fiscal stabilization system (European Commission, 1993). Euro area countries independently decide on public debt (public savings) in the case of asymmetric shocks. The Stability and Growth Pact constitutes a limit for national fiscal deficits and limits national fiscal stabilization during a recession. Figure 20 shows fiscal balances and real GDP growth for the euro area. The cyclicality is clearly visible; public net borrowing (indicated by fiscal deficits) rises in times of low GDP growth and declines during recovery. However, euro area countries did on average not reduce public debt during boom the years 2000 or 2006/2007, as intended by an anti-cyclical fiscal stabilization concept. Moreover, euro area countries on average violated the deficit ceiling of 3 percent of GDP in the years 2003 and 2004 as well as during the crisis 2009 and 2010.

A supranational fiscal stabilization is, up to now, not in place in the euro area. However, some member countries use a fiscal stabilization mechanism to absorb regional shocks. These mechanisms work analogous to supranational fiscal stabilization but with the national level redistributing between regions or federal states. For example, Germany has a tax equalisation system *(Länderfinanzausgleich)*, which shifts tax revenues from federal states with high per capita tax revenues to federal states with low tax revenue per capita. Similar systems are in place in Belgium (Intervention de Solidarité Nationale) or Italy (to assist the Mezzogiorno region). Supranational redistribution at EU level such as EU Structural Funds or Social Funds do not intended to stabilize asymmetric shocks but to promote long-term convergence between member countries or to support a certain sector *(Common Agriculture Policy)*. Although EU structural funds related to EU cohesion policy distribute 347 billion euros between 2007

and 2013 (European Union, 2009) the transfer volume is low in relation to the EU-GDP.

Figure 20: Euro area fiscal balances and euro area real GDP growth



Source: European Commission, AMECO Database and IMF (real GDP growth)

4.2.2 Fiscal stabilization and persistent asymmetric economic developments

Both, national fiscal and supranational fiscal stabilization are in theory suitable economic policy tools to smooth temporary asymmetric economic developments in the face of asymmetric shocks or due to unsynchronized business cycles. However, if an asymmetric economic development becomes persistent and the real exchange rate cannot realign, the adjustment of wages and prices will become long lasting (Blanchard, 2007). In the long run, as unemployment increases, the political and economic pressure to adjust competitiveness increases. Blanchard (2007, 7) calls this way of adjustment competitive disinflation, representing "[...] *a period of sustained high unemployment, leading to lower nominal wage growth until relative unit labour costs have decreased* [...]", and the real exchange rate has realigned. During such a competitive disinflation both fiscal stabilization mechanisms, national fiscal stabilization and supranational stabilization, might become unsustainable (Belke and Baumgärtner, 2002, de Grauwe,

2009a).[45]

Figure 21 and 22 illustrate the effects of a persistent asymmetric economic development on fiscal stabilization, given that the real exchange rates do not realign. In Figure 21, country 1, which has permanently higher growth than country 2, has public budget surpluses while permanent sluggish growth in country 2 makes them to run public deficits until the debt level becomes unsustainable. In a monetary union with a centralized fiscal policy, the supranational fiscal policy would be unidirectional, leading to a permanent tax transfer payment for country 1 (Figure 22).

Figure 21: National fiscal stabilization and persistent heterogeneous growth

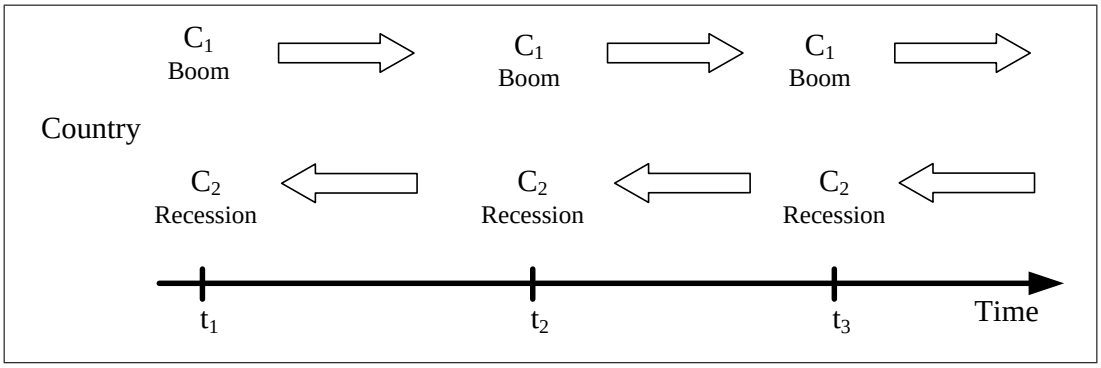
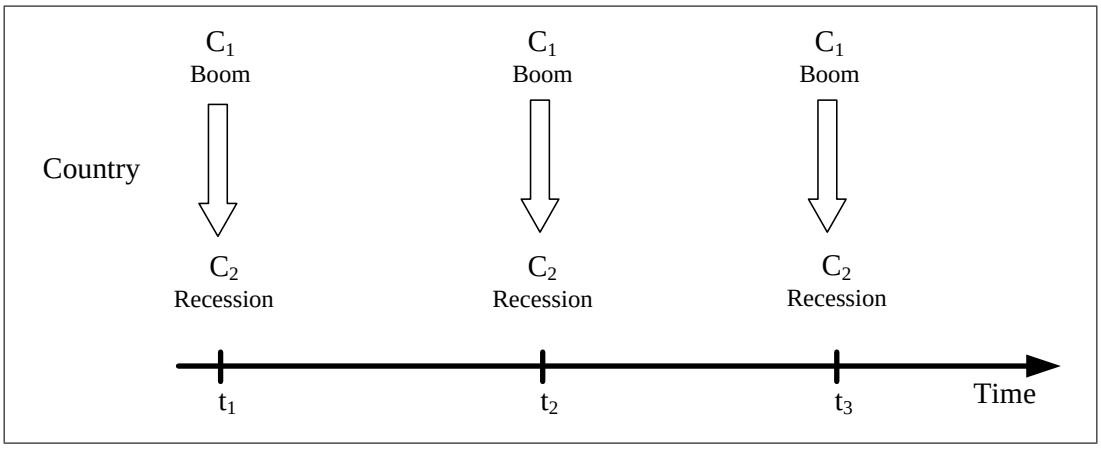


Figure 22: Supranational fiscal stabilization persistent heterogeneous growth



The divergence of competitiveness and current accounts within the euro area since 1999 originated a persistent asymmetric economic development (Zemanek et al., 2010,

[45] A symmetric shock, such as the entry of former communist countries into the world market and the rise of China can destabilize national fiscal stabilization as well. For instance, low cost production in Central and Eastern Europe and East Asia has substituted labour intensive production all over Europe. Rising unemployment might have been initially interpreted as temporary shock, which triggered an increase in public debt initially perceived as temporary. The persistent nature of the shock however resulted in a continuing rise of public debt levels.

Schnabl and Zemanek, 2011). It was caused by persistent asymmetric wage growth between Germany and the southern European countries. While Germany had a moderate wage growth, Greece, Portugal, Spain and Italy experienced a high wage growth above productivity. That gradually increased Germany's competitiveness, measured in unit labour costs, while southern European countries significantly lost competitiveness within the euro area (Schnabl and Zemanek, 2011).[46]

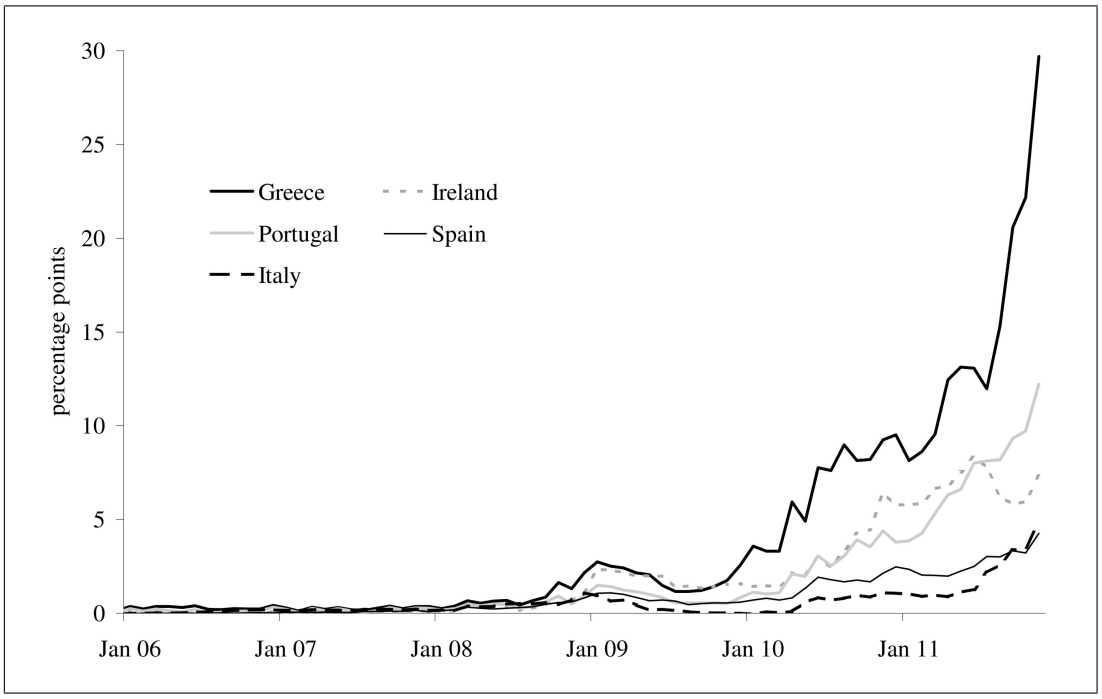
Until the crisis, in particular Greece and Portugal used public borrowing to stimulate sluggish domestic economic activity caused by the gradual decline of competitiveness in labour intensive production versus low-cost countries in East Asia and Central and Eastern Europe. Moreover, public wages as well as social benefits increased which stimulated domestic consumption. The reluctance against structural reforms of rigid labour markets and social security systems prior to the crisis made governments to finance social security and employment via public debt. The financing needs to stabilize the economy during the crisis dramatically further inflated fiscal deficits and public debt levels.

During the course of the economic crisis, investors began to doubt the sustainability of public debt levels in crisis countries. In particular, they expect that the twin deficits in the current accounts and public finances will not unwind in a short time, if intra-euro area real exchange rates are not realigned. Moreover, the crisis countries would need to raise more public debt to sustain economic growth. Strongly diverging government bond spreads against Germany indicated that capital markets have already judged fiscal policies in Greece, Ireland and Portugal as unsustainable. Figure 23 shows government bond spreads to German government bonds that started to rise since the end of 2008. Since the end of 2009, lenders lost confidence in public finances of Greece, Portugal and Ireland.[47] Public borrowing at the capital market has now become impossible for Greece, Ireland as well as Portugal. Their financing needs have been substituted by a quasi-supranational fiscal stabilization via rescue packages by EU partner countries.

[46]The real depreciation of the Germany against European partner countries was partly due to a competitive disinflation after a strong inflation following the German reunification boom (Schnabl and Zemanek, 2011).

[47]The crisis in Ireland is the result of a banking crisis and is not fully comparable to Greece or Portugal. However, Irish unit labour costs had also strongly increased prior to the financial crisis and are an obstacle to economic recovery.

Figure 23: Government bond spreads to Germany (10-year benchmark bonds)



Source: Datastream

Although the rescue packages are provided as loans and guaranties and are conditional to fiscal consolidation and structural reforms, this indirect supranational fiscal stabilization will become persistent, if the intended structural reforms fail. Then, current loans and guaranties need to be converted into direct transfers. Examples for persistent supranational fiscal stabilization, thus direct transfers systems, are those on a national level in Italy (persistent north-south transfers) and Germany (persistent west-east transfers). For instance in Germany, west-east transfers via the German tax equalization system have summed up to almost 20 percent of the East German federal states' public budgets in 2008. The progress of the convergence process of East Germany after the reunification shock is rather slow. Structural unemployment remains high and tax revenues per capita low. Hence, the need for public transfers persists.

The question arises, why euro area countries failed to implement flexible labour markets prior the crisis in contradiction to predictions. E.g. European Commission (1990), Berthold and Fehn (1998) and Calmfors (2001) argued that the loss of an autonomous monetary policy and nominal exchange rate alignments in a monetary union would enforce structural reforms to maintain flexibility in the case of an asymmetric shock.

4.2.3 Fiscal stabilization and structural reforms

A possible explanation for less than expected structural reforms in the euro area could be the fiscal stabilization policy by euro area countries. Structural reforms are associated with political costs, such as the opposition from voters or employees who lose their rents originating in generous regulations, such as minimum wages or strict hiring and firing regulations (Saint-Paul, 2004). To avoid political costs and to secure re-election, politicians use fiscal policy to finance the consequences of non-reforming such as unemployment or public employment, instead of implementing structural reforms to reduce unemployment. Such behaviour is in particular analysed for development aid. For instance Rodrik (1996) and Hsieh (2000) argue that aid transfers can be responsible for delayed structural reforms. The transfer income and fiscal expansion reduce the pressure on governments to implement structural reforms, which are the prerequisite to attract private capital investments (Devarajan et al., 2001).

The hypothesis, that expansionary fiscal policy allows politicians to delay structural reforms, is backed by empirical evidence on development aid (Heckleman and Knack, 2008, Rodrik, 1996). Fester and Seitz (2005) and Seitz et al. (2004) provide anecdotal evidence for the German tax equalization system. They show that East German federal states, who benefit from transfers, have a significantly larger public sector (relative to their size) than West German federal states. Furthermore, only around 50 percent of transfers provided for public investments to the East German municipalities and federal states are invested (Seitz et al., 2004). The remaining part has been diverted to public consumption.

Thereby the ability to finance non-reforming and inter alia the pressure to implement structural reforms depends on the fiscal stabilization policy. Sustained national fiscal stabilization (public borrowing) depends on the willingness of private lenders to provide capital. If lenders do not punish rising debt levels by rising interest rates or expect a bailout in the case of default (Krugman, 1998, Corsetti et al., 1999, Heppke-Falk and Wolff, 2007), governments are able to prolong fiscal stabilization instead of promoting structural reforms. In particular, supranational fiscal stabilization related to a tax equalisation system provides a stable public transfer income, which can be

used to finance delayed structural reforms.

Aid and fiscal stabilization will lead to moral hazard. Moral hazard will occur if an economic agent behaves rational from an individual perspective (but suboptimal from a perspective of the whole group). The difference in rational behaviour of the agent and the group results from unequally distributed information or different risk taking (e.g. Holmström (1979)). In the context of fiscal stabilization policies, the suboptimal behaviour is the delay of structural reforms for instance by financing unemployment via transfers or public debt. For the politician it is an optimal behaviour as the political costs of reforms are circumvented, but it is a suboptimal behaviour for the country. The incentive for structural reforms differs between supranational fiscal stabilization and national fiscal stabilization, as will be shown in a principal-agent framework.

4.3 Supranational fiscal stabilization and structural reform incentive

4.3.1 The principal-agent framework

The principal-agent framework is part of the contract theory developed by institutional economics. The main assumption of the principal-agent framework is an asymmetric distribution of information between two economic players (Arrow, 1970, Mirrlees, 1974, 1999). Thereby, the agent has an information advantage over the principal and/or the agent does not bear the risk of its action. In the context of this paper, the agent is the government of a country in a persistent recession with high unemployment and rigid labour markets. To finance unemployment benefits, the country either receives transfers from a supranational fiscal stabilization mechanism or increases public debt. Instead of financing the prolongation of unemployment, the government can also opt for structural reforms (and bear political reform costs) to reduce unemployment and therefore government expenditure to support the country's economic recovery. If political costs of reforms are high, financing unemployment instead of structural reforms might be the preferred option for the agent. Then the recipient country will remain reliant on further fiscal transfers or public debt. The principal is the payer of the transfer, a prospering country or region, or a lender to the country in recession.

The general model setting is the following. The principal denoted by subscript P, a supra-national institution, another country, region, or a lender, provides capital to the recipient country, which is the agent, denoted by subscript A. We assume that the principal's utility U_P depends positively on output in the recipient country (Y_A). The principal benefits from a high output in the agent country, as it reduces the probability of further transfers or it maximises the probability of a repayment of the debt. The transfer T reduces its utility as funds are not available for own use. In contrast, the utility of the recipient country's government U_A depends positively on its output (Y_A) and the transfer T.

$$U_P = Y_A - T \tag{35}$$

$$U_A = Y_A + T \tag{36}$$

The output Y_A is assumed to be stochastic with respect to the economic environment but also conditional to the use of transfers, i.e. on structural reform effort a_j. Non-reforming is indicated by subscript no and represents $a_{no} = a_j = 0$. Structural reforms are indicated by subscript ref. As structural reforms require a minimum reform effort, a_j needs to be significantly larger than zero above a certain unknown threshold level a_{min}, with $a_{ref} = a_j > a_{min} > 0$.[48] If the agent decides to use transfers for public consumption and not to reform (a_{no}), GDP will be high (Y_{high}) with the probability (π_1). With the probability $(1 - \pi_1)$ the GDP will be low (Y_{low}). However, if the government implements structural reforms (a_{ref}) the probability for a high GDP (Y_{high}) jumps to π_2. Probability π_2 is assumed to be higher than π_1 because structural reforms increase labour market flexibility, thus allowing a real exchange rate depreciation, which stimulates exports and growth. Table 28 shows probabilities for high and low output contingent on reform effort. It is assumed that $0 < \pi_1 < \pi_2 < 1$, $Y_{low} < Y_{high}$ and $a_{no} < a_{ref}$.

Thus, output Y_A can be rewritten as expected output conditional on reform effort $E[Y_i|a_j]$ with $i = low, high$ and $j = no, ref$. Additionally, the agent has reform costs

[48] The assumption of a threshold level avoids that small reform effort accounts as a structural reforms.

Table 28: Output and its probability, conditional to structural reform effort

	Output Y_a	
Reform effort	Y_{low}	Y_{high}
a_{no} non-reforming	$1 - \pi_1$	π_1
a_{ref} structural reforms	$1 - \pi_2$	π_2

for a certain reform effort a_j. Reform costs are added to equation (36) weighted by γ ($\gamma > 0$) and reduce the government's utility. The utility functions U_P and U_A become:

$$U_P = E\left[Y_i|a_j\right]_A - T \tag{37}$$

$$U_A = E\left[Y_i|a_j\right] + T - \gamma a_j \tag{38}$$

As the recipient country decides how it will use the transfers, the rational behaviour of the agent is not equal to the expectations of the principal. For the principal the utility is maximized if the recipient country (agent) implements structural reforms. Then, the expected value of output in the receiving country is maximized, as the probability of high output rises from π_1 to π_2. However, whether the recipient government will choose structural reforms is unclear, because it balances the utility of a larger expected output against the utility of the transfer income and the loss arising from potential reform costs γa_j.

Based on this framework, we analyse the incentive for structural reforms for different forms of fiscal stabilization policy by comparing different model settings. For supranational fiscal stabilization, we differentiate between unconditional, conditional and co-financed transfers. Unconditional transfers are without any conditions to the recipient authority, for example transfers in an tax-equalisation scheme such as in Germany or the proposed supranational EU tax system (von Hagen and Wyplosz, 2008), where funds are automatically redistributed. In contrast, conditional transfers are only provided under the condition to implement structural reforms. Co-financed transfers obligate the recipient region to co-finance a certain (small) proportion as in the case of EU Structural funds.

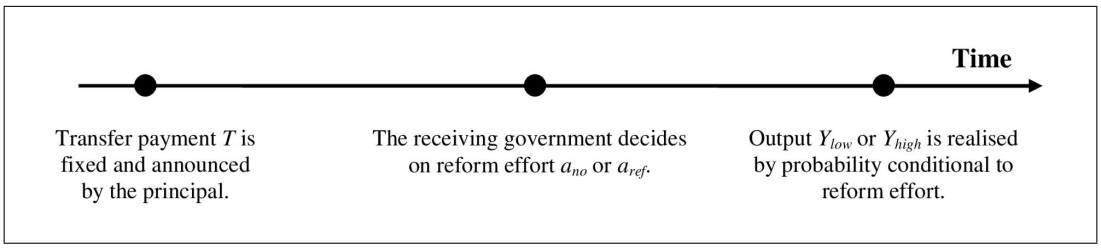
4.3.2 Unconditional supranational fiscal stabilization

The model setting for unconditional supranational transfers is similar to the baseline setting as described above. The receiving government can use transfers without conditions. This implies that transfers provide a larger utility in the case of non-reforming than in the case of structural reforms. To model this "reverse utility", transfers T in equation (38) are weighted by $(1 - a_j)$. Equation (38) becomes:

$$U_A = E\left[Y_i|a_j\right] + T - Ta_j - \gamma a_j \tag{39}$$

The game sequence for unconditional supranational transfers is presented in Figure 24. First, the transfer payment to the recipient country (T) is ex-ante fixed and not re-negotiable, as for instance in the German tax equalisation scheme. Second, the government, which receives the transfer, will decide on its reform effort (a_{no} or a_{ref}). Third, the output will become high or low (Y_{high} or Y_{low}) given the probability (π_1 or π_2) which is conditional to the chosen reform effort a_j.

Figure 24: Game sequence of the decision process – unconditional supranational fiscal stabilization



Given this model setting, the recipient government (agent) decides on whether it implements structural reforms or not. Each decision will result in a specific utility. We calculate the utility of the recipient government for both reform efforts a_{no} and a_{ref}. To analyse the decision, we set both utilities (no reforms and reforms) equal and scrutinize under which conditions the government will be indifferent between non-reforming and structural reforms.[49] This indifference reform effort reveals the incentive for structural reforms for the stabilization policy in question. The lower the indifference reform effort a^*_{ref}, the lower is the incentive for structural reforms.

[49] We assume that if the government is indifferent between non-reforming and structural reforms and that $a_{ref} > a_{min}$ holds, it will choose structural reforms.

$$U_A\left(a_{no}\right) = U_A\left(a_{ref}\right) \tag{40}$$

$$E\left[Y_A|a_{no}\right] + \left(1 - a_{no}\right)T - \gamma a_{no} = E\left[Y_A|a_{ref}\right] + \left(1 - a_{ref}\right)T - \gamma a_{ref} \tag{41}$$

As $a_{no} = a_j = 0$ and $E\left[Y_A|a_j\right] = \left(1 - \pi_m\right)Y_{low} + \pi_m Y_{high}$ with $m = 1, 2$, we can rewrite equation (41):

$$\left(\left(1 - \pi_1\right)Y_{low} + \pi_1 Y_{high}\right) + T = \left(\left(1 - \pi_2\right)Y_{low} + \pi_2 Y_{high}\right) + \left(1 - a_{ref}\right)T - \gamma a_{ref} \tag{42}$$

Solving equation (42) for a_{ref} yields the indifference reform effort level a^*_{ref}. The subscript UC denotes the case of unconditional transfers.

$$a^*_{ref,UC} = \frac{1}{\gamma + T}\left(\pi_2 - \pi_1\right)\left(Y_{high} - Y_{low}\right) \tag{43}$$

Given the assumptions $\pi_1 < \pi_2$, $Y_{low} < Y_{high}$ and $a^*_{ref,UC} > a_{min}$, it can be shown from equation (43) that:

- The higher the weight of reform costs γ in the utility function, the lower needs to be the indifference reform effort level $a^*_{ref,UC}$ to assure that the recipient government will implement structural reforms, as $\frac{\delta a^*_{ref,UC}}{\delta \gamma} < 0$. Otherwise, the utility from using transfers without implementing structural reforms exceeds the utility of structural reforms, despite a low expected output.

- A large transfer T reduces the incentive for structural reforms, as $\frac{\delta a^*_{ref,UC}}{\delta T} = -\frac{1}{(\gamma+T)^2}\left(\pi_2 - \pi_1\right)\left(Y_{high} - Y_{low}\right) < 0$. The transfer compensates the government for the reduced utility of a low expected output in the case of using transfers for delaying reforms.

- A large difference of probabilities for high output $(\pi_2 - \pi_1)$ conditional to reform efforts allows a higher effort level for structural reforms (a_{ref}) relative to non-reforming (a_{no}). Structural reforms increase the expected output relatively more and, hence, the expected output, which compensates for reform costs.

- The same is true for the difference for high and low output $(Y_{high} - Y_{low})$.

In short, for this model of an unconditional supranational fiscal stabilization, moral hazard of politicians will result in delayed structural reforms if (i) the transfer income is high relative to expected output and reform costs, if (ii) political costs of structural reforms are high, or if (iii) the expected output after structural reforms is too low to compensate for reform costs. Because a low output is more likely without reforms, the dependency on transfers will persist as long as the recipient country has a low probability to generate a large output. Hence, unconditional transfers and the resulting decrease in reform activity (moral hazard) lead to delayed structural reforms which themselves constitute the need for further transfers. A vicious circle has set in.

Given political costs of structural reforms, unconditional supranational transfers are likely to be used for public consumption and to delay reforms. That applies to unconditional automatic national tax equalisation schemes in several euro area countries such as Germany or Belgium. Moreover, a supranational fiscal stabilization system for the euro area as proposed by von Hagen and Wyplosz (2008) or other supranational fiscal policy (Dullien and Schwarzer, 2009) would have similar implications.

4.3.3 Conditional supranational fiscal stabilization

One possibility to reduce moral hazard is to make transfers of a fiscal stabilization mechanism conditional to structural reforms. After the recipient country has accepted the conditions of transfers, the final decision to implement structural reforms remains with the recipient government. An example is the rescue package for Greece, which is conditional to structural reforms. Although the politicians seem to be willing to implement far-reaching structural reforms, it is not certain whether high political costs will make them change their mind.

Conditional transfers are modelled by weighting transfers T by the structural reform effort a_{ref}, due to the conditionality of transfers. The utility function (38) changes to:

$$U_A = E\left[Y_i|a_j\right] + a_{ref}T - \gamma a_j \tag{44}$$

Deriving the indifference reform effort level $a^*_{ref,CO}$, with the subscript CO indicating conditional transfers, yields:

$$a^*_{ref,CO} = \frac{1}{\gamma}\left(\pi_2 - \pi_1\right)\left(Y_{high} - Y_{low}\right) \tag{45}$$

The indifference level of conditional transfers in equation (45) is larger than that of unconditional transfers in equation (43). This indicates that, all variables equal, structural reforms are more likely with conditional transfers than with unconditional transfers. Transfers T do not negatively affect the decision on structural reforms. Nevertheless, if political costs of reform are too high the government will avoid reform and may divert transfers to finance non-reforming. The experience of East Germany, where transfers dedicated for investment were used for public consumption, shows the relevance of this model (Seitz et al., 2004). To avoid that transfers are not used in line with the agreed conditions, a monitoring system needs to be installed by the transfer payer, or conditionality needs to be enforced by penalties.

4.3.4 Co-financed supranational fiscal stabilization

Monitoring, however, is costly and penalties might not be credible. To avoid monitoring costs, a possibility to eliminate moral hazard within a supranational fiscal stabilization system is to provide transfers conditional to a co-financing by the recipient government. The recipient government has to add a certain percentage to each euro transfer they receive, which corresponds to an risk participation of the recipient government on transfers. Co-financing is for instance widely used for EU-Structural, Cohesion and Social Funds.

We include a co-financing contribution (S) in our model in form of a loss for the recipient government, as it cannot use these funds for other purposes. However, a higher expected output in the case of structural reforms makes the agent's contribution relatively less costly as it earns a "reform return". Therefore, the negative effect of the co-financing contribution is reduced by weighting co-financing S with $1 - E\left[Y_i|a_j\right]$. A high output because of structural reforms reduces the loss from co-financing. The utility function (38) becomes:

$$U_A = E\left[Y_i|a_j\right] + T - S + E\left[Y_i|a_j\right]S - \gamma a_j \tag{46}$$

The effect of a co-financed (CF) supranational fiscal stabilization on the reform incentive is scrutinized in the same procedure as in equations (40) to (42), which yields:

$$a^*_{ref,CF} = \frac{1+S}{\gamma}\left(\pi_2 - \pi_1\right)\left(Y_{high} - Y_{low}\right) \tag{47}$$

Co-financing (S) positively affects the indifference reform effort. The larger the co-financing the larger will be the incentive for structural reforms. Co-financing increases reform incentive of the recipient government, compared to conditional transfers, as it shifts some costs of non-reforming from the transfer payer to the transfer recipient. Thus, the risk participation motivates the transfer recipient government to implement structural reforms.

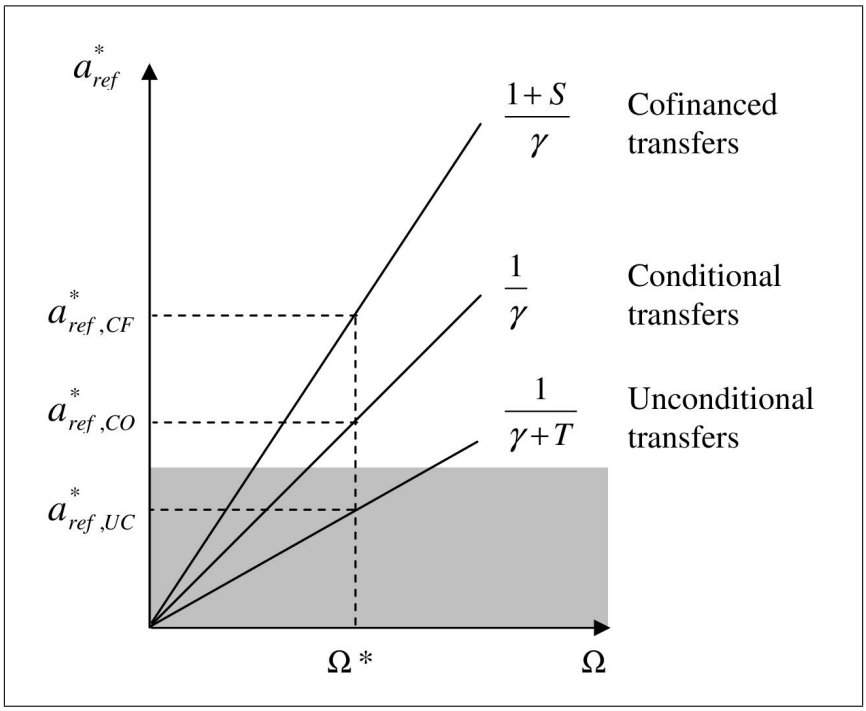
Summarizing, given a supranational fiscal stabilization system, unconditional and conditional transfers without monitoring provide the lowest incentive for structural reforms. Co-financing internalizes costs of non-reforming and is therefore reform enhancing. The order is visualized in Figure 25, which displays the indifference reform efforts a^*_{ref} at the y-axis dependent on the economic environment Ω described by $\Omega = \left(\pi_2 - \pi_1\right)\left(Y_{high} - Y_{low}\right)$ on the x-axis. The graphs indicate the three analysed variants of supranational fiscal stabilization. Their slopes are given by the first parts of equations (43), (45) and (47). Given a specific economic environment Ω^*, the graphs determine the indifference reform effort levels. Co-financed transfers have the steepest slope ($\frac{1+S}{\gamma}$), thus, the highest incentive for structural reforms (indicated by $a^*_{ref,CF}$). The grey area indicates the minimum reform effort a_{min}. As in Figure 25 $a^*_{UC} < a_{min}$, thus, reform incentive of unconditional transfers is too low given the Ω^*, no reforms would be implemented with a unconditional supranational transfer system.

4.4 National fiscal stabilization and structural reform incentive

4.4.1 National fiscal stabilization and moral hazard

The public debt issued in the case of national fiscal stabilization in a recession is based on a credit contract, through either a bond issue or a bank credit. A credit contract

Figure 25: Indifference reform incentive for supranational fiscal stabilization



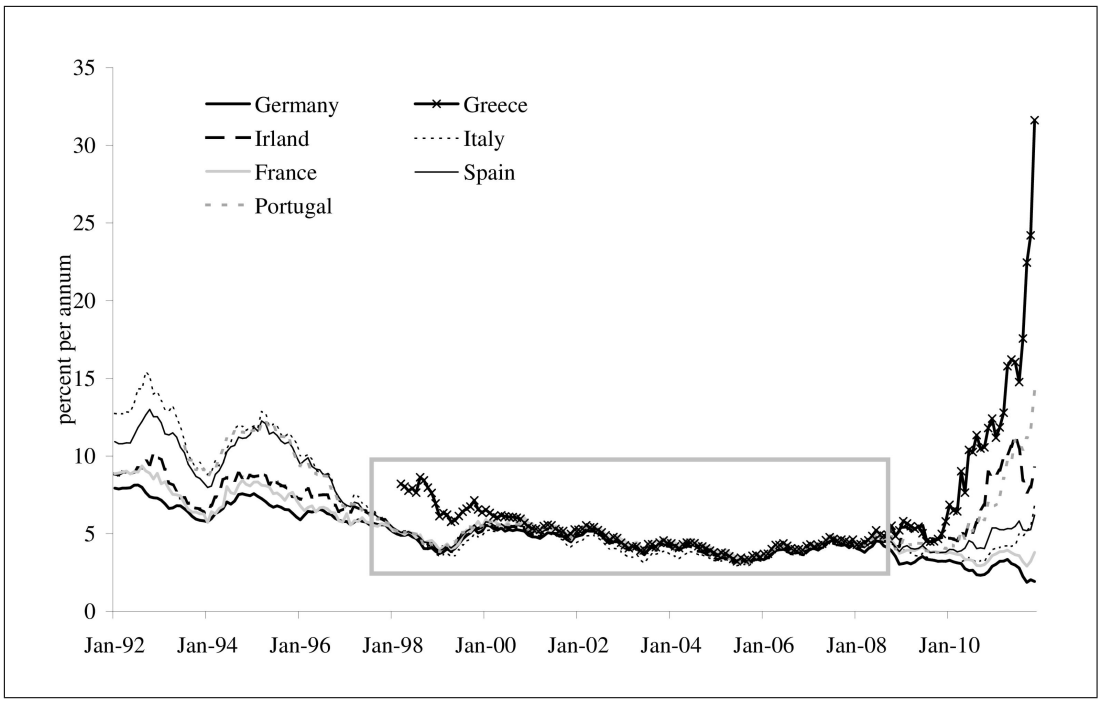
constitutes in theory an incentive compatible contract to overcome moral hazard in a principal agent setting (Dietrich and Vollmer, 2005). The agent (who borrows funds for investment from the principal) has to repay the loan plus the interest payment. Thus, the agent will only receive a return from its investment, if the overall investment return exceeds his payment to the principal. As the agent only gets the excess return, he has a strong incentive to work for the success of the investment project. In the context of public borrowing, this standard credit contract would imply that a government that raises public debt always has the incentive to implement structural reforms to increase the probability of a high output.

However, the general textbook setting does not fit in general to government debt. First, politicians borrow on the behalf of the public budget or public investment projects. They profit from the success of an investment project in the form of political success. Taxpayers indirectly carry the debt burden. The government and the person responsible for repayment of the debt (taxpayer) are not equal. This makes it possible that politicians use public debt to "bribe" voters prior to elections (Nordhaus, 1975) i.e. to finance the delay of structural reforms by increasing debt to postpone the political costs of structural reforms. The politician can buy its re-election or prevent public

opposition against reforms by passing the costs to future taxpayers (Rodrik, 1996).

Second, the possibility of a bailout of governments in the case of a default creates a further moral hazard situation – this time for lenders. If lenders anticipate that credit provided to a government is informally insured against default by a potential bailout they will not account for the risk of rising debt accumulation by the debtor government (Krugman, 1998, Corsetti et al., 1999). That can explain why interest rates for euro area government bonds converged to uncommonly low levels since 1998 until the 2008-2011 crisis (grey boxed area of Figure 26) although some European governments accumulated high stocks of public debt. Apparently, lenders seem to have interpreted all countries of the European Monetary Union as being jointly liable for a single member countries' debt. Markets seem to have ignored the European Treaty, which explicitly excludes bailouts for the euro area (Schnabl and Zemanek, 2011). Politicians might have exploited this market interpretation by using national fiscal stabilization for delaying structural reforms and thereby accumulating high levels of public debt.

Figure 26: Government bond yields for selected euro area countries (10-year benchmark bonds)



Source: Datastream, Note: The grey box indicates the era of low interest rates in the euro area.

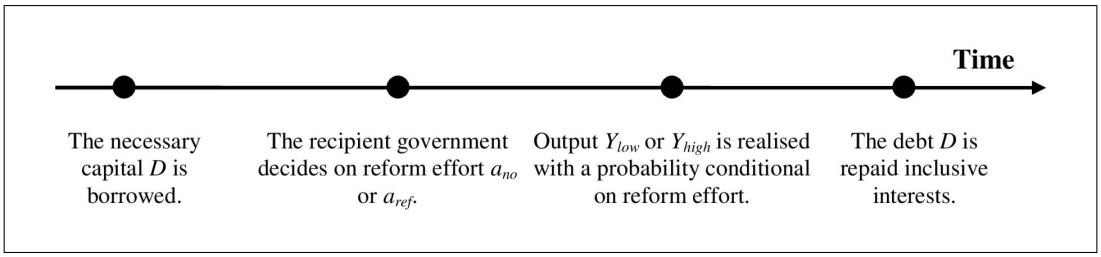
Therefore, we analyse the incentive for structural reforms given a national fiscal stabilization policy. We distinguish between public debt that have to be repaid after one

period and debt accumulation. The latter one represents the situation in the euro area prior the European debt crisis when easy lending conditions allowed euro area governments to accumulate large stocks of public debt.

4.4.2 National fiscal stabilization without debt accumulation

In this section, we abstract from debt accumulation and assume an one-period model. Public debt has to be repaid including interest payment after the period. Such a national fiscal stabilization without debt accumulation is a theoretical reference scenario related to the textbook case of an incentive compatible standard credit contract. The setting is that a government borrows capital, uses these capital for reforms or non-reforming, and needs to repay debt inclusive interest payment after output Y_A is realised. The game sequence for this national fiscal stabilization pattern is displayed in Figure 27:

Figure 27: Game sequence of the decision process – national fiscal stabilization without debt accumulation



For our analysis, we assume that the principal who provides capital has the stilized utility function of equation (37),[50] as we only analyse the agent's behaviour (receiving government). The utility function of the debt raising government (agent) is represented by equation (48). Similar to co-financed supranational transfers, the government's utility is positively dependent on expected output and borrowed funds (D) and negatively determined by political costs to use these funds for structural reforms γa_j. The redemption amount including interest payment $(1 + r) D$, with r indicating the interest rate, negatively enters the utility function. Similar to equation (46), redemption payment is weighted with $1 - E[Y_i|a_j]$ which makes the loss of utility of the repayment smaller in the case of a structural reforms as a higher output is expected.

[50] We concentrate on moral hazard in using the borrowed capital for structural reforms and abstract from moral hazard of lenders linked to an expected bailout.

$$U_A = E\left[Y_i|a_j\right] + D - \left[(1+r)\,D - E\left[Y_i|a_j\right](1+r)\,D\right] - \gamma a_j \tag{48}$$

Again, we analyse the incentive for structural reforms by comparing the utilities in the case of structural reforms and no reforms. The indifference reform effort $a^*_{ref,B}$ (with B labelling reference borrowing case without debt accumulation) is:

$$a^*_{ref,B} = \frac{1+(1+r)\,D}{\gamma}\left(\pi_2 - \pi_1\right)\left(Y_{high} - Y_{low}\right) \tag{49}$$

Assuming the redemption amount (borrowing plus interest payment) $(1+r)\,D = R$, equation (49) becomes:

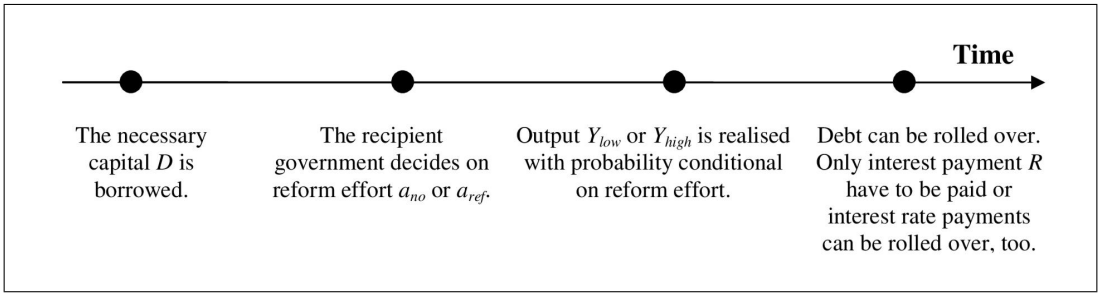
$$a^*_{ref,B} = \frac{1+R}{\gamma}\left(\pi_2 - \pi_1\right)\left(Y_{high} - Y_{low}\right) \tag{50}$$

Equation (50) has similar characteristics as equation (47) for a co-financed supranational fiscal stabilization. The decision on structural reforms depends positively on the redemption amount. Increasing interest payment R, either by a rising interest rate r or by a large credit D, increases the incentive for structural reforms. The redemption amount (thus, indirectly the interest payment) reduces the utility of expected output. Therefore, the government has an incentive to implement structural reforms to increase the expected probability for a high output Y_{high}, as long as reform costs γa_j are not prohibitively large and $a^*_{ref,B} < a_{min}$. Therefore, this case reflects the incentive compatible standard credit contract.

4.4.3 National fiscal stabilization with debt accumulation

However, the characteristics of government debt allow governments to accumulate public debt over time and to rollover debt to future taxpayers. We assume that debt has not to be paid back and the government can borrow additional capital if required. By doing so, the country accumulates a rising stock of public debt. The accumulation of public debt changes the game sequence. In Figure 28, the government borrows and decides on its reform effort. Then high or low output will occur. After that, either only interest rates have to be paid and debt will be rolled-over or debt including interest payments can be rolled-over.

Figure 28: Game sequence of the decision process – national fiscal stabilization with debt accumulation



Because the public debt has not to be paid back after the period, the raised capital has a similar characteristic as unconditional supranational transfers. It provides a larger utility in the case of non-reforming than in the case of reforming. Therefore, D enters the utility function of the recipient government similar to equation (39) and is weighted by $(1 - a_j)$. If only the initial debt D is rolled over and interest payments is made at the end of the period (partial debt accumulation), the redemption amount R (which includes interest payment) reduces the government's utility in equation (51) similar to equation (48). In the case that the debt and interest payment is rolled over (complete debt accumulation), the redemption amount exits the utility function, as shown in equation (52).

$$U_A = E\left[Y_i|a_j\right] + D - a_j D - \left(R - E\left[Y_i|a_j\right] R\right) - \gamma a_j \tag{51}$$

$$U_A = E\left[Y_i|a_j\right] + D - a_j D - \gamma a_j \tag{52}$$

The analysis for the government's incentive for structural reforms yields an indifference reform effort level $a^*_{ref,PDA}$ for a partial debt accumulation (PDA) of initial debt and $a^*_{ref,CDA}$ for a complete debt accumulation of interest payments and debt (CDA):

$$a^*_{ref,PDA} = \frac{1+R}{\gamma + D}\left(\pi_2 - \pi_1\right)\left(Y_{high} - Y_{low}\right) \tag{53}$$

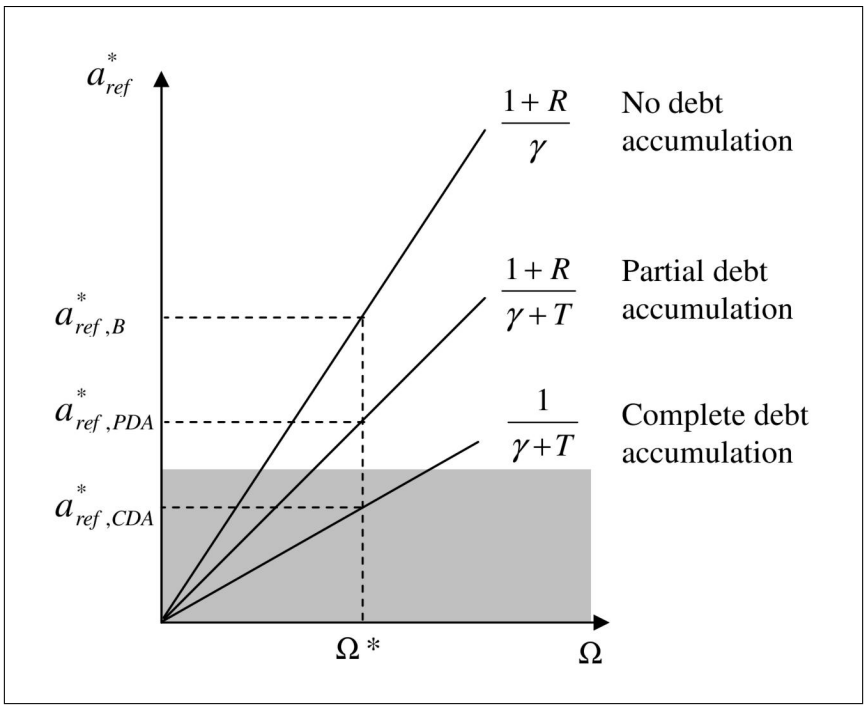
$$a^*_{ref,CDA} = \frac{1}{\gamma + D}\left(\pi_2 - \pi_1\right)\left(Y_{high} - Y_{low}\right) \tag{54}$$

Debt accumulation in equation (53) reduces the incentive for structural reforms compared to the reference case without debt accumulation as the debt D in the denominator reduces the reform indifference effort. Thus, only the interest payment (included in

$1 + R$) indirectly has a positive impact on the reform incentive. The utility of borrowed capital compensates for the low probability for a high output in the case of non-reforming and political costs of structural reforms are avoided. The moral hazard to use public debt for delaying reforms will be in particular strong, if debt and interest payments are rolled over (see equation (54)). Such unconditional public borrowing has the same low reform effort level as unconditional supranational fiscal stabilization (see equation (43)).

The order of structural reform incentives in national fiscal stabilization are presented in Figure 29. The indifference reform effort a^*_{ref} is plotted on the y-axis and the economic environment Ω with $\Omega = (\pi_2 - \pi_1)(Y_{high} - Y_{low})$ is on the x-axis. The grey area again shows the minimum reform effort a_{min}. In this example, public borrowing with a complete debt accumulation implies a too low incentive to implement structural reforms given a certain economic environment Ω^*. Non-reforming can be financed by public debt as long as borrowers are willing to provide funds and/or interest rates are low enough that interest payment do not exceed the utility from borrowed funds. In contrast, reform incentive of both other national stabilization mechanisms exceed the minimum reform incentive and would lead to structural reforms.

Figure 29: Indifference reform incentive for national fiscal stabilization



The declining interest rate levels in the euro area since the mid 1990s (Figure 26) can therefore be a reason, why many euro area countries did not reform since the start of the euro. In the context of our model, falling government bond interest rates (i) reduce the pressure on governments to use borrowed funds for structural reforms and/or (ii) provide an incentive to increase public debt. That correlates with results of empirical studies which find that reform activity in euro area countries did not accelerate after EMU (Duval and Elmeskov, 2006, Belke et al., 2006b, Zemanek et al., 2010). Instead, in many countries the government debt became a cheap policy option to finance unemployment benefits and public consumption to avoid structural reforms. This fuelled the build-up of intra-euro area imbalances until the financial crisis.

The build-up of large stocks of public debt happened although the institutional setting of EMU has aimed to prevent unsustainable debt accumulation. The Stability and Growth Pact (SGP) de jure limited public borrowing to three percent of GDP per year and the stock of public debt to 60 percent of GDP. However, the effectiveness of the SGP has been de facto very low and depending on political decisions. The mechanism to enforce structural reform did not work. Thus, the current European debt crisis is partially the result of the weakness of the SGP. The (almost) default of Greece and Portugal may now enforce structural reforms in these crisis countries. However, the political will of European politicians to avoid a present default in the euro area has lead to the rescue package for Greece and the proposal of a permanent European Stability Mechanism ESM (starting 2013).[51] The credit facilities are a quasi-supranational fiscal stabilization system. Yet, it is unclear whether the conditionality of these transfers becomes binding in the long-term. This imposes the threat that necessary structural reforms might be further delayed and supranational transfers will be necessary in the future.

This analysis shows that the institutional setting of fiscal stabilization mechanisms determines whether a government feels forced to structural reforms or whether it will finance non-reforming with transfers or public debt. Either national or supranational fiscal stabilization could be used to postpone structural reforms, for instance unconditional supranational fiscal stabilization as well as a national fiscal stabilization with

[51] In December 2011, euro area countries agreed on to set up the ESM in 2012, but the contract still waits for signing.

debt accumulation. Co-financed supranational fiscal stabilization and public borrowing without (or a very restricted) debt accumulation might stimulate structural reforms. Table 29 summarizes different fiscal stabilization systems and their incentive for structural reforms.

Table 29: Fiscal stabilization systems and incentive for structural reforms

Indifference reform level - supranational fiscal stabilization	Incentive for structural reforms	**Indifference reform level - national fiscal stabilization**
Unconditional supranational fiscal stabilization	LOW	Complete debt accumulation
$a^*_{ref,UC} = \frac{1}{\gamma+T}(\pi_2 - \pi_1)(Y_{high} - Y_{low})$		$a^*_{ref,CDA} = \frac{1}{\gamma+D}(\pi_2 - \pi_1)(Y_{high} - Y_{low})$
Conditional supranational fiscal stabilization	MIDDLE	Partial debt accumulation
$a^*_{ref,CO} = \frac{1}{\gamma}(\pi_2 - \pi_1)(Y_{high} - Y_{low})$		$a^*_{ref,PDA} = \frac{1+R}{\gamma+D}(\pi_2 - \pi_1)(Y_{high} - Y_{low})$
Co-financed supranational fiscal stabilization	HIGH	Without debt accumulation
$a^*_{ref,CF} = \frac{1+S}{\gamma}(\pi_2 - \pi_1)(Y_{high} - Y_{low})$		$a^*_{ref,B} = \frac{1+R}{\gamma}(\pi_2 - \pi_1)(Y_{high} - Y_{low})$

4.5 Economic policy implications

The main implication of this paper is that the design of a fiscal stabilization mechanism affects structural reform activity. In particular, unconditional tax equalisation schemes erode structural reform incentives in the recipient country, which creates a vicious circle: Supranational transfers finance the delay of structural reforms, which again makes transfers necessary. Only a strict conditionality and an independent monitoring of the transfer or co-financing of transfers can enhance the efficiency of a supranational fiscal stabilization. In that light, the proposed explicit fiscal equalisation mechanism at EU level (von Hagen and Wyplosz, 2008) and a further development of the ESM towards an implicit transfer union need to be treated with caution. The urgently necessary structural reforms to adjust the real exchange rate towards increased competitiveness in the euro area would be postponed and the need for further fiscal stabilization would persist.

Our research supports a tightening and the strict application of the Stability and Growth Pact. If countries are able to accumulate excessive public debt, the potential to finance persistent fiscal stimulus and to delay necessary structural reforms via new debt will arise as long as creditors are willing to provide funds, as in the case of Portugal

and Greece. In this context, a credible limit to public debt level and a very restricted borrowing, such as constituted in a fiscal rule (e.g. the German *Schuldenbremse*), will increase the incentive for structural reforms.

However, the current EU bailout package for Greece, the current EFSF bailout of Portugal and Ireland as well as the future ESM might allow Greece and other countries to postpone reforms further. It depends on the EU and its member countries to enforce structural reforms to ensure the realignment of real exchange rates to reduce the intra-euro area imbalances, at the risk of political resentments or even disintegration. A better design of fiscal stabilization policy or a better enforcement of debt rules in the euro area would have done better.

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This thesis analyses determinants for structural reforms in the euro area. First, it is theoretically scrutinized how the common monetary policy of the European Central Bank causes a reform bias between small and large countries. Second, it is examined how private market adjustment, structural reforms and their interaction affect the intra euro area current account balances of euro area countries. Third, it is analysed how an asymmetric foreign asset and liability distribution across the euro area affects single countries need for structural reforms of labour markets. Fourth, the impact of fiscal stabilization policy on structural reform activity will be examined.

Selbständigkeitserklärung

Statement of Authorship

Hiermit erkläre ich, die vorliegende Dissertation selbständig und ohne unzulässige fremde Hilfe, insbesondere ohne die Hilfe eines Promotionsberaters, angefertigt zu haben. Ich habe keine anderen als die angeführten Quellen und Hilfsmittel benutzt und sämtliche Textstellen, die wörtlich oder sinngemäß aus veröffentlichten und unveröffentlichten Schriften entnommen wurden, und alle Angaben, die auf mündlichen Auskünften beruhen, als solche kenntlich gemacht. Ebenfalls sind alle von anderen Personen bereitgestellten Materialien oder erbrachten Dienstleistungen als solche gekennzeichnet.

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As signed version has been submitted to Universität Leipzig, Wirtschaftswissenschaftliche Fakultät.