FINANCIAL AND ECONOMIC CRISIS:

CAUSES, CONSEQUENCES AND THE FUTURE

Lubor Lacina Petr Rozmahel Antonin Rusek (editors)

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Financial and Economic Crisis: Causes, Consequences and the Future

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Introduction

The financial and economic crisis and its aftermath changed the economic and political landscape around the world. Its impact on international economic relations in general and the differential impact on the national economies in Europe poses a key challenge for both the European and national institutions.

The contributions in this volume explore the implications of the economic and financial crisis for the economic policies (especially from the perspective of monetary, fiscal policies). Emphasis is given to the functioning of the European Economic and Monetary Union.

The book is divided into three parts and the Epilogue. The first part discusses the dynamics of the Eurozone, its history, present difficulties and possible future trajectories.

In the first chapter, Antonin Rusek from the Susquehanna University in Selinsgrove, Pennsylvania, answers the question whether the Eurozone's countries converge or diverge over time. He looks at the dynamics of 10 economic variables, covering the general performance (GDP, consumption), price environment (prices and interest rates), both public and private financial variables and competitiveness (real effective exchange rates, unit labor costs etc.). His complex analysis of the data indicates that whereas in most of areas neither convergence nor divergence can be identified, in the all important competitiveness area the long-term divergence between the North and the South of the Eurozone is undeniable.

The second chapter is authored by Horst Tomann from the Freie Universitat in Berlin, Germany. The purpose of his discussion is to demonstrate the limits of public debt in a monetary union. Referring to the European Monetary Union (EMU), the Greek over-indebtedness is taken as a case for policy coordination. Within the institutional setting of the EMU there are several policy options to resolve the problem of overindebtedness. Rather than debating the institutional details, the author is concerned with the economic rationale of those options. In this perspective, a policy coordination seems to be required to avoid a process of deflation in Europe.

In the third chapter Lubor Lacina and Milan Jílek from Mendel University in Brno, Czech Republic discuss the deficit biases of public finances, public debts and fiscal rules in the EU.

They argue that public deficits and debts, by virtue of their dynamics and the levels they reach, are a developmental phenomenon in the majority of European and non-European economies. Because of the real problems they entail, an extensive amount of theoretical and empirical research is focused on the issue. It assumed greater importance when the recent economic crisis forced governments to offer large-scale discretionary fiscal economic incentives, leading to significant structural deficits and a rapid growth of the public debt. Because of the time inconsistency of government policies, it is clear that what is at stake is the sustainability of fiscal policy in many countries. Substantial motivation thus exists to seek out mechanisms to solve the problem imposed by the deficit tendency in public finance.

The prospects of Sweden and UK joining the Eurozone in the future are analyzed by Hubert Gabrisch, the Director of Halle Institute of Economic Research in Halle, Germany, in Chapter 4.

The aim of his discussion is to assess whether central banks of Sweden and UK would lose their influence on monetary developments in their countries and, instead, gain influence in ECB monetary policy decisions in case of Euro adoption. Hence, the chapter does not estimate a model for possible welfare gains and losses of adopting the Euro by these two EU member countries. Rather, it is a policy study with a focus on one of the economic reasons behind the political decision to preserve an own currency in order to stabilize the economy against adverse country-specific disturbances. In part, it observes that in Sweden and UK, because in both countries the floating exchange rate is coupled with inflation targeting by the central bank – the institutional requirement for doing this is an independent monetary policy.

The second part of the book is dedicated to the discussion of the impact of the financial and economic crisis across the EU – with the emphasis on the non-Eurozone EU members

Adam Koronowski from the Collegium Mazovia in Siedlce, Poland, looks at the impact of the crisis on the policy credibility of some EU countries in Chapter 5.

He stresses that the recent financial and economic crisis had an asymmetric impact on the countries of the European Union. While some reasons for this asymmetries are identified, others remain far from being clearly and openly expressed. In particular, it is not quite obvious why some countries experienced a sharp decline in their credibility in the financial markets. This credibility crisis is commonly explained with poor fiscal stance and high public deficits in the respective countries; Portugal, Ireland, Italy, Greece and Spain (PIIGS). The problem with this explanation is that high public debts and deficits are not specific only to these countries.

PIIGS countries also share another feature; they have high current account deficits and considerable negative international investment positions and at the same time they don't have a simple tool to improve their balance of payments situation; the exchange rate.

Although fiscal stance and public debt are important, countries which were hit most experienced a broader problem of foreign debt crisis which mirrors the situation of the private sector, too. This characteristic of the crisis is blurred by the membership of the countries in the Eurozone.

When we accept this diagnosis a question about positive policy actions arises. Unfortunately, fiscal consolidation in the most problematic countries is neither an optimum solution nor a real possibility. Countries which are in the Eurozone are unable to use individual monetary and exchange rate policy which seems otherwise a proper instrument in their situation. Moreover, the economic policy of the European Union in the face of the crisis is erratic, in the breach of important rules which were supposed to govern economic life in the EU and the Eurozone. Moreover, it does not address in a perspective manner the specific problems encountered by these countries which experience the most strain. The future looks misty and dark.

In Chapter 6 Carsten Colombier of the Federal Finance Administration, Bern, Switzerland, looks on the way how to consolidate government budgets in the environment of external imbalances.

His analysis focuses on the western European countries of the EMU. In deviation from the relevant literature external imbalances are explicitly taken into account and the longer-term impact on productivity growth is analysed. The evidence that austerity measures in the EMU have affected labour productivity growth adversely is provided. Therefore, the view that fiscal contractions are expansionary in the longer run is rejected in the case of the EMU. In particular it is suggested that Euro area countries, which run a current-account deficit, should only start with austerity measures if a sustainable upturn sets in. Otherwise a negative spill-over for other EMU members is to be expected. As all Euro area countries cut their budgets simultaneously a savings paradox is likely. The latter may only be averted by either a fundamental change of fiscal stance in the current-account surplus countries such as Germany or if the current recovery in these Euro area countries boosts domestic demand in due time. Additionally, the level of public debt in the EMU would not appear to have interfered with fiscal policy.

Karin Kondor from the Estonian Ministry of Finance in Tallin, Estonia, and Karsten Staehr from the Tallin Eniversity of Technology and Bank of Estonia in Tallin, Estonia discuss the impact of the global financial crisis on the output performances across the EU in Chapter 7.

They attempt to explain the different output performance in the 27 countries in the EU based on measures of their pre-existing vulnerability and resilience. Rapid financial deepening and high leverage, both domestically and externally, aggravated the crisis and led to larger output losses. The level of financial depth, on the other hand, did not have a negative effect on output during the crisis. A large degree of trade openness was associated with worse output performance, possibly because of export demand falling markedly during the crisis. Finally, government deficits and debt stocks do not seem to have affected the output negatively. The Baltic States stand out as having a substantial leverage in the sample because of their very large output losses during the crisis.

In Chaper 8, Péter Halmai and Victória Vásáry from the University of Pannonia in Veszprem, Hungary, discuss the relationship between the economic crisis and a potential growth across the EU.

They point out that the financial crisis affected the different EU states to a different extent. The symmetric shock had asymmetric consequences. The chapter compares the European processes of the potential growth in different country groups and draws conclusions. Changes in the convergence processes connected to the potential growth in the European Union are analysed separately. In addition, the chapter studies possible post-crisis trends and possibilities for the economic policy to increase the potential growth. The possible role of macroeconomic policies and the institutional system is increasingly focused on by modern growth theories. Economic policy reforms are studied as regards their role in strengthening the potential growth.

The impact of the world economic crisis on unemployment in Spain is described in Chapter 9 by Lubor Lacina and Marian Petrjanoš from the Mendel University in Brno, Czech Republic. The chapter focuses on the evaluation of Spanish labor markets and their reaction to the recent economic crisis. The aim is to analyze the impact of crisis on the macroeconomic performance of the Spain. The comparative analysis of selected economic indicators, mainly on the labor market and competitiveness is performed. There is also a focus on the microeconomic background concerning especially the Spanish labour market institutions such as the employment protection legislation and a collective bargaining. These labour market institutions, sometimes called "labour market rigidities", may be partly blamed for the labor market performance and its slow adjustment process during the crisis.

The third part of the book provides some views on the relationship between the financial crisis and the performance of the EU's "new member countries" – i.e. the countries which joined the EU in 2004 and 2007.

In Chapter 10, Petr Rozmahel and Nikola Najman from the Mendel University in Brno, Czech Republic try to find some evidence of the European business cycle emerging during the recent years of economic and monetary integration in Europe.

They ask whether the integration processes are sufficiently dominant to bring the European cycle into existence during the analyzed period. In the first part of their analysis Rozmahel and Najman estimate static cross correlations describing actual business cycle similarity during the whole analyzed period. To find the convergence trends they then measure correlations in two and also four consecutive periods in 1996–2009. Increasing correlation with satisfactory significance level proves business cycle convergence. Authors suggest two benchmarks to identify European business cycle shaping. The Euro area average (EA-2000, EA12-2006, EA13-2007, EA15-2008, EA16) of quarterly GDP and US economy quarterly GDP representing the rest of the world economy are used as benchmarks for correlation measuring. Increasing correlation towards the Eurozone cycle and simultaneous decrease in correlation of majority of selected countries towards the US is then considered as emerging European business cycle in authors analysis.

Stanislav Cernosa of Aristej Research Group, Maribor, Slovenia discusses the vertical intraindustry trade between the CEE's and the core EU member states in Chapter 11. The aim of his chapter is to reject the prediction of the standard HOV model that there is relatively little intra-industry content in bilateral trade between the less developed Czech Republic, Poland and Slovenia as the Central European countries (CEC-3), and the fifteen on average more developed core European Union states (EU-15). The fact is that Central European countries are deeply integrated in trade with either horizontally or vertically differentiated products, and that EU-15 members are the most important trading partners. Consequently, if trade with differentiated products exists between less developed countries and on average more developed EU-15 members, then the expected share of intra-industry trade in this trade relationships is anything but zero.

Milan Palát from the Mendel University in Brno, Czech Republic, contributed Chapter 12. The author discusses dynamics of investment and saving activities in EU countries. He points out that in the new member countries of the European Union, the rate of investment was exceeding the rate of saving in most of the monitored period whereas in the "original" EU-15 countries as a whole, the rate of investments roughly corresponded to the rate of saving on a long-term basis. For the purpose of comparison, a difference indicator between the rate of investment and the rate of saving in EU-countries is developed and monitored. Polynomial trends of the difference indicator of the rate of investment and the rate of saving in the reference period indicate similar developmental tendencies in several groups of countries under investigation. This analysis also proves that there is a correlation between the rate of investment and the rate of saving in most observed countries.

In the last chapter Krzysztof Kompa and Dorota Witkowska, of the Warsaw University of Life Sciences, Warsaw, Poland, discuss the dynamics of capital markets in the Baltic States in the first decade of the 21^{st} century.

The aim of their discussion is the basic comparative analysis of Baltic Security Exchanges in the period from January 2000 to March 2010. They employ the daily rates of return and risk measures as the most important characteristics that describe financial instruments, and the analysis of these features is always provided when investing is considered. In the chapter the measures of central tendency, dispersion, asymmetry and flatness and correlation are applied and discussed in depth in the comparative context.

In the Epilogue Antonin Rusek looks at the near term future of the world economy in the mirror of the recent economic dynamics. In his view, the US economy is unlikely to recover before 2013. Chinese (and other Asian) economies will slow down – how much remains to be seen. Europe is and will remain in the centre of problems, even if the main source of the European difficulties is political dogma (the preservation of the European in its current shape and scope) rather than a genuine economic difficulties.

But, indeed, future is always unpredictable, but it is. Caveat Consules.

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I The Eurozone: Past, Present and . . .

1 The Eurozone: Convergence or Divergence

(Some thoughts about the long-term dynamic forces in the EMU 1999–2010)

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1.1 Introduction

Will the Eurozone in its present form survive the next decade? And if not, what monetary and political arrangements can we expect in the geographical area commonly known as Europe? For the European Integrationists such questions do not even exists (and some of them think that these questions should not even be asked). However, for the realists this is The Question to ask. After all, the answer (whatever it may be) will significantly determine the economic (and, indeed, the political) dynamics of Europe in the foreseeable future.

Indeed, one may safely assume that the European interstate currency (Euro) will survive in some form and so will the European economic integration. What form it will be remains, however, a question. One may only welcome the (finally) increasing debate about the Euro's and the Eurozone's future. Recent essay of Goodhart (2010) is a brilliant example of what can be achieved by the unprejudiced mind.

The objective of this chapter is to contribute to this analysis by comparing the long-term dynamics of major economic indicators in the Eurozone's North and South. Indeed, today it is increasingly accepted that the divergences between the Eurozone member economies are at the root of the current crisis.

It is recognized that the Eurozone (the group of countries using the common currency Euro) is, indeed, first and foremost the political creation (Waigel, 2008). Nevertheless, as an economic phenomenon the Eurozone is a subject of the economic analysis. It was understood from the beginning that the prospective European common currency area is not OCA (optimum currency area). (Bayoumi and Eichengreen, 1993) In response to this some economists, starting with Frankel and Rose (1996), argued that the introduction of the common currency brings the participating countries closer to an OCA – hence the OCA is an endogenous phenomenon.

After the establishment of the Eurozone (January 1999), the ideas of an "endogenous OCA" were developed (and partially tested) by several economists, among them De Grauwe and Mongelli (2005) and Warin, Wunnawa and Janicki (2009). These represent the confirmation, albeit qualified, of the endogenous OCA.

On the other side, Marco Buti, Director General of ECOFIN, expresses the concern about growing divergences within the Eurozone in the areas of public debt, current account imbalances and competitiveness (European Commission, 2010). Similarly Rusek (2010) fails to find a significant convergence trend in a broad group of Eurozone's economic indicators.

The variety of results concerning the conversion of the Eurozone into the OCA and, perhaps more importantly, the transformation of the political arrangement into a genuinely integrated economic area warranties the look at the actual historical dynamics in the Eurozone, especially into a comparison of its "northern" and "southern" parts. This chapter is the step in this direction. The methodological approach and data are discussed in Section 1.2. Section 1.3 reports the empirical findings and Section 1.4 concludes.

1.2 Methodological Approach and Data

The goal is to compare the performance of the different parts of the Eurozone as a whole, not of individual countries. And, indeed, we aim at getting a broad picture of the Eurozone dynamics in a multidimensional economic space. Therefore, the following approach was adopted:

The definition of the Eurozone is limited and includes only the original 11 countries (Belgium, Germany, Austria, Netherlands, Luxemburg, Finland, France, Italy, Spain Ireland, Portugal) plus Greece, which joined in 2001. Slovenia (which joined in 2007), Malta and Greek Cyprus (which joined in 2008), Slovakia (joining in 2009) and Estonia (joining in 2011) are excluded, given the short time series available.

We define as "northern" part the group of 7 countries – Germany, Austria, Netherlands, Belgium, Luxembourg, Finland and France. "Southern" part is then composed of Italy, Spain, Portugal, Greece and Ireland.

To measure the group wide economic dynamics, the variability (measured as the coefficient of variation) for each variable was calculated, both over the all 12 countries and over the seven "northern countries per each period. The resulting time series were then analyzed for their dynamic properties and compared to one another. (This approach was preferred to the direct comparison between the "northern" and "southern" groups, given the fact that the small size of the southern group -5 countries only - may rise doubts about the statistical reliability of numbers derived from the 5 observations only.) It is then obvious to conclude that if the difference in variabilities between the "northern" group of 7 countries) declines over time, we observe the increasing convergence in the measured variable. And, indeed, the increasing difference in measured variabilities indicates a rising and cumulative divergence between the "northern" and "southern" parts of the Eurozone.

The data analyzed include the GDP per capita, consumption per capita and the unemployment rate, all representing the general and observable economic conditions. Nominal and real interest rates and the HICP inflation rate represent the dynamics of the pricing environment. Gross domestic government debt to GDP ratios reflect the dynamism of fiscal policy (remember, there is no national monetary policy in a currency union). The unit labor costs based real effective exchange rates (REER) and the labor productivity reflect the dynamics of the competitiveness within the Eurozone. Finally, the evolution of current account deficits (as a ratio to GDP) indicates both the evolution of the domestic fiscal stance and the competitiveness (European Commission, 2010).

The most of data used in the analysis were obtained from the Eurostat data bases, except for the REER which are available from the ECB. Depending on the variable, the data are available either in the monthly frequency, covering the period 1999:M1 to 2010:M5 and indicated as (m) in Table 1, or in the quarterly frequency, indicated by (q) in Table 1 and covering the period 1999:Q1 to 2009:Q4.

1.3 Empirical Results

Analytical results are reported in Figure 1 and Tables 1 and 2.

The data in Figure 1 were normalized to get all in the same scale and hence graphically comparable. The formula used was $VM_{it} = (\sigma_{it}/ /\sigma_i(1999:1)) - 1.0$, where VM_{it} is the value of the normalized variable i at the period t, σ_{it} is the variability coefficient for the original variable i at the period t and the $\sigma_i(1999:1)$ is the value of the original variable i (variability coefficients) at the starting period (first quarter or month of 1999 respectively). i denotes individual variables as listed above.

Graphical results indicate that there was a very little of what could be called a "significant" decline in the variability differences between the Eurozone as a whole and the "North" (i.e. the graphs positioned below the zero line) in any variable. That, indeed, indicates no significant and meaningful convergence between the "south" and the "north" of the Eurozone. Possible exemptions are the unemployment in the pre-recession period (2002–middle 2008) and the public debt to GDP ratios just after the establishment of the Eurozone (from the middle of 2001 to the end of 2003). But even here the variability increased with the onset of recession On the other side, the differences in variabilities between the Eurozone as a whole and the "north" - indicating the rising divergence between the "north" and "south" - of the REER's and the labor productivity (from the beginning of the Eurozone) increased significantly, indicating a steadily rising divergence in the competitiveness. In other variables the differences in the variability between the Eurozone as a whole and the "north" appear to remain basically unchanged compared to the state when Euro was introduced.

Next step was to conduct the more formal statistical inquiry. All variables (i.e. the time series for the differences in the variability indicators between the Eurozone as a whole and the "north" for all variables specified above) were first tested for unit roots. The results are reported in Table 1 for both ADF and Perron tests.

The hypotheses of unit roots - i.e. the stationarity of the measured variable - are rejected in the all cases except two - the consumption per capita and the current account to GDP ratio. In the latter two the results are undetermined, with the unit root hypothesis accepted by the one test but rejected by the other. That indicates that eight out of ten of the analyzed variables were not truly stationary - i.e. with the both stationary mean and variance - during the whole common currency (i.e. the Euro) - period. In the remaining two the true stationarity is possible, but only possible.



Figure 1 Variability of Selected Indicators In The Eurozone Source: Own Calculations Based On Eurostat Data.

To get a better understanding of the time related dynamics of all analyzed variables, each variable was regressed against the constant and the time trend. Given the significant serial correlation displayed by the most variables, the Beech-McKinnon ML estimator was applied. Results are reported in Table 2.

Only one of the analyzed variables – GDP per capita – displays the statistically significant negative trend, indicating an observable convergence process between the "north" and the "south" of the Eurozone.

Variable	Lags	ADF Test	5% Crit	Perron Test	5% Crit	Result
GDP per Capita (q)	1	-1.78	-2.94	-1.67	-2.94	Rejected
Consumption Per Capita (q)	3	-4.21	-2.94	-2.70	-2.94	Undetermined
Unemployment (m)	1	0.23	-2.88	1.84	-2.88	Rejected
Inflation (m)	2	-2.53	-2.88	-2.17	-2.88	Rejected
Long Term Interest Rates (m)	2	-1.56	-2.88	-1.65	-2.88	Rejected
Gov. Debt to GDP Ratios (q)	1	-1.00	-2.94	-1.51	-2.94	Rejected
Current Account To GDP Ratios (q)	8	-2.83	-2.96	-4.65	-2.93	Undetermined
Person Labor Productivity (q)	1	-1.59	-2.94	-1.39	-24.93	Rejected
REER based On ULC (q)	2	-1.55	-2.94	-1.34	-2.94	Rejected
Real Interest Rates (m)	1	-2.64	-2.88	-2.17	-2.88	Rejected

Table 1 Unit Roots Tests

Source: Own Calculations Based On Eurostat Data.

Five variables report a statistically significant positive coefficient for the time trend variable, indicating the rising divergence between the "north" and "south" over the period of the Eurozone existence.

Of those the unemployment is perhaps to be explained by a combination of socio-cultural values and demographic trends. But the public debt to GDP ratios and (to a degree) the current account to GDP ratios reflect the north-south differences in the fiscal rectitude and discipline. The latter, together with REER's and the labor productivity, then indicate the rising divergence between the Eurozone's "north" and the Eurozone's "south" in the key long-term variable – the competitiveness.

Variable	Constant	Trend	Coef. of Serial Correlation (rho)	Rbar ²	Result
GDP per Capita	0.0002 (8.639)	-0.0001 (5.844)	0.4255 (2.868)	0.73	Declining
Consumption Per Capita	0.0002 (7.541)	-0.0001 (0.055)	0.7635 (6.918)	0.53	Steady
Unemployment	-1.3778 (1.672)	0.0132 (3.538)	0.9960 (132.8)	0.99	Increasing
Inflation	21.928 (1.586)	-0.0015 (0.205)	0.9547 (38.97)	0.91	Undetermined
Long Term Interest Rates	49.687 (5.451)	-0.0451 (0.911)	0.9546 (39.80)	0.94	Steady
Gov. Debt to GDP Ratios	-1.4055 (1.370)	0.0638 (3.847)	0.6786 (5.539)	0.81	Increasing
Current Account To GDP Ratios	-0.2041 (0.182)	0.0391 (2.151)	0.2260 (1.412)	0.17	Increasing
Person Labor Productivity	-3.1696 (4.354)	0.0872 (7.405)	0.6810 (5.553)	0.92	Increasing
REER based On ULC	-0.9116 (0.391)	0.0314 (2.854)	0.9352 (15.90)	0.93	Increasing
Real Interest Rates	14.572 (1.031)	0.0342 (0.444)	0.9402 (33.61)	0.89	Undetermined

Table 2 Estimates

Source: Own Calculations Based On Eurostat Data.

These results are not really surprising (European Commission, 2010). But the rising divergence here constitutes the major problem for the cohesion of the Eurozone – or perhaps even a threat for the Eurozone's survival in its current re-incarnation.

The differences in variabilities between the Eurozone as a whole and the "north" remain steady for the consumption per capita and the long-term real interest rates. But this indicates the lack of convergence between the "north" and "south". HICP inflation and the nominal interest rates estimates remain undetermined, indicating a "Brown motion" type of the random processes. But again, no north-south convergence is indicated.

To summarize, both graphical and statistical analyses do not show any convergence trends and/or tendencies for nine of the 10 variables chosen. But they confirm several divergent trends, most importantly in the competitiveness area.

1.4 Conclusion

In conclusion to this analysis, it has to be emphasized again that EMU is first and foremost the political arrangement, albeit with a significant economic impact. Its cohesion is therefore determined by the political will to remain the member of the arrangement. This in turn will be influenced by the impact of relative economic performances on the domestic political processes in individual Eurozone member countries. But it must be stressed here that economic considerations, even if they receive the most attention from both the economists and the general public, are only parts of the overall process of political decision making, and may be not the most important ones. Countries engagement in complicated structures of the global security and political and economic relationships goes far beyond a simple calculus of economic gains and losses. And it is with this in mind we should evaluate the above reported results.

Indeed, in its first 11 years of existence, the Eurozone was a reasonably cohesive political arrangement. However, significant cracks in its economic façade are clearly developing in the areas most important for the long run economic performances of individual countries – productivity and competitiveness. And, indeed, the observed economic divergence trends are along the most politically sensitive north-south axis. Unless addressed, these may constitute significant, and perhaps ultimate, threats to the Eurozone cohesion and perhaps to its existence.

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2 The Challenge of European Policy Coordination After the Economic Crisis

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> 'The funny thing is that ... the expectations, even the prejudices of investors, become economic fundamentals'

> > Paul Krugman The Return of Depression Economics

Since 2010, the stability and viability of the European Monetary Union (EMU) has proved to be highly vulnerable to the second-round effects of the US sub-prime crisis. The main challenge was not in the first place an attack on the exchange rate of the Euro – which proved to be rather stable vis-à-vis the dollar. Instead, the challenge came as an attack on the financial viability of highly indebted countries within the EMU. In early 2010, those countries which had benefitted from the credibility of the Euro until then, in particular Greece but also Portugal and Ireland, experienced a dramatic rise in the spreads of government bonds. The market for Greek government bonds dried up totally. As a consequence of the market's perception of excessive deficits, the Euro's credibility was set at stake. So, European policy coordination was challenged: The European partners, in particular the partners in the European had to assist Greece that could not regain a sustainable budget on its own. This "bilateral" assistance in fact did violate the Treaty's no-bail-out clause which for the first time would have become effective. Financial markets calmed down but temporarily. The European Council met to an urgent weekend session of May 7–9 to conclude a Financial Stabilisation Facility (EFSF) for assistance of European governments under threat of insolvency. This enormous facility which together with IMF-assistance sums up to €750 bn, about five times the ordinary EU budget, was born under heavy pressure of international financial markets and rating agencies that had put solvency of Portugal and Spain into question. The package was again intended to be a temporary device to calm down markets and was enriched by some IMF-conditionality. When Ireland had to draw on this facility in order to stabilise its banking sector, the debate continued whether Portugal and Spain would be the next candidates. It became clear that eventually the union would lack the political power to stem such a burden which was an enlarged security net for banks and their investors. By overruling the Treaty's no-bail-out clause twice the Council had set the substance of the Treaty at stake. Going on with that kind of solidarity would end up in a European transfer union between 'weak' and 'strong' members.

Against this background, the purpose of this chapter is to demonstrate the limits of public debt in a monetary union. Referring to the European Monetary Union (EMU) the Greek over-indebtedness is taken as a case for policy coordination. Within the institutional setting of the EMU there are several policy options to resolve the problem of overindebtedness. Rather than debating the institutional details, the chapter is concerned with the economic rationale of those options. In this perspective, policy coordination seems to be required to avoid a process of deflation in Europe.





2.1 The Greek Tragedy

An economic analysis has to distinguish two different aspects of the problem: First, is the Greek deficit unsustainable? And what are the adequate measures of economic policy to regain sustainability? Second, which measures are required to regain the confidence of investors, not only to hold Greek bonds but also to invest in Euro. It is this second aspect of the problem that urges the European partners and the EU to engage in measures of cooperation and coordination. This is an urgent task since investors' confidence may deteriorate in a self-fulfilling process quite independent of the Greek deficit problem.

Is the Greek deficit unsustainable? After the Greek government has abandoned its practice of creative accounting, it disclosed a budget deficit of more than 12 percent of GDP in 2009. The corresponding debt ratio, the total amount of debt in relation to GDP, was calculated above 110 percent. According to the criteria of the Stability and Growth Pact, these figures are clearly excessive. But is the Greek debt unsustainable? The actual size of the deficit is the result of the crisis. Greece had provided a rescue fund for banks, and the economy was hit severely and unemployment rose. Nonetheless, the Greek budget shows a structural deficit of considerable size. So, to calm down the EU Commission and the Council, prime minister Papandreou promised to reduce the budget deficit by four percentage points this year. By this binding commitment he gave up any flexibility to combat the consequences of the crisis in his country.

A short primer on fiscal policy should remind us of the criteria to evaluate the sustainability of a budget. The budget balance,

$$BB = G - T + iD = \Delta D; \tag{1}$$

is composed of the primary deficit – that is government expenditure, G, minus tax revenue, T – and interest payments on the existing debt D. How to finance this balance? Excluding monetisation of the debt as well as the option of privatising public assets, a deficit has to be financed on the capital market by issuing bonds. So, each year's deficit increases the existing stock of the public debt. To receive a sustainable budget, the growth of debt must be restricted. Since each additional Euro of debt creates interest payments, the critical question is if future budgets can bear the increase of interest payments. In particular, if additional interest payments would be financed by issuing new bonds, the growth of debt gained momentum (see, for instance, the exponential increase of interest payments on Greek public debt from 1979 to 1995, Figure 2, page 33). We may take components of the growth of debt as the criteria to evaluate sustainability of the budget.

$$\Delta D/D = (G - T + iD)/D = (G - T)/D + i = \alpha(Y/D) + i$$
(2)
for $\alpha = (G - T)/Y$

The growth rate of debt has as components the primary deficit ratio α , that is the relation of the primary deficit to GDP or income, Y; the debt ratio, D/Y; and the rate of interest, *i*. Let us now compare the growth of debt to the growth of income. A useful comparison is to ask under what condition the growth of debt equals the growth of income. Taking r as the growth rate of income, this condition is:

$$\alpha(Y/D) + i = r \tag{3}$$

or

$$\alpha = (r - i)(D/Y) \tag{3a}$$

So, in a macroeconomic equilibrium, when the rate of interest equals the rate of income growth, the primary budget has to be balanced. We may also conclude that a primary surplus is necessary to compensate for a fall in the growth rate. Otherwise, the burden of debt would increase. The amount of the required surplus depends on the size of the debt ratio. A debt ratio above 100 percent, the case of Greece, works as a multiplier. Suppose, Greece's GDP will rise by 2 percent in nominal terms in 2010, which means stagnation in real terms, and the long-term interest rate on government bonds will be 6 percent on average. Taking the actual debt ratio of more than 110 percent as basis, the government would have to achieve a primary budget surplus of at least four and a half percent of GDP in order to avoid a further increase in the debt ratio. Although this is not impossible, it is very hard to achieve in a stagnant economy without applying new methods of creative accounting.

Actually, the Greek real GDP fell by 4% in 2010. It should be clear, then, that the Greek government got stuck in a severe dilemma. Long-term sustainability requires a reduction of the budget deficit. So, the

government has to reform its tax system, particularly by increasing the fiscal drag on higher incomes and, on the other hand, cut public expenditure. But even if it is successful in undertaking these measures which have already been enacted, the results will not immediately show up in the budget criteria. The reason is that the immediate income effect of its measures will reduce tax revenues. In addition, if the budget deficit cannot be brought down financial markets may further increase the risk premium on government bonds and thus aggravate the task of consolidation.

The problem is that financial markets' expectations (as well as the regulations of the Stability and Growth Pact) are fixed on criteria that are not under control of the government in the short run. Under these conditions, as the Greek experience has demonstrated, if the budget is perceived of being unsustainable, an austerity programme of the government cannot turn investors' expectations.

This leads us to the second aspect of the problem, the lack of confidence in financial markets. Evidently, Greece needed some backing to discourage speculative attacks on Greek bonds, but, on the other hand, the promise of assistance given by the other member states must not weaken incentives for the Greek government to resolve the debt problem on its own. The base line for a solution is a default. Although Greece is member of the Eurozone, it is a sovereign debtor. So, the government may well be tempted to achieve a default, renegotiate on its debt, accept a hair cut and start from scratch again. Its main interest is to have further access to financial markets. If Greece stood on its own, that would be a rational solution avoiding an accelerated debt growth and giving the opportunity to revive the economy. After all, insolvency procedures during South American and African debt crises have been designed according to this principle. The lenders would bear the cost of default and would have to depreciate Greek bonds in their portfolios. So, the cost of default would be laid mainly on banks and financial institutions, both inside and outside of Greece. So long as Greek private households have invested in Greek bonds the default would hit them like a tax on their assets and that would have an indirect progressive effect.

But Greece is member of the Eurozone. For that reason, Europe cannot stand aside since a Greek default might severely damage the Euro's reputation. This, at least, has been the official saying. Accordingly, it would not even be helpful that the European Council would compensate the banks for their losses – which it might have done instead of direct
assistance to Greece to avoid a default. To secure credibility of the Euro, new rules of fiscal cooperation seem to be necessary.

2.2 The Present Debate

This was early recognised by Daniel Gros and Thomas Mayer in February 2010 (who updated their paper on 17 May), and it was underlined by a group of renown German economists by 18 June.

The idea is to introduce an orderly-insolvency procedure for European governments and so to avoid a situation like in case of Greece, when a default was considered as being a political taboo out of fear that it would dangerously hit financial markets. The real possibility of a sovereign default would have three basic effects. First, investors would have to realise that in case of insolvency they must take part of their investment risk. Second, fiscal responsibility would predominantly stay with national governments – a substantial element of the Treaty. Third, the clear and transparent assignment of risks would sharpen incentives of risk-taking with borrowers as well as with lenders. There are different proposals of how to institutionalise a procedure of sovereign insolvency (see, for instance, Gros/Mayer, May 2010; Fuest et al., June 2010) but the basics are meanwhile common among economists. To become a credible threat, the Treaty's no-bailout rule has to be institutionalised by establishing a fund. In case of an upcoming sovereign default, the fund would buy 'junk bonds' at market prices in exchange for own bonds. So, investors would have to realise losses, although on a restricted scale, and contagion effects would be avoided. The fund's capital – which founds its credibility – would have to be collected by EU member states, presumably applying a scheme similar to IMF rules. In addition, it seems attractive to charge countries during a deficit procedure according to the Stability and Growth Pact (the original idea of Gros/Mayer) and so sharpen the Pact's incentives. But those incentives are not decisive. The real effect on expectations and behaviour should come from the fact that an orderly sovereign default was a real option.

There were other proposals to improve fiscal discipline in the EMU. So, introduction of an exit clause into the Treaty to get rid of unpleasant partners was discussed. Though an exit clause and an exclusion clause exist already in the Lisbon treaty, this option seems to be too general to exert strong incentives on fiscal discipline. The idea to instrumentalise these clauses was meanwhile rejected in the political debate. More recognition deserves the idea to institutionalise economic governance in the EMU and so to achieve fiscal discipline by closer policy coordination among EMU members and, at the same time, reduce macroeconomic imbalances within the union. This proposal has been particularly stressed by the French government that pursues the objective of a European economic government. The topic of policy coordination concerns again the monetary sphere of the economy – competition policy and structural policies are settled on the European level – and the relationship between the real economy and financial markets. It is nurtured by the critique that the EMU in its present form is not a viable policy regime.

This has to be clarified, taking a more general perspective. So, in what follows I would like to address some basic relationships between a monetary regime and policy coordination in order to analyse and evaluate those proposals.

2.3 The Trilemma of Monetary Integration

In a globalised world with free trade, market agents and, in their interest, governments are striving for stable exchange rates. To achieve this objective in an integrated monetary regime, there are but two options for the international financial architecture which basically exclude each other. You may have either free movement of capital – which is also in the interest of market agents. Or you may have national autonomy in monetary policy – which is liked by governments to pursue national goals of economic policy.





After World War II, the Bretton-Woods-Regime combined stable exchange rates and some autonomy in monetary policy. In that regime, external disequilibria showed up in current account imbalances which required policy adjustments, in case of a fundamental disequilibrium adjustment of the exchange rate. Policy coordination in that regime followed a simple rule which was to stabilise the exchange rate vis-à-vis the US dollar. There was some asymmetry in the system because surplus countries could stand an external disequilibrium – and, consequently, were not prepared to cooperate – whereas deficit countries could not. So, "autonomy" was with the surplus countries. It was due to the rise of international capital movements and a dollar "glut" that the system collapsed.

The following regime of flexible exchange rates was dubbed a "regime of no commitments" (Paul De Grauwe). Central banks were freed of the burden of defending exchange rates and the globalisation of capital markets surged. However, in this regime, that we know today, it turned out that flexible exchange rates did not easily stabilise. On the contrary, and unexpectedly, they were not only volatile in the short run but followed long-term trends that did not fit to the "fundamentals", that is to say trade balances and productivity trends and inflation differences. The reason is that exchange rates are now determined by financial markets and it is the expectations – and even the prejudices (Paul Krugman) – of investors which have become fundamentals. So, we may dub the present regime as well a "regime of currency competition" (Hajo Riese).

Against this background of past and present experience, how should we assess the European Monetary Union? First of all, the predominant objective of stable exchange rates has been (re-)established by irrevocably fixing the rates within the union. At the same time, since the EMU is a regime of low inflation, inflationary expectations have been stabilised on the low end. So, there is much less uncertainty for market agents and investors within the EMU than without it. On the other hand, there is a case for policy coordination since national governments still pursue their independent economic policies. As for fiscal policies, national sovereignty and responsibility is underlined by the no-bail-out rule, and also the Stability-and-Growth Pact until now has not really touched autonomy of the national governments because the final decisions have been taken by the Council. As for national wage policies which have also macroeconomic effects since they determine real exchange rates within the EMU. there is still less coordination, mainly through the "Macroeconomic Dialogue". So, without coordination, external imbalances may arise also

within the EMU – not only as a consequence of market forces but as a consequence of divergent national policies. It is true, such imbalances do not imply immediate solvency problems – like in the Bretton-Woods regime – but they may endure. If they should be tackled for some reason, this again was a task for the Council. The Commission has only limited competence in the field of macroeconomic coordination. Let us have a closer look on the monetary imbalances within a monetary union like the EMU and analyse flows and stocks, respectively.



Figure 4 Current Cccount Balance: Germany (1) and Greece (2) Source: OECD.

2.4 Flow Analysis

Regarding flows, an external disequilibrium is expressed by the fact that real absorption (a) and real income (y) are not in balance. For a country performing a deficit in its current account, like Greece, the condition is

a > y

that is to say, the sum of real investment and real consumption in Greece exceeds real income (the value of production). The monetary implication is that the excess of absorption is externally financed (by capital imports). This market constellation is typical for a country in the stage of catching-up, when investment exceeds internal savings. The use of capital for investment should increase productivity and enable the country to repay the borrowed money. If, on the other hand, the excess of absorption indicates over-consumption (private or public), a return to an external equilibrium requires to reduce the level of real wages.



Figure 5 Relative Unit Labbour Cost: Germany (1) and Greece (2) Source: OECD.

In such a constellation, policy implications are different within the EMU. As an outsider, Greece would have been required to adjust the exchange rate. Devaluation of its currency would have increased competitiveness of Greece's internal production and, on the other hand, would have reduced real absorption by the rise of import prices. Within the EMU, this remedy is excluded. If, for some reason, the external imbalance has to be closed, real adjustments are required, either real productivity growth and / or a reduction of real wages by reducing the wage level. So, Greece would have to steer an austerity course of economic policy in order to reduce its external deficit. But there is another condition which has to be fulfilled. Within the EMU, Greece can only be successful in reducing its deficit if its partner countries accept that their surplus is diminished

accordingly. In view of the recent criticism of the German export surplus put on the agenda by the French government and the embarrassed response of German politicians to this critique, that option seems to be quite unrealistic. So, accumulation of Greek external deficits will go on, expressing the preferred market constellation within the EMU. Greece seems to be in a situation comparable to Germany's case after World War I, when German reparation payments were not in the economic interest of the receiver countries because a real transfer would have required for them to accept a deficit in their current accounts (Keynes, The Transfer Problem, 1929).

2.5 Stock Analysis

The catch-up to higher income levels requires public as well as private capital investments. So, one would expect that a country like Greece has a high and growing public debt in relation to national income, corresponding to its external deficit. However, there are tow reasons why the Greek public debt might be overvalued. First, Greece's high debt ratio is to a large extent the legacy of the past. Before entering the monetary union, Greece experienced waves of high inflation (jointly with devaluations of its currency). With high inflation, the nominal value of public debt does not correctly express its burden since inflationary expectations also blow up the expected value of the government's revenues. This comes true in a process of (unexpected) disinflation, when the inflation rate is cut but the interest burden on long-term public debt remains. By accessing the EMU, Greece was exposed to such a process of disinflation (Figure 6). It is true, by restructuring its debt the Greek government by and by took advantage of the low EMU interest rates. Consequently, the current interest payments were reduced but still the nominal value of debt was too high: the reduction of inflation had increased the real burden of the debt. Since inflation is no more an option to reduce the burden of the debt, its devaluation seems necessary. Second, as I said, the Greek government is a sovereign debtor. The economic rationale for such a debtor is to service its debt so long as the net value of payments is positive (Niehans, 1986). That is to say, the net amount of borrowing should exceed the amount of interest payments. Writing δ for the growth rate of debt, $\Delta D/D$, the condition in any given period t is

$$c(t) = (\delta - i) D(t)$$

$$\tag{4}$$

Actually, this condition is evidently violated for Greece. Again, what seems necessary is a depreciation of the nominal value of the debt in order to reduce the amount of interest payments in relation to net borrowing. It should be clear that this remedy is not due to some warmheartedness but is necessary to restore viable relations within the EMU. Moral hazard problems that might arise concern the future and have to be taken seriously. However, they seem to be more tractable than moral hazard problems induced by bail-out solutions. How much remains of those problems in the end, depends largely on the design of an orderly-insolvency procedure (see above).



Figure 6 Disinflation: Greece Source: OECD.

2.6 Conclusion

The EU constitution does not provide a comprehensive system of fiscal transfers. The EU structural funds and the Cohesion Fund are of minor importance as far as the macroeconomic equilibrium within the union is concerned. The EU may rather be described as a competitive system of fiscal federalism. Accordingly, the member states' governments are sovereign debtors. On these conditions, the credibility of the no-bail-out rule requires to consider default as a real option. So, to depreciate Greece's public debt would have strengthened the rules of the system and not weakened them. On the other hand, flow imbalances within the EMU do not indicate solvency problems. Economic policy coordination

should rather be concerned with attempts to shift real exchange rates within the EMU. In the case of Greece, a strategy to reduce its external deficit would require to deflate the national wage level (the substitute for an exchange rate adjustment which is no longer possible). Independent of the economic rationale of such a strategy, its success rests on the condition that the partner countries are prepared to accept its consequences. Otherwise, the EMU would end up in a deflationary process. So, like in the Bretton-Woods regime, there is a case for economic policy coordination within the EMU, even though the terms of coordination are different.

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3 Deficit Bias of Public Finances, Public Debt and Fiscal Rules¹

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3.1 Introduction

Government deficits and government debt, by virtue of their dynamics and the levels they reach, are a developmental phenomenon in the majority of European and non-European economies which cannot be neglected (Fig. 7). Because of the real problems they entail, an extensive amount of theoretical and empirical research is focused on the issue. It assumed greater importance when the recent economic crisis forced governments to offer large-scale discretionary fiscal economic incentives, leading to significant structural deficits and rapid growth in public debt. Because of the inconsistency over time of government policy, it is clear that what is at stake is the sustainability of fiscal policy in many countries. Substantial motivation thus exists to seek out mechanisms to solve the problem imposed by the deficit tendency in public finance.

The goal of this chapter is to point out potential explanations for the deficit tendency in public finance and subsequently to clarify the importance of fiscal rules (with an emphasis on numerical fiscal rules) in solving the problem. The first section demonstrates the existence of a deficit bias in public finance in the EU countries, notes differences between countries and proposes several explanations for the deficit tendency. A further section illustrates a potential role for fiscal rules in resolving the deficit tendency in public finance, as well as pointing out the problems associated with their use. The Fiscal Rules Database (European Commission, DG ECFIN) is employed to analyze the use of numerical fiscal rules in EU countries from 1990–2008.

 $^{^1\,\}mathrm{A}$ part of the text which follows is taken from the output of research project QI 92A023.



Figure 7 Development of the General Government Consolidated Gross Debt as Percent of GDP in the EU-15 Countries, the USA and Japan in the Last 40 Years

Source: DG ECFIN AMECO database, Excessive deficit procedure (based on ESA 1995) and former definition (linked series), 2011 and 2012 – predictions. Prepared by the authors.

3.2 The Existence of Public Finance Deficits and Public Debt

Economic reality points to a deficit tendency in public finance and gives rise to worries about the sustainability of public finance. This phenomenon is clearly visible in Figure 8, which shows development in the total and cyclically adjusted primary balance (CAPB) as a proportion of GDP in budgets of the EU countries and the Eurozone. Figure 9 shows a persistent rise in the relative weight for public debt among the EU-15 and in the Eurozone (EA-12).

Table 3 on page 48 demonstrates that CAPB, as a measure of discretionary fiscal behavior by governments, varies among countries to a pronounced degree in terms of both level and dynamics. Also apparent is high variability in the relative weight of public debt.

Only eight EU countries were capable of reducing the relative weight of public debt between 1995 and 2010 (Group 1, Fig. 10, page 49). These countries were Belgium and Italy, where the level of debt attains very high figures, and Denmark, Hungary, the Netherlands, Finland and Sweden, where the level is in the range of 60% of GDP. Finally, there is Estonia, where debt levels are quite low.



Figure 8 Development of the General Government Total Balance (Left) and Cyclically Adjusted Primary Balance (Right) in % of GDP in the EU-15 Countries and the Eurozone (EA-12)

Source: DG ECFIN AMECO database, Excessive deficit procedure, 2011 and 2012 – predictions. Total balance = Net lending (+) or net borrowing (-). Prepared by the authors.



Figure 9 Development of the General Government Consolidated Gross Debt as Percent of GDP in the Countries of the European Union and the Eurozone

Source: DG ECFIN AMECO database, Excessive deficit procedure (based on ESA 1995), 2011 and 2012 – predictions. Prepared by the authors.

	CAPB i	n % GDP	General Government Cons. Gross Debt as % of GDP		
	1995	2010	1995	2010	
Mean	1.044310	-2.859419	54.34299	61.30341	
Median	1.125300	-1.917900	55.59820	62.17210	
Maximum	4.790600	2.192700	130.35300	140.24170	
Minimum	-2.615100	-27.196100	7.03410	8.04550	
Std. Dev.	2.378871	5.421281	34.37710	30.78282	
Observations	21	27	25	27	

Table 3 Descriptive Statistics for Cyclically Adjusted Primary Balance and the General Government Consolidated Gross Debt as Percent of GDP in the EU Countries (Comparing 1995 and 2010)

Source: DG ECFIN AMECO database. Prepared by the authors.

There is also a distinct set of countries which started with relatively low debt values for which the debt growth dynamic was markedly high during the period under observation (Group 2, Fig. 10). This group includes, among others, the Czech Republic, Slovakia and Slovenia. The third group of countries (Group 3, Fig. 10) demonstrates a relatively high level of debt at the start of the observation period, with further increases by 2010. Examples would be the UK, Germany, France and others, including Portugal and Spain. Ireland is a special case (with debt growing due to non-budgetary causes) as, of course, is Greece, by virtue of its high level of indebtedness and its subsequent growth.

These figures and tables raise a number of questions. What causes the relative weight of public debt to incline toward growth? Why were some countries capable of reducing the relative weight of public debt between 1995 and 2010, while others saw their debt rise dramatically?

3.3 A Normative View on Balanced Budgets

Before explaining the tendency of public finances to veer into budget deficits, it is worth exploring Barro's balanced budget model (Barro, 1979). Barro harkens back to Ricardian equivalence theory, i.e., the thesis that substituting public debt for taxes has no influence on real variables (interest rates, consumption, etc.). But Ricardian equivalence provides no explanation for the creation of public debt. Barro formulated a "simple theory of optimal public finance which identifies factors which



Figure 10 Development of the General Government Consolidated Gross Debt as Percent of GDP for Various Groups of EU Countries

Source: DG ECFIN AMECO database, Excessive deficit procedure (based on ESA 1995). Prepared by the authors.

may influence the choice between taxation and debt".² The essence of the theory is to maintain constant tax rates over time and to balance expenditures and revenue shocks with budget deficits and surpluses, so that tax distortions (excessive tax burdens) are minimized under "tax smoothing"³.

The tax smoothing model focuses on a closed economy in which consumers make use of their disposable labor income for savings and consumption. The government is considered to be a benevolent entity maximizing consumer utility. The rational horizon is infinite for both the government and individuals in society. The model thus abstracts from the timeframe dictated by the lifetime of the government and from intergenerational redistribution. The government finances expenditures by direct taxation of personal income, i.e., distorting taxes. Under the conditions specified in the model, the level of taxation is determined by the intertemporal budget constraint which defines the equality condition for the present value of governmental expenditures (an exogenous variable) and the present value of taxation. The logic of the model may be illustrated by Fig. 11. The situation assumes that government expenditures remain constant until time t and are anticipated to remain constant within the period under consideration. At time t, an unanticipated increase in expenditures occurs (Alesina and Perroti, 1994, speaking about the war) which is anticipated to last until time t + n. Optimal budget policy in this case would dictate a moderate but permanent tax increase at time t, with a deficit from time t until t + n and a surplus for times after t + n.



Figure 11 Optimal Budget Policy According to Barro (1979)

Note: T – government revenues; G – government expanditures. Source: Drawing after Alesina and Perotti (1994).

Alesina and Perotti (1994) point to a significant expansion of the model to take cyclical fluctuations in tax revenues as a function of the economic

² Barro (1979), p. 941.

³ Lucas and Stokey (1983) building upon Barro (1979).

cycle into account. For similar reasons, the tax rate should be maintained at a constant value throughout the economic cycle, which implies deficits during recession.

There are a number of studies which have examined this optimal budget policy model. Barro (1986) was relatively successful in explaining the development of US public deficits in the post-World War I era using this model. More recent studies include Adler (2006), who uses the "tax smoothing" model to explain the approximately 60% of the variance in the budget balance of the Swedish central government between 1952–1999.

But Barro's normative approach fails to explain some budget deficits which persisted (and continue to persist) after expenditure (or revenue) shocks have died down. Alesina and Perroti (1994), for example, note that the model does not explain the sharp growth in the relative weight of US public debt during the 1960s. At time t + n, the government may succumb to the temptation to cut taxes, which may result in the budget deficit persisting, or the debt created not being amortized. An explanation for the tendency toward deficits in public finance may, however, be sought in a positive analysis of the influence of political and institutional variables, which may be subject to pronounced variation between countries.

3.4 Justification for the Deficit Bias in Public Finance

Most explanations of the deficit bias found in the literature focus upon political and institutional factors (for an overview, see Alesina and Perroti, 1994; Gregor, 2005; Dvořák, 2008; Debrun et al., 2008; Jílek, 2010). In particular, emphasis is laid upon the fiscal illusion of voters, the political budgetary cycle, intertemporal redistribution, use of the deficit as a competitive tool by political parties, political fragmentation, distribution conflicts within coalitions and the so-called "common pool" problem.

Given that justification using the theory of public choice has always been present, there exists a problem explaining the growth of deficits and debt from the 1970s, as well as the differences which obtain between countries. The following explanations may be found in the literature:

a) Lower potential growth, the size of the public sector and globalization. Concurrent slowing of economic growth in the majority of developed countries and growth in the public sector (under the influence of the production of goods and services by the state and the expansion of the welfare state). This results in increased public spending without raising taxes. The reason is potential higher costs of taxation when the existing tax burden is already high, i.e., economic costs of taxation (mobility of the tax base, tax competition) and political costs of taxation (European Commission, 2006).

- b) The role of the monetary union. A flexible exchange rate regime in tandem with an unsustainable procyclical fiscal policy has a direct negative impact on the economy in terms of higher real interest rates, lower growth, etc. Within the monetary union, i.e., in a fixed exchange rate environment, because the reaction of interest rates will be only partial and thus have a lesser crowding out effect, an expansive fiscal policy may bring intensified economic growth. The reason for this is that excessive public deficits by one member of the monetary union will call for the increased interest rates not only in that country but for other members, as well. Lack of fiscal discipline is thus reflected by means of a crowding out effect in other members of the union. For the offending country, however, irresponsible fiscal policy will lead to only a partial reaction in interest rates with a decreased crowding out effect, and thus to higher economic growth (for details, see, e.g., Beetsma and Bovenberg, 1998; Detken, Gaspar and Winkler, 2004; Weale, 2004). Within the monetary union, then, there may be greater motivation for deficit deviations.
- c) Fiscal rules. There is tremendous variation in the rules used by various countries, including the EU countries. It is possible that it is precisely this variation which may explain the variance in deficits and debt both temporally and in terms of space. The section which follows focuses on the issue of fiscal rules.

3.5 The Introduction of Fiscal Rules As a Potential Solution to the Deficit Tendency in Public Finance

The existence of the deficit bias in public finance, by virtue of the nature of its origin, forms a strong argument in favor of creating a number of obligatory (explicit) fiscal rules. The (implicit) disruption of the fiscal constitution is also an argument in its favor, as noted by Buchanan and Wagner (1999).

The term (explicit) fiscal rule (or rules) is sometimes taken in the broad sense to include all legislative or procedural elements impacting on budget policy performance. An example would be the so-called budget institutions defined by Alesina and Perotti (1994, p. 32) as "all rules and regulations used to prepare, approve and implement public budgets". A similar definition is given by Hallerberg et al. (2001), which defines a fiscal rule as a combination of a fiscal objective and regulations as to what the government should do to achieve the fiscal target. Any ex-ante budgetary limitations may be considered to be fiscal rules. Normally this concerns a set of institutional policy limitations in discretionary fiscal decisions.

The chief benefit brought by fiscal rules is supposed to be the limitation of inconsistent discretionary fiscal measures by the government. Some authors maintain that fiscal policy founded on fiscal rules is main to a discretionary approach which, because of a tendency for incumbents to abandon prior public policy obligations, is inconsistent over time (Kydland and Prescott, 1977). It is clear that a rationally behaving government will tend to make sub-optimal discretionary decisions to increase its reelection chances, instead of adopting measures which would heighten the wellbeing of society (Cukierman and Meltzer, 1986; Niskanen, 1994 and 2008).

Another argument for introducing fiscal rules lies in the negative external factors and spillover effects within the federation or currency area. For instance, a fiscal rule limiting deficits at the lower levels of government may prevent the relaxation of fiscal policy in a single fiscal unit from influencing others or impacting higher levels of government, e.g., by means of higher interest rates (Kopits and Symansky, 2000).

Some authors, however, express skepticism as to the usefulness and efficiency of fiscal rules. Their doubts stem from both theoretical and practical considerations. Kopits (2001) states that, at the theoretical level, neither traditional macroeconomic analysis nor the functional principles of public finance are based upon the existence of fiscal rules. To the contrary; the discretionary approach is broadly accepted as a tool for fulfilling conventional fiscal functions, namely functions of allocation, redistribution and stabilization. At the same time, it is clear that the government must commit itself to fiscal discipline in a trustworthy manner even without the existence of permanent fiscal rules. The current literature (e.g., Debrun et al., 2008, European Commission, 2006, 2009, 2010, etc.) speaks somewhat more broadly of so-called national fiscal frameworks created by a set of elements forming fiscal policy at the national level. These national fiscal frameworks may include:

1) National Independent Budgetary Institutions

The delegation of fiscal policy (or a portion thereof) to an institution not subject to short-term political pressure. The radical notion of an independent authority which autonomously decides on fiscal policy goals was presented by Wyplosz (2005). A more realistic variant is to delegate the search for specific approaches to fiscal policy (unbiased predictions, ex post evaluation of impacts...) to an independent institution *(fiscal council)* (Debrun, Hauner and Kumar, 2009).

National independent institutions are supplementary element in strengthening fiscal discipline. These institutions may be defined as independent, non-ideological entities focused on budgetary policy, financed from public funds and functionally independent from the fiscal authorities (European Commission, 2010). As a consequence of this definition, this role may not be played by the central bank or parliament. The role of independent institutions is technical in nature, i.e., the institutions should provide macroeconomic predictions, evaluate the status of public finances, etc. The final decision on matters of public finance must remain in the hands of elected bodies.⁴

2) Improving the Quality of Budgetary Procedures

This concerns improving the quality of the preparation, approval, implementation and control processes of the yearly budget. The goal is to ensure that adequate consideration is given to the budgetary impacts of policy decisions taken. Hallerberg and von Hagen (1999) defined two broad approaches to centralization (and improved control) of budgetary processes: a) the delegation approach, in which the governing role in enforcing budgetary discipline is explicitly held by the minister of finance or the prime minister (e.g., France, Germany, the UK), b) the contract approach, in which the budget procedure provides ex ante for an agreement (contract) with administrators of

 $^{^4}$ In 2008, there were 27 independent budgetary institutions in the EU countries. They included the Bureau of Economic Policy Analysis in the Netherlands, the Institute of Economic Research in Austria, the Swedish Fiscal Policy Council, etc. Further details are contained in the European Commission (2006, 2009, 2010).

chapters and other components of the budget on the size of the budget and requirements for recoverable resources (e.g., the Netherlands, CR, Finland, Belgium).⁵

3) Medium-term Budgetary Framework

The medium-term budgetary framework serves for medium-term budget planning. During the annual budget process (i.e., in putting together the yearly budget) basic measures are often adopted whose economic and budgetary influence significantly exceeds a one-year horizon. At the same time, it may be assumed that the annual budget will provide an insufficient basis for strategic budgetary planning and structural reforms, the impact of which may usually be anticipated to come in the medium-term.

4) Introduction of Ex-Ante Numerical Fiscal Rules

A definition for numerical fiscal rules is given by Kopits and Symansky (2000). A fiscal rule is a permanent limit on fiscal policy expressed using a summary of numerical indicator such as the public budget deficit, public debt, or a significant component of these variables. The key components of the definition are the permanency of the limit and the existence of the indicator.⁶

3.6 Numerical Fiscal Rules in the EU Countries

Numerical rules are among the most frequently employed. They are particularly attractive because of their relatively clear definition, comprehensibility and transparency. At the same time, however, such hard-andfast rules may to a certain extent limit flexible reactions to unanticipated events, cyclical changes, etc.

A wide range of such rules exists. Depending upon the fiscal indicator targeted, one may define a) balanced budget rules, b) debt rules, c) expenditure rules or d) revenue rules. Fiscal rules may cover the entire public or general government sector or only a portion thereof (the central government, subnational governments).

Table 4 shows the types of numerical fiscal rules employed at individual governmental levels in the EU countries in 2008. The table makes clear

 $^{^5\,{\}rm For}$ more on the position of the Ministry of Finance of the CR in the budgetary process, see Gregor (2008).

 $^{^{6}}$ This definition does not include medium-term budget frameworks.

that numerical fiscal rules are used on a fairly massive basis at all levels of government in the EU countries. Only Greece, Cyprus and Malta did not make use of fiscal rules in 2008. Typically, balanced budget rules are employed at the level of the general government, with expenditure rules at the level of the central government. Both balanced budget and debt rules are used in particular at the local governmental level.

	BBR	BBR+ER	DR	ER	RR	Total number of rules
GG	DK, EE, ES, HU, SE, UK, (6)	-	BG, PL, SI, UK, (4)	BG, DK, NL, (3)	DK, NL, (2)	15
CG	DE, FI, PT, (3)	-	LT, LU, (2)	CZ, FR, IE, IE, LT, LU, SK, FI, (8)	FR, LT, (2)	15
CG+RG	AT, (1)	-	-	DE, IT, (2)	-	3
CG+SS	-	-	-	SE, (1)	LV, (1)	2
SS	BE, LU, (2)	-	FR, (1)	BE, FR, (2)	FI, (1)	6
RG	BE, IT, PT, DE, (4)	-	ES, ES, (2)	-	-	6
RG+LG	IT, (1)	IT, (1)	-	-	-	2
LG	BE, DE, FI, FR, IE, LT, PT, RO, SE, (9)	-	DE, EE, ES, HU, LV, RO, SI, CZ, SK, (9)	-	-	18
Total number of rules	26	1	18	16	6	67

Table 4 Types of Numerical Fiscal Rules Used in Individual
Countries and Subsectors of General Government (2008)

Note: BBR – balanced budget rule, DR – debt rule, ER – expenditure rule, RR – revenue rule, LG – local government, RG – regional government, CG – central government, SS – social security funds, GG – general government. Source: DG ECFIN Fiscal Rules Database, March 2010, prepared by the authors.

The dynamic development of the use of fiscal rules is evident in Figures 12 and 13. A number of fiscal rules used in the EU-27 countries has grown dramatically since 1990. The sector coverage of fiscal rules has also expanded. At the start of the period under observation, rules were primarily used for local governments but by 2008, they were being applied to a greater extent at the central level. There has also been noticeable growth in expenditure and income rules, which tended to be the exception at the start of the period.

Table 5 provides an overview of definitions for objectives by individual type of fiscal rule.

Because of the high variability in numerical fiscal rules, there is a need for indicators to aggregate the chief characteristics which are decisive in terms of effectiveness. So-called fiscal rule indexes serve this purpose.



Figure 12 Number of Numerical Fiscal Rules Used in EU Countries by Governmental Subsector

LG – local government, RG – regional government, CG – central government, SS – social security funds, GG – general government. Source: DGECFIN, Fiscal rules database. Prepared by the authors.

Many such fiscal rule indexes have already been constructed. Recent efforts include indexes used by the European Commission to analyze numerical fiscal rules in individual EU countries. The European Commission (European Commission, 2006, p. 164) evaluates the following characteristics of numerical fiscal rules: 1) the statutory basis and potential to set and change objectives, 2) the authority responsible for monitoring rule compliance, 3) the authority responsible for enforcement, 4) the enforcement mechanism and 5) media visibility.

These characteristics are aggregated into a so-called Fiscal Rule Strength Index (FRSI) which may be determined for each individual fiscal rule. Because more than one fiscal rule is normally applicable for each country, the need arises to aggregate FRSI indexes. The FRSI index for each individual rule is then combined into a summary Fiscal Rule Index (FRI). This is essentially the sum of FRSI used in a particular country during a particular year, weighted by the extent of coverage of public finance provided under the rule.



Figure 13 Number of Numerical Fiscal Rules Used in the EU Countries by Type of Rule

Note: RR – revenue rules, ER – expenditure rules, DR – debt rules, BBR – balanced budget rules.

Source: DGECFIN, Fiscal Rules Database. Prepared by the authors.

BBR	Golden rule	Total balanced budget rule	Nominal deficit ceiling	Deficit ceiling in % GDP	Structurally defined balance	Total
	5	10	7	1	3	26
DR	Nominal debt ceiling	Debt ceiling as %GDP	Ceiling defined as debt related to the ability to pay back debt	Other		Total
	5	3	8	2		18
ER	Nominal expenditure ceiling	Real expenditure ceiling	Nominal rate of growth	Real rate of growth	Other	Total
	5	2	4	3	3	17
RR	Tax burden in %GDP	Tax rate restrictions	Allocation of additional tax revenues	Other		Total
	0	1	4	1		6

Table 5 Frequency of Defined Objectives for Individual Fiscal Rulesin the EU Countries (2008)

Note: RR – revenue rules, ER – expenditure rules, DR – debt rules, BBR – balanced budget rules.

Source: DGECFIN, Fiscal Rules Database. Prepared by the authors.



Figure 14 Fiscal Rule Index Development in the EU and the Eurozone between 1990–2008 (Standardized Values)

Source: DG ECFIN, Fiscal Rules Database. Prepared by the authors.

The evolution of the index over time may indicate whether a particular country or group of countries is attempting to limit discretionary influences by the government on public finance. Fig. 14 shows a significant increase in the value of the FRI index in EU countries on average and thus reveals an attempt to resolve the issue of the deficit tendency in public finance by using numerical fiscal rules. A look at individual countries, however, shows a different picture (Fig. 15). Maintaining the same division of countries into groups as was used in Fig. 10, page 49, it is evident that the majority of the countries in Group 1 (featuring a drop in the relative weight of public debt from 1995–2010) had already begun to use fiscal rules during the first half of the 1990s, the rules in question being relatively strong. This contrasts with a later start and lower strength for rules introduced by the second group of countries, characterized by high growth in the relative weight of public debt. The countries in Group 3, characterized by a relatively high relative weight of public debt with subsequent growth, introduced numerical fiscal rules later and, in many cases, of lesser strength than the countries in Group 1. Group 4 countries include Greece and Ireland. No numerical fiscal rules at the national level were introduced by Greece (along with Malta) during the period under observation. Ireland's fiscal rules are evaluated as being of very low force and were not introduced until 2000. In spite of that, the two countries displayed markedly divergent fiscal development (see Fig. 10 on page 49, Group 4) and the causes of debt acceleration at the end of the period were (and continue to be) different.



Figure 15 Fiscal Rule Index Development in Individual Groups of EU Countries sorted by Development of General Government Debt as % of GDP

Note: Groups of countries are the same as in the Figure 10, page 49. Source: DG ECFIN Fiscal Rules Database, standardized FRI values. Prepared by the authors.

3.7 Empirical Evidence for the Effectiveness of Numerical Fiscal Rules

Empirical evidence for the effectiveness of fiscal rules (including numerical rules) is comparatively weak and not clear-cut. Poterba (1996) maintains that this is no great surprise given the variability of fiscal rules in various countries, the broad heterogeneity of rules and institutions in various countries, and the fact that this entails problems quantifying individual variables. It is even possible that the fiscal results may be influenced by another, difficult-to-measure variable such as voter preference. In spite of that, Poterba comes to the conclusion that the empirical evidence supports the opinion that strict fiscal rules may reduce fiscal deficits. He also states, however, that the evidence is not sophisticated enough to make clear how concrete changes in budget rules influence fiscal results.

An evaluation of existing fiscal rules by Kopits and Symansky (2000) in terms of effectiveness is less optimistic. Economic performance after the introduction of fiscal rules varies. On the one hand, attempts to use fiscal rules on the national level in developed economies contributes to a drop in inflation and interest rates, reduces the crowding out effect and ameliorates external imbalances. The US economy provides an example of how strict ex post budget rules correlate positively with lower fiscal deficits but it has not been demonstrated that this would influence product variability. On the other hand, the application of fiscal rules leads to distortion in the composition of governmental expenditures, particularly to a drop in public investment and growth in taxes. In some cases, fiscal rules have reduced the amount of fiscal transparency and given rise to creative accounting practices or encouraged one-off improvements in the budget situation from privatization revenues. Von Hagen (1991) also states that fiscal restrictions bring forth substitutions between debt instruments.

A study by the International Monetary Fund (IMF, 2009) analyzed developed and developing market economies and found 24 cases of fiscal consolidation leading to significant, lasting reduction in government debt since 1980. Even though some countries achieved this without relying on diligent fiscal rules, the changes in countries with fiscal rules were on average greater. The rules most commonly used were balanced budget rules and expenditure rules. The majority of fiscal rules cover the government sector as a whole or the central government. Evaluation of the effectiveness of numerical fiscal rules may also be based on a presumed causal relationship between the FRI index and values of the cyclically adjusted primary balance (CAPB). Recent studies (Debrun et al., 2008, European Commission, 2006 and 2008) come to the conclusion that the existence of fiscal rules positively influences fiscal discipline: stronger, broader rules are connected to higher cyclically adjusted primary balances. Debrun et al. (2008) also concluded that the type and design of the rule is an important factor influencing fiscal discipline. Balanced budget rules and debt rules have a pronounced influence on deficits. By contrast, the study shows expenditure rules have no significant influence, not even at the level of expenditures.

The model shown in Fig. 16 provides a comprehensive, simplified view which aggregates FRI and CAPB development from 2000–2008. The results indicate that the FRI index has a certain capability to explain variance in CAPB values between countries and shows countries with a higher average FRI value demonstrate higher average CAPB values. The models in Fig. 17 illustrate the dependence between the relative weight of public debt (D) in 2010 and changes in the relative weight of public debt (ΔD) between 2008–2010 on the value of the Fiscal Rule Index (FRI) in 2008. The relative weight of public debt in 2010 was lower in countries with higher FRI values, as was growth in the relative weight of public debt in these countries between 2008–2010.

3.8 EU Fiscal Rules

An important precondition on the success of European economic integration is the sustainability of fiscal policy in the individual member countries. This becomes even more important in the environment of the monetary union given the EU countries' experience with fiscal development in the 1970s and 1980s, when the relative weight of public debt doubled. Fiscal development is supported and enforced within the EU by fiscal rules. These rules were formerly anchored in the Maastricht Treaty as one of the conditions for entry into the Eurozone and later into the Stability and Growth Pact (SGP), based upon worries that fiscal discipline might be relaxed in the Eurozone countries.

The SGP is the framework for coordinating national fiscal policy under the Economic and Monetary Union (EMU). It is based upon fiscal rules defined in the Maastricht Treaty (boundaries are placed on public deficit numbers (3%) and on public debt (60% of GDP). The goal is to ensure



Figure 16 Dependence of CABP in % GDP on FRI

CABP = $-0.597 + 1.213^{***} \cdot \text{FRI}$, ser = 1.859, R² = 0.275 (0.394) (0.392) Note: *** p < 0.01.

Source: DG ECFIN AMECO, Fiscal Rules Database. Prepared by the authors.





D = 71.007*** – 14.914** · FRI, ser = 28.981, \mathbf{R}^2 = 0.201 (6.782) (5.942) ΔD = 16.984*** – 4.127* · FRI, ser = 10.364, \mathbf{R}^2 = 0.131 (2.425) (2.125) Note: * p < 0.1, ** p <= 0.05, *** p < 0.01. Source: DG ECFIN AMECO, Fiscal Rules Database. Prepared by the authors.

healthy public finances as a condition for the proper functioning of the economic and monetary union.⁷ The SGP contains both a preventive and sanction mechanisms.

The preventive mechanism calls for member countries to maintain public finances in a close to balanced state or a state of surplus over the medium-term and obligates them to avoid exceeding the limits on public deficits defined in the Maastricht Treaty. The preventive mechanism requires EU member countries to submit an annual stabilization program (for Eurozone countries) or a convergence program (for other countries). In these programs, they inform the European Commission on measures designed to preserve or attain healthy public finances over the mediumterm. The Commission evaluates the programs and provides feedback. Based upon a recommendation from the European Commission, the EU Council may issue a so-called *early warning* before the deficit becomes excessive. The Commission may recommend that member countries adopt fiscal policy measures.

The SGP sanction mechanism is governed by the so-called *Excessive Deficit Procedure* (EDP). The procedure is brought into operation if a member country exceeds the deficit boundary defined in the Maastricht Treaty. The EDP procedure may lead to financial sanctions.

There is an extensive literature analyzing fiscal rules at the EU level from the institutional standpoint (Buti, Eijffinger and Franco, 2003), from the political and economic standpoint (Schuknecht, 2005), from a "creative accounting" point of view (von Hagen and Wolf, 2006), as well as in terms of the influence on the fiscal behavior of the country (von Hagen, 2002; Gali and Perotti, 2003). One of the more recent studies is that of Prušvic (2010), which evaluates the effectiveness of European fiscal rules after 15 years of having been in effect. The outcome of this and a number of other analyses is that fiscal rules at the EU level have had a substantial consolidation affect during the European integration process.

But problems may be seen in spite of this positive evaluation. The striking fact is that, the existence of fiscal rules at the supranational level has not led to a reduction in the relative debt levels. It is evident that not even the period of economic growth was used for fiscal consolidation and the creation of reserves for periods of recession. In reality, the basic elements of the Maastricht Treaty and the SGP were not respected –

 $^{^7\,{\}rm More}$ detailed information on the Maastricht Treaty and SGP is available in Baldwin and Wyplosz (2008).

elements such as the no-bailout provision and financial sanctions for breaching numerical fiscal rules.

In reaction to this reality, the European Commission proposes adopting legislative measures⁸ to deepen the coordination of fiscal policy between the member states. Prevention remains preferred over the sanction mechanism.

Strengthening the coordination of fiscal policy between the member states consists in the ex ante evaluation of national budgets of the EU member countries. The purpose of the measure is early detection of inconsistent policies and emerging imbalances. At the same time, because of the need to provide reliable data, strengthening of the Eurostat mandate is expected during the audit of national statistics.

The core of the sanction mechanism is the excessive deficit procedure (EDP). The problem lies in its slow functioning. The Commission proposes a procedure to speed and further strengthen the sanction mechanism by the payment of interest deposits, and later noninterest bearing deposits, along with a potential fine for inadequate fiscal policy if the member state does not show adequate improvement in fulfilling medium-term budget objectives during a period of economic growth.

The economic crisis has demonstrated that countries with a high level of debt are extremely vulnerable to the amount of expenditures for debt service. At the same time, countries with high indebtedness have only limited opportunities to implement countercyclical policy during a period of crisis. From this, it follows that EDP should place greater emphasis than it has heretofore on public debt criteria. The EDP procedure will be brought into play in countries whose relative weight of public debt exceeds 60% of GDP even if the drop in indicator values has not reached the designated tempo. Tied to this will be an evaluation of the deficit amount, which will be consistent with the required reduction in debt.

The European Commission also supports the complementarity of national fiscal rules with EU rules and the integration of the objectives contained in the Maastricht Treaty in national legislation. European law should designate a obligation for the laws of member countries to contain procedures enabling them to fulfill their budgetary discipline commitments.⁹ More specifically, it is proposed that minimal require-

 $^{^{8}}$ See, e.g., European Commission (2010): Reinforcing Economic Policy Coordination.

 $^{^9\,{\}rm See}$ Protocol No. 12, attached to the Treaty on the Functioning of the EU.

ments for the so-called national fiscal framework be established. The national fiscal frameworks are considered to form the basis for responsible fiscal policy at the national level. According to the European Commission, they are to include a system of accounting, statistics, prediction, numerical fiscal rules and independent national budgetary institutions, budget procedures which include all phases of the budget process, a medium-term budgetary framework and fiscal relationships between levels of government.

3.9 Conclusions

The deficit bias of public finance and the accumulation of public debt in the EU countries is reality. But there are pronounced differences between countries. An explanation for the existence of the deficit tendency may be sought in a positive analysis of political and institutional factors. But these factors have varied potential to explain differences in the level and dynamics of deficits and debt in the EU countries.

The results of this chapter indicate that variable fiscal rules have the potential to explain various levels of fiscal discipline, as well as various levels of public indebtedness in the EU countries. From 1990–2008, growth in the strength and coverage of numerical fiscal rules has been visible in the EU countries. These rules have had a positive influence on the cyclically adjusted primary balance of the budget and the dynamics of the relative weight of public debt. The chance that governments will adopt discretionary fiscal measures which are inconsistent over time, however, remains high.

The European Commission supports the complementarity of national fiscal rules with EU rules and the integration of the objectives contained in the Maastricht Treaty in national legislation.

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4 Should Sweden and UK Adopt the Euro?

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4.1 Research Question

The aim of the chapter is to assess whether central banks of Sweden and the UK would loose their influence on monetary developments in their countries and, instead, gain influence in ECB monetary policy decisions in case of Euro adoption. Hence, we are not going to estimate a model for possible welfare gains and losses of adopting the Euro by these two EU member countries. Our study is a policy paper with a focus on one of the economic reasons behind the political decision to preserve an own currency in order to stabilize the economy against adverse country-specific disturbances. In part, we observe Sweden and the UK, because in both countries the floating exchange rate is coupled with inflation targeting by the central bank – the institutional requirement for doing this is an independent monetary policy. There are still other EU member countries outside of EMU. Some of these countries have a fixed peg against the Euro, among them Denmark. Their monetary policy is obliged to defend the nominal peg, and the logical consequence is that ECB policy rates lead the policy rates of the national central bank. Differences in short-term market rates should be due to the central bank's intervention on the foreign exchange markets, hence, these differences would disappear in case of Euro adoption. The question whether Denmark would perform better with a flexible exchange rate and inflation targeting, is hypothetical and not the aim of this chapter. Nevertheless, we include Denmark into our sample to compare money market developments with the two countries with flexible exchange rate.

We evaluate the economic reason for staying outside the EMU applying co-integration and GARCH techniques. We ask two questions: the first one is whether money market rates are determined by domestic factors (among them policy rates) or rather foreign factors, here: the markets rates (Euribor) of the larger Euro area. If money market rates follow the Euribor, we may conclude that monetary policy in Sweden or the UK has actually no major influence on domestic money markets. The second question reads as follows: even with being determined by the Euribor (and ECB policy rates), there could be arguments to dispose of tools a central bank has with an own currency, and which can be used if necessary, for example in case of adverse country-specific disturbances. We apply a GARCH-M-GED model to reveal risks of country-specific disturbances.

The road map of this chapter is as follows: Section 4.2 provides a brief discussion of the literature. Section 4.3 describes the data and the model set up. Estimation results are presented and discussed in Section 4.4. Section 4.5 concludes with some political considerations.

4.2 A Review of the Literature

Institutional aspects: Sweden, the UK (and Denmark) are 'old' EU members still outside EMU. While the UK and Denmark make use of an optout clause, Sweden is obliged to adopt the Euro after fulfilling the convergence criteria. For all three cases holds that lacking political support in the population was and is a main factor for remaining outside. In the case of Sweden, the government managed not to fulfill the convergence criteria (having a floating exchange rate and violating the inflation criterion).¹⁰ The Riksbank and the Bank of England follow direct inflation targeting, while in Denmark the exchange rate target guides monetary policy. Further, inflation targeting in the two former countries seems to follow the simplest of all simple policy rules (Kuttner, 2004, p. 99), the classic backward-looking Taylor rule, giving the policy rate as a function of the current output gap and inflation deviation. Giving up an own monetary policy rule would have no institutional effects on the monetary sector if this rule would have been the same for the ECB.

Whether Sweden, the UK (and Denmark) should join the EMU is a topic of economic research since the early 1990s. Most studies since then have dealt with a broad understanding of welfare gains and losses, including those of growth, employment and inflation. A well-known example is the so-called Calmfors study (Calmfors et al., 1996) for the Swedish government. The Calmfors commission, consisting of five economists and three political scientists, concluded that Sweden (in 1996) was not yet ready to adopt the Euro. The Commission argued that monetary

 $^{^{10}\,{\}rm In}$ addition, the Riksbank is not an independent central bank, and therefore, Sweden does not meet one of the institutional criteria for becoming a member of EMU.

union would lead to only small efficiency gains due to reduced transaction costs and less exchange rate uncertainty and increased competition. However, these gains needed to be weighed against the adverse effects of large country-specific disturbances that could have severe consequences if they were not counteracted by country-specific monetary policy and exchange insurance against such extreme events (Söderströhm, 2008). The literature on the subject that followed did not end with clear conclusions. Moser et al. (2004) found increasing signs of business cycle synchronization between the three countries and the EMU and hence, improving conditions for adopting the Euro. However, Mazier and Saglio (2008) using an international macroeconomic model, found severe structural asymmetries among EU countries – even 10 years after the Euro was introduces in 11 countries, so that in case of an initial negative shock Sweden, the UK and Denmark could offset the effects thanks to their greater flexibility. Söderströhm (2008) reconsidered the conclusions of the Calmfors commission 10 years later and achieved conflicting results when applying different models. In particular, he found that countryspecific disturbances have been important for fluctuations in the Swedish economy since 1993, implying that EMU membership could be costly. An attempt to reconcile the conflicting results ended without conclusive results. Söderströhm also referred to a political argument: The Calmfors commission claimed that a possible loss of political influence, in the EU could be detrimental for Sweden when staying outside of the EMU. But 'available evidence suggests that there are no strong political disadvantages for Sweden remaining outside EMU' (Söderströhm, 2008, pp. 20/21 with reference to various studies on this issue). Moser et al. (2004) argued that the bilateral exchange rates with the Euro are subject of economic policy coordination in the EU and regarded as of common interest (see Article 124.2 of the EU Treaty). From this perspective, a loss of influence is rather implausible, since EU and EMU countries are interested to avoid competitive devaluations. Reade and Volz (2010) applying VAR techniques, found that money market rates in Sweden were co-integrated with the Euribor. They argue that in this case, Sweden's monetary policy would more or less follow the ECB's policy. One might conclude that Sweden's monetary system would be integrated with the Euro area like Denmark's, however with a flexible exchange rate. Reade and Volz concluded that Sweden would not lose something they never had – influence on money markets – after joining EMU but would gain more political influence over the common monetary policy of the ECB. However, the authors achieved their results by an extensive use of dummies for days of high instability in the data. Actually, they circumvented one of the major arguments the Calmfors commission (1996) raised against a premature membership in EMU, namely the appearance of adverse country-specific disturbances. This seems to be linked to the selected econometric methodology: outliers in a test for co-integration with daily data appear as 'white noise'. In addition, co-integration does not correct for leptokurtosis in the data as well. A leptokurtic distribution means that risks (measured by the volatility) are suppressed in tranquil times (signaling a co-movement, say, with the Euribor), but extremely elevated ('fat tail risks') in turbulent market times.

A methodology that tries to take care of the problems of white noise and leptokurtosis, is the GARCH approach. Different to linear regression models, a GARCH model explains a non-zero mean in time series by non-linearity in the variable (Engle et al., 208). The non-linearity reflects the impact of news ('shocks') on the behavior of the variable and reveals its specific risk structure, which cannot be seen with other econometric models. A GARCH approach can address the problems of a leptokurtic distribution of many monetary variables as well. ARCH/GARCH models provide an appropriate technique to deal with non-linearities and fat tails in monetary policy key variables. Multivariate GARCH-M models were recently applied to Euro candidate countries of Central-Eastern Europe by Kočenda/Poghosyan (2007) in their study on foreign exchange risks and Gabrisch/Orlowski (2010) on financial market risks, among them short-term interest rate risks. These studies detect important differences across the countries due to underlying systemic differences between them. Gabrisch and Orlowski (2010) argue that different risk premiums increase the probability of potentially destabilizing nominal shocks even in case of a co-movement of short-term interest rates. For the country group considered, Gabrisch and Orlowski (2010) found actually no co-movement between the countries interbank rates and the Euribor, and the prevalence of extreme risks in the conditional volatility series of interbank rates. We believe that the application of a GARCH model to the questions raised here is innovative.

4.3 Data and Methods

We use daily data of the Frankfurt money market rate since 1975, the three-months money market rates of Sweden (Sibor) and the UK (Libor).
The Frankfurt money market (FF_GM) rate stands for the Euribor. The latter is reported since 1999, while the former is older and goes back to 1975. We prefer to have series as long as possible in order to perform co-integration estimations. Correlation coefficients in Table 6 reveal an almost 100% and highly significant identity between Libor and Euribor since 1998, so that we feel safe to use the older and longer time series of the Frankfurt money market rate for longer time spans. We observe an almost complete correlation between FF_GM/Euribor and the Cibor of Denmark as well, which confirms the hypothesis that monetary policy is integrated in case of a fixed exchange rate with the Euro. There remain interesting differences between the Sibor (Sweden) and the Libor (UK). Correlation between Euribor and Libor is relatively weak, and reflects the strong integration of British financial markets with the rest of the world.

	Euribor	Sibor (Sweden)	Libor (UK)	Cibor (Denmark)
FF_GM against	0.999***	0.838***	0.628***	0.931***
Euribor against		0.836***	0.625***	0.930***

Table 6 Correlation of FF_GM Rate with the Four Money Market Rates Between 12/02/1992 and 6/03/2010 (4568 Observations)

*** Significance at the 1 per cent level.

Source: Datastream, data taken from: Deutsche Bundesbank (FF_GM), the Bank of Sweden (Sibor), National bank of Denmark (Cibor), Bank of England (Libor), and FBE&ACI: Europäischer Bankenverband und Handelsorganisation ACI (Euribor); own compilation.

Figure 18 illustrates the data process of the three-months 'Euribor' and the three-months money market rates of Sweden (Sibor), the UK (Libor), and Denmark (Cibor) over time. We observe a strong dissimilarity between the 'Euribor' and the Libor (confirming the weak correlation and the specific 'competitive' situation between financial market places of Frankfurt and London), and an increasing co-movement of the Euribor and the Sibor since around 2004. A similar picture shows the Danish Cibor, although there seems to be more deviation in the recent financial crisis than in the Swedish case – a sign that the National bank of Denmark did not only counter money market disturbances with interventions on the exchange rate market but also with some independent interest rate decisions.



Figure 18 Time Distribution of Euribor and Three-months Market Rates of Sweden, UK, and Denmark

Source: Datastream, data taken from: Deutsche Bundesbank (FF_GM), the Bank of Sweden (Sibor), National bank of Denmark (Cibor), Bank of England (Libor), and FBE&ACI: Europäischer Bankenverband und Handelsorganisation ACI (Euribor); own compilation. Table 7 presents the descriptive statistics of the series including data available for all countries for the period 02/12/1992 - 18/06/2010. Data show weak skewness (left and right), and remarkable leptokurtosis for the Euribor, the Libor and the Cibor (< 3), but an almost normal distribution for the Sibor (3.1). Using the longer periods if available, all interest rates show remarkably lower kurtosis coefficients, hence, the emerging leptokurtic distribution since 1992 could reflect the various disturbances around this time (the Nordic Banking crisis and the EMS crisis), but some effects of the approaching EMU as well.¹¹ To put it differently: since the pre-euro period, extreme interest rate gains emerge with a higher probability than one should expect under a normal distribution (Jacobi, 2005, p. 4). By standard deviation measure (common sample), Sibor is the most volatile variable, while Euribor is least volatile. Euribor, Sibor, and Cibor are right-skewed, shoring a prevalence of positive over negative shocks; Libor is left-skewed.

	Euribor	Sibor	Libor	Cibor
Mean	3.593	4.362	5.146	4.361
Median	3.405	4.102	5.460	3.876
Maximum	9.080	13.130	7.800	23.500
Minimum	0.634	0.473	0.530	1.195
Std. Dev.	1.523	2.329	1.600	2.440
Skewness	0.711	0.729	-1.190	2.773
Kurtosis	4.228	3.089	4.692	14.886
Jarque-Bera	672.034	405.978	1488.486	23737.260
Probability	0.000	0.000	0.000	0.000

Table 7 Descriptive Statistics (4567 Observations for All)

Source: Datastream, data taken from: Deutsche Bundesbank (FF_GM), the Bank of Sweden (Sibor), National bank of Denmark (Cibor), Bank of England (Libor), and FBE&ACI: Europäischer Bankenverband und Handelsorganisation ACI (Euribor); own compilation.

ADF tests reveal unit roots for all interest rates at their levels except for SIBOR. First differences, however, are stationary (Table 8), so that we use first differences in our regressions.

Our GARCH-in-Mean (GARCH-M) model considers the conditional covariance terms and excludes arbitrage possibilities. Furthermore, in ARCH/GARCH models leptokurtosis can be captured by the GED parameter. The leptokurtic, fat-tailed distribution means that volatility

 $^{^{11}}$ Descriptive statistics for the period since 1999 (EMU) show a decline of leptokurtosis.

Levels							
Series	Prob.	Lag	Max Lag	Obs			
SIBOR	0.0097	5	31	4572			
CIBOR	0.4957	21	33	5699			
LIBOR	0.8573	4	36	8464			
FF_GM	0.6861	5	37	9247			
	First	differences	5				
D(SIBOR)	0.0000	4	31	4572			
D(CIBOR)	0.0000	20	33	5699			
D(LIBOR)	0.0000	3	36	8464			
D(FF_GM)	0.0000	4	37	9247			

Table 8 Unit Root Tests (ADF)

Source: Datastream, data taken from: Deutsche Bundesbank (FF_GM), the Bank of Sweden (Sibor), National bank of Denmark (Cibor), Bank of England (Libor), and FBE&ACI: Europäischer Bankenverband und Handelsorganisation ACI (Euribor); own compilation.

of the examined series is subdued and concentrated around the mean at normal market periods, but it tends to explode at turbulent times – a problem that standard OLS regressions cannot satisfactorily capture. The appealing idea behind this methodology is to investigate the inmean GARCH variances. These variances might be unstable and even increasing, and deviate from the benchmark variable – in our case: the Euribor – thus require particular attention by monetary policy.

A basic assumption of long-run convergence of both the Euribor and the Sibor or Libor is a decreasing in-mean GARCH variance in the time series, i.e. a diminishing risk. Hence, information about the stability and risks cannot be just linearly extrapolated from historical data like in the case of co-integration analysis. It is better captured by the dynamics of the in-mean variance in the conditional mean equation with generalized error distribution specification (GARCH-M-GED). The GARCH estimator grasps the aggregate effects of all the institutional and structural asymmetries, regardless whether real or nominal convergence can be actually observed in the long-period time-series. One of these institutional asymmetries might stem from the different role, integration and regional orientation of financial markets in the countries considered ('London-Frankfurt'). The sign of the in-mean GARCH variance coefficient reflects positive or negative risk premium for investors. Considering these advantages, we have chosen to apply this method to the short-term market interest-rate, which are assumed to be affected by the policy rates of the central bank.

For the purpose of our empirical testing, we develop the following model examining co-movement between domestic i_t^{3M} (Sibor, Libor, and also Cibor) and common currency or Eurozone i_t^{*3M} (FF_GM alias Euribor) three-months money market interest rates. The basic stochastic model of interest rate yield co-movement is of typical linear character with ξ as the error term.

$$i_t^{\rm 3M} = \beta_0 + \beta_1 i_t^{*\rm 3M} + \xi_t \tag{5}$$

Considering non-stationarity of the examined bond yields at their levels (shown in Table 8), we convert the model variables to their firstdifferenced terms. Further, it is a well-known fact that linear regressions should be applied only when the error is assumed to have a zero mean and a constant standard deviation σ . In finance and monetary economics, however, this is frequently not the case. In ARCH/GARCH behaviour, we focus on the error process and assume the conditional mean to be zero. The term 'conditionality' stands for the forecast for the variable i_t^{3M} conditional on the information I_{t1} known at time t_1 . Based on the information available at earlier times one can define the conditional means and the conditional variances of these earlier periods (Engle et al., 2008). Hence, conditional volatility dynamics of changes in the considered countries' short-term interest rates as a function of the euribor is examined on the basis of the GARCH(p,q)-equation system with ARCH(p) and GARCH(q) lags. The conditional mean equation with first differences is represented by

$$\Delta i_{t}^{3M} = \beta_{0} + \beta_{1} \Delta i_{t}^{*3M} + \beta_{2} \sigma_{t-1}^{2} + \xi_{t}^{'}$$
(6)

where ξ' is the error with a conditional mean (= 0). The inclusion of the GARCH variance σ_{t-1}^2 in the mean equation allows for ascertaining the overall risk premium on short-term interest rates. An estimated value of the β_1 coefficient is expected to be close to or higher than one if a given change in the euribor drives significantly the short-term market rates in the countries into the same direction. This variable explains the room for an independent monetary policy pursuit by policy rate setting. The conditional mean equation is derived from Eq. (6) and is supplemented with the GARCH in-mean conditional variance M component σ_{t-1}^2 .

A negative risk premium for domestic short-term money instruments is detected when $\beta_2 < 0$, (positive when $\beta_2 > 0$). Our data generating

process assumptions include the generalized error distribution (GED) parameterization to account for possible 'tail risks' or a fat-tailed data distribution (leptokurtosis according to Table 7, page 75).

The corresponding conditional variance equation is specified as

$$\sigma_t^2 = h_0 + h_1 \xi_{t-1}^{'2} + \ldots + h_p \xi_{t-p}^{'2} + g_1 \sigma_{t-1}^2 + \ldots + g_q \sigma_{t-q}^2 \tag{7}$$

The ARCH terms $h_p \xi_{t-p}^{\prime 2}$ represent the impact of 'news' or shocks to volatility from p-periods before, while the GARCH terms $g_q\sigma_{t-a}^2$ reflect persistency in volatility carried from q-periods before. In particular, we are focusing on the sum of ARCH and GARCH coefficients; if its value is less than unity, the GARCH(p,q) process is a special case of homoskedastic white noise; it implies diminishing volatility as a proxy of declining interest rate risk In hindsight, risk convergence is detected if the sum of ARCH and GARCH terms is less than one. If the sum is larger than one, the ARCH process loses its white noise properties. The impact of past shocks on the conditional variance is persistent. Further, a change in the sign in subsequent ARCH coefficients points at strong speculation. The orders of p for the ARCH terms for each interest rate series have been chosen on the basis of minimum Schwartz information criterion (SIC) and maximum log-likelihood. For the GARCH term, we decide for one lag only (q = 1). Such a reduced model has proved efficiency in many empirical studies (Jacobi, 2005, p. 20). The GED parameter was fixed through an optimisation process aiming at positive R squared. We insert a dummy (LEH) for the outbreak of the financial crisis with 1 since the 10 October 2008 (Lehman Brother default).

4.4 Estimation Results

The selected, most robust results of the GARCH(p,1) tests based on Eqs. (6) and (7) for each country's interest rate are shown in Table 9. The With respect to the conditional mean equation, there is a strong comovement between the Euribor and the three-months money markets rates of Sweden with a flexible and Denmark with a fixed exchange rate. With daily data, the coefficients β_1 are pretty high and explain a change of the domestic interest rate between 37% and 38%. Not surprisingly, the Libor only shows a weak co-movement – and one may see this as a first true sign of monetary independence of the Bank of England from Euroland. A decompressing impact on the gap between Euribor and

Variables	Sweden	Denmark	UK					
	Conditional Mear	equation						
Constant term	0.000	-0.000	-0.000					
Euribor3M	0.374***	0.384***	0.107***					
Log (GARCH)*1000	0.003***	-0.008	-0.004					
LEH (*1000)	0.377	-0.752**	-0.040					
Conditional Variance Equation								
Constant	0.000***	0.000***	0.000***					
ARCH(1)	0.226***	1.217***	0.224***					
ARCH(2)	-0.028	-0.748***	-0.080***					
ARCH(3)	-0.175***	0.122***	-0.078***					
ARCH(4)	0.187***	-0.314***	0.217***					
ARCH(5)	-0.106***		-0.056***					
ARCH(6)	-0.036***		-0.196***					
GARCH(1)	0.942***	0.856***	0.976***					
Sum of ARCH/GARCH residuals	1.010	1.133	1.007					
GED parameter	1.5	1.0	1.3					
	Diagnostic Sta	atistics						
Log likelihood	11284	14333	13963					
SIC	-4.920	-5.000	-3.289					
Adj. R-squared	0.039	0.002	0.003					
DW	1.89	2.631	1.892					
Observations	4566	5720	8457					

Table 9 Changes in Three-months Market Interest Rates vis-à-visChanges in Euribor-3-months Daily Series; Sample: TotalPeriod^a

^a Sweden: 12/03/1992–6/03/2010; Denmark: 7/01/1988–6/03/2010; United Kingdom: 1/04/1978–6/03/2010. Significance levels: *** 1%, ** 5%, * 10%.

Source: Authors calculations.

the domestic interest rate can be observed only for Sweden, since its (Log)GARCH variable shows a significant positive premium relative to Euribor. The variable is insignificant for the Libor and for the Cibor. Interestingly, an impact of the Lehman default (financial crisis) can be observed for Denmark's Cibor only, and that impact is negative. It seems to have a strong monetary integration with the EMU contributing to stability of the Danish money market.

In the conditional variance equation, ARCH/GARCH coefficients are highly significant. Note, that coefficients describe the deviation of volatility from Euribor volatility; hence, it can be interpreted as a sign of the prevalence of country-specific disturbances. For the Sibor and the Libor we get very higher orders of ARCH-type shocks to volatility, suggesting an unstable path of adjustment. Further, the sums of the residuals are larger than 1, hence, all conditions for a non-stationary process are fulfilled. We can expect a widening volatility gap between the Euribor and the short-term interest rates in Sweden and the UK. In case of the Danish Cibor, a widening gap between volatility of Euribor and Cibor is likely due to disturbances on the foreign exchange market (and could be healed by adoptint the Euro). The alteration of signs of the residuals reveals high speculation in the market. The GED parameter reports remarkable 'fat tails'.¹² Finally, the GARCH(1) coefficients are very high. In case of the UK for example, the coefficient reports that almost the whole volatility from the previous period is carried over to the current period, so it is highly persistent – the same holds for Sweden and Denmark (although at a bit lower level). The optimization process ended in GED parameters below 2, indicating some leptokurtosis. In this case, volatility in money markets tends to escalate during turbulent market periods, while it remains subdued at times of normal market risks.

When we compare these results with those obtained by Gabrisch and Orlowski (2010) in their study on Euro candidate countries from the east since the year 2000, coefficients show a pretty good co-movement of short-term interest rates, while in Poland, Hungary, the Czech Republic, Romania and Slovakia no co-movement could be identified. Compared to Sweden, where the (Log)GARCH variable illustrates a widening gap to the Euribor in turbulent market times, the variable obtained a negative sign, hence, the gap tends to diminish. The persistence of shocks to volatility – GARCH(1) – seems to be weaker in the new Euro candidate

 $^{^{12}}$ Note that in ARCH/GARCH models a parameter below 2, but in descriptive statistics of higher than 3 reflects leptokurtosis.

---- Conditional standard deviation



Figure 19 GARCH Conditional Standard Deviation Residuals Generated from Estimations in Table 9

Source: Own compilation.

countries than in Sweden or UK. Finally, 'fat tail' risks are at considerably higher levels in new Euro candidate countries, where the GED parameter turned out to be less than 1 than in the countries considered in this chapter.

The graphical displays (Figure 19) of the GARCH conditional standard deviation shows huge jumps in interest rate volatility for Sweden and the UK relative to the FF-GM/Euribor, coinciding with the Nordic banking crisis (Sibor) and the EMS crisis 1992–3 (UK) and since 10 October 2008, the collapse of Lehmann Brothers. In the intermediate period, volatility behaves restlessly. To put it differently: there seems not to be any stabilizing contribution of the Euribor to the volatility of the two market rates. Compared with the two money markets, the money market of Denmark displays more stability since the Nordic Banking crisis episode. However note that the scales of the three countries are quite different. Since Denmark was hit by the Nordic crisis more than the other countries, a reduction of the scale is useful. When we fixed the scale at maximum 0.7, we found flagstaff building until 2002, but then, different to Sweden a tranquil period of about 6 years.

4.5 Conclusions

It is a fact that the support for adopting the Euro by the population was and likely is weak in the countries considered. However, the economic debate is more sophisticated, and political and economic arguments follow their own business cycles. For example, during the financial crisis there were some debates whether the country would not better perform under the umbrella of the EMU. Iceland's government decided to apply for EU membership in order to adopt the Euro as soon as possible. The Euro crisis of 2010 drove ideas of a 'Nordic Euro' to the surface of the debate about the future of the EMU – an area without Greece, Italy, Portugal, Spain and Ireland, but with Sweden, Denmark, Norway and even Switzerland.

With respect to economic arguments, the data and our test results do not underpin the argument that the countries considered would not much lose in economic terms when adopting the Euro, but would gain on political influence. This holds in part for the UK, where Europe's largest financial market is located and necessitates an own currency and independent monetary policy. But, it holds in the case of Sweden as well. Our results confirm the existence for elevated risks for short-term market rates in turbulent times of the Libor and Sibor vis-à-vis the Euribor. We see this as an argument for an own currency under a flexible exchange rate system. It is well possible for the Sibor that in tranquil times, the domestic money market rate is driven by the Euribor, and the policy rates mimic the ECB's policy. However, in turbulent times an independent monetary policy becomes necessary since the domestic interest rate does no longer follow the Euribor, but is affected by country-specific factors. These turbulent times happen more frequently than plain figures show. For Sweden and even more for UK, there is not yet a specific gain to adopt the Euro; the already achieved participation of both countries in the monetary policy coordination framework of the EU does not offer them significant more influence. Reversely, they could even lose influence according to the very low weight in the ECB's monetary policy compared to their prominent position rooting in their option to use the exchange rate as policy instrument. For Denmark, we would conclude, there is no monetary policy argument to stay outside of EMU from the perspective of our specific considerations.

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II The Impact of the Financial Crisis on Economic Performance Across EU

5 Credibility Crisis in the European Union: Fiscal or Balance of Payments Crisis?

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5.1 Introduction

This chapter is intended to analyze reasons why some countries of the European Union experienced particularly strong impact of the economic and financial crisis which resulted in their undermined financial credibility. This group of countries, far from being homogenous, comprises Portugal, Ireland, Italy, Greece and Spain and it is commonly shortly called PIIGS. Greece and Ireland both experienced long-term sovereign rating downgrades twice in 2009 and Portugal and Spain once in 2009 (ECB, 2010, p. 38). While ten-year government bond yields of the Euro areas countries diverged in 2008 and 2009, Greek and Irish bond yields recorded the fastest growth and remained at particularly high levels (with high spreads over German bonds) (ECB, 2010, p. 37). According to a popular opinion these countries were subject to particularly strong tensions in their public finances which eventually led to a serious loss of credibility. Although this opinion is not quite false, it is only partly true; the fiscal situation of these countries must be considered in a broader context which matters a lot. To justify briefly this point of view two examples might be called for; the example of the UK with double-digit public deficits and a rather high level of public debt and the example of Belgium with public debt close to 100% of GDP and still considerable public deficits. Neither of these countries experienced the same pressures which were exerted on the PIIGS.

This chapter begins with a short overview of the reasons for the crisis (Section 5.2). These reasons to a certain degree explain why the shock turned out to have an asymmetric impact on the countries of the European Union. This part of the chapter also presents fiscal costs of the crisis and fiscal stimuli to boost the economies. Paradoxically, PIIGS countries were not among those running most expansionary fiscal policies.

It is the initial economic situation which matters a lot. Economic developments in the European Union before the crisis and resulting different vulnerabilities among its member countries are discussed in Section 5.3. It is argued that – although fiscal stance and public debt are important – in the case of the countries in question there is another problem of balance of payments imbalances, which mirrors the situation of the private sector, too. This characteristic of the crisis is blurred by the membership of the countries in the Eurozone. Having the common currency also prohibits the application of the easiest and best solution; devaluation.

Section 5.4 is devoted to the analysis of the economic policy in the face of the crisis. It is argued that the countries which experience negative, asymmetric developments including balance of payments imbalances are deprived of policy instruments necessary to overcome their problems. What concerns the common economic policy of the European Union it seems to be erratic, in breach of important rules which were supposed to govern economic life in the EU and in the Eurozone, it neglects democratic control over public finances and – last but not least – it does not address in a perspective manner the specific problems encountered by the countries which were hit most.

The last section (Section 5.5) concludes.

5.2 How the Crisis Hit the European Union Member Countries

The reasons for the present financial and economic crises – although quite complex – are fairly well recognized and presented in the literature. They comprise hasty deregulation of the financial sector, poor supervision, wrong incentives and erroneous monetary policy. Also the development of the crisis at first in the United States and then in Europe is subject to comprehensive description. In this part of the chapter I would like to limit my remarks only to some characteristics of the crisis in the European Union, in particular to asymmetric impact of the initial financial shock and different budgetary reaction to and costs of the crisis.

Particular countries of the EU to different extent experienced contractionary effects of the shock. Among the countries which were hit rather strongly (in terms of GDP) there are both representatives of the PI-IGS group (in particular Ireland) and those which do not belong to this category (Germany). The same applies to countries where the crisis had fairly mild effects for GDP; amongst them there is Poland but also Greece which experienced the most severe loss of credibility (European Commission, 2009(b), p. 27). According to the European Commission (2009(b), p. 27) there are three characteristics of the economies which determined the extent to which the crisis had its contactionary effects. Firstly, it is the extent to which housing markets had been overvalued and construction industries oversized. This feature mirrors the role of the real estate market bubble in the present crisis. Its negative impact was severe in United Kingdom, France, Ireland, Spain and the Baltic countries - this group consists of both PIIGS countries and other EU members. Secondly, the impact of the shock reflected the export dependency of the economy and the current account position. In fact, this is a mixed criterion. "Countries where export demand has been strong and/or which have registered current account surpluses are more exposed to the sharp contraction of world trade (e.g. Germany, the Netherlands, and Austria). Countries which have been running large surpluses are also more likely to be exposed to adverse balance sheet effects of corrections in international financial asset markets. Conversely, countries which have been running large current account deficits may face a risk of reversals of capital flows." (European Commission, 2009(b), p. 29) Later in the chapter we will pay attention to the latter relation between current account deficits and credibility crises. Among countries with high deficits there are Portugal, Greece and Spain. The third characteristic which determined the impact of the shock on economic activity was the size of the financial sector and/or its exposure to risky assets. This criterion applies particularly to the United Kingdom and Ireland.

The first conclusion we may draw from these observations is that the acute loss of credibility on international financial markets was not clearly related to the depth of the crisis in terms of GDP and that the features which determined the extent of contraction find little explanatory power in this respect.

Another explanation which obviously comes to mind is a sharp deterioration of a poor fiscal stance and high public debt (irrespective of GDP dynamics). Let's have a closer look at fiscal developments in the EU member countries during the crisis.

Table 10 and Table 11 present public deficits and debts as a percentage of GDP of chosen EU countries, EU and the Eurozone. The tables show a general deterioration of the balances of public finances and growth of public debt in each of the countries. Some countries experienced

Country	2007	2008	2009
Belgium	-0.2	-1.2	-6.0
Czech Rep.	-0.7	-2.7	-5.9
Germany	0.2	0.0	-3.3
Ireland	0.1	-7.3	-14.3
Greece	-5.1	-7.7	-13.6
Spain	1.9	-4.1	-11.2
France	-2.7	-3.3	-7.5
Italy	-1.5	-2.7	-5.3
Netherlands	0.2	0.7	-5.3
Austria	-0.6	-0.4	-4.0
Poland	-1.9	-3.7	-7.1
Portugal	-2.6	-4.9	-9.4
Sweden	3.8	2.5	-0.5
UK	-2.8	-4.9	-11.5
EU	-0.8	-2.0	-6.8
Euro zone	-0.6	-2.0	-6.3

Table 10 General Government Deficits/Surpluses of Chosen EUMember Countries, EU and Eurozone, % GDP

Source: Eurostat data.

Country	2007	2008	2009
Belgium	84.2	89.8	96.7
Czech Rep.	29.0	30.0	35.4
Germany	65.0	66.0	73.2
Ireland	25.0	43.9	64.0
Greece	95.7	99.2	115.1
Spain	36.2	39.7	53.2
France	63.8	67.5	77.6
Italy	103.5	106.1	115.8
Netherlands	45.5	58.2	60.9
Austria	59.5	62.6	66.5
Poland	45.0	47.2	51.0
Portugal	63.6	66.3	76.8
Sweden	40.8	38.3	42,3
UK	44.7	52.0	68.1
EU	58.8	61.0	73.6
Euro zone	66.0	69.7	79.0

Table 11 General Government Debt of Chosen EU MemberCountries, EU and Eurozone, % GDP

Source: Eurostat data.

particularly sharp rise in public deficits. This group consists mainly of PIIGS countries. Moreover, Greece even before the crisis had high and excessive deficits.

These remarks on fiscal developments in the European Union in the wave of the crisis are far from being complete. There is broad literature – mainly published by the ECB and the European Commission – which analyses many aspects of public finances in distress. It covers contingent liabilities, factors driving government bond yield spreads, discretionary stimuli versus automatic stabilizers and a change in fiscal stance, the effectiveness of budgetary spending aimed at boosting the economy, the need for consolidation, problems due to aging societies and fiscal sustainability. This literature is very much focused on technical aspects of fiscal developments. The picture of fiscal situation in EU member countries it presents is quite precise and much more complete than what have been presented above.

To whatever degree the analysis of fiscal developments is complete it does not necessarily mean that this is the whole story behind the credibility crisis. We still face some puzzles rather neglected in the literature. Let's note that the United Kingdom also recorded double-digit deficits while Italy kept its deficit at a moderate level, well below the average for the European Union and for the Eurozone. The fiscal situation of the United Kingdom (comprising both deficits and debts) was not much different (at least until 2010) than that of Ireland and worse than that of Spain. Greece and Italy had very high debts but the same is true in the case of Belgium which did not experience much market pressure (and public deficits were in Belgium rather high as well). Some other countries of the PIIGS group, Spain and Ireland, had even lower debts than "benchmark" Germany or an average for the European Union and the Eurozone.

I am ready to agree that the situation of public finances is an important, may be the main factor driving the development of the credibility crisis. However, this cannot be the whole picture; its analysis still leaves us with the puzzles. In the next part I will present some missing elements.

5.3 Fiscal Crisis or Balance of Payments Crisis

Before the present crisis erupted and before public finances of some member countries of the European Union get beyond control there had been some tensions within the Euro area. In 2008 new problems emerged and captured public interest but these old tensions did not necessarily disappeared; conversely, they seem to be closely interlinked with the present fiscal crisis of some EU member countries.

The mechanism of these tensions started in some countries of the monetary union with the reaction of market participants, particularly consummers, to lower interest rates due to participation in the Euro area. As a result the economy became overheated and inflation was slightly but persistently higher in these countries than the average for the Euro area (European Commission, 2001). Eventually, it brought about considerable "real exchange rate" appreciation or loss of international competitiveness (European Commission, 2005, Wyplosz, 2006, 2006(b)). Current account deficits emerged/increased. As foreign liabilities grew, possibilities to further accumulate the debt and run current account deficits came closer to a limit. In the absence of foreign exchange rate it eventually calls for decline in private and/or public spending. As a consequence the economy stagnates (Koronowski, 2009). Of course, this mechanism creates some pressure to cut public spending, either as a means to alleviate current account imbalances or simply to keep public deficits under control, especially in line with the provisions of the Stability and Growth Pact.

The PIIGS countries perfectly match the above scenario. In 1999 – 2006 the competitiveness of the economy (versus other countries of the Euro area) declined by 27% for Italy, by 12% for Spain and by 10% for Greece. Portugal and Ireland also suit the general pattern although some additional factors played a role there (Wyplosz, 2006b, Basto, 2007, Koronowski, 2009).

Here we come to the missing elements of the puzzle, which is current account deficits, high foreign liabilities and resulting vulnerabilities of the economies. This problem is also recognized, although in a rather weak form, by the European Commission (2009, p. 193): "The loss of the exchange rate as an adjustment instrument may imply protracted periods of self-reinforcing destabilising dynamics due to price and wage rigidities. Current account imbalances and net foreign asset positions can in turn play an important role in a context of exacerbated tensions in financial markets." The same problem was recognized by Visser (1995, p. 136) in the context of the theory of optimum currency areas. In his critique of Ingram's opinion that a high degree of financial integration should be an argument in favor of a currency area (a criterion of the optimum currency area) Visser wrote: "If, for instance, diverging cost developments cause chronic sizeable current-account imbalances. wealth holders may at some point refuse to accumulate the debt of the deficit country. Capital inflows dry up and speculative attacks against the currency of the deficit country are to be expected, forcing a devaluation." Visser formulates his reservations in the traditional optimum currency area terms of fixed exchange rates and possible devaluations. In a monetary union there couldn't be a speculative attack against a currency or devaluation but wealth holders may still refuse to further accumulate the debt of the deficit country, in particular its government or financial institutions. In this juncture, there is no exchange rate risk which could spur investors to sell the currency of the deficit country but credit risk matters and it is even exacerbated by the absence of the exchange rate adjustment mechanism; it would be very difficult to service (foreign) debt as long as there is no improvement in the current account/domestic savings. It pertains to both public and private debtors, the problem has a macroeconomic dimension that relates to incomes and savings and eventually determines the ability of domestic agents to service their debts. Government bond markets would be usually most liquid and would react most abruptly. High government liabilities and deficits themselves may obviously be subject to increased risk and investors' nervousness. However, current account deficits may crucially worsen the situation. Imposing higher taxes on private agents who barely service their own debts and who are inclined to borrow even more in spite of tough market conditions would be rather difficult and dangerous. Any attempt to cut spending would badly influence incomes and exacerbate the situation of private borrowers and financial institutions.

Investors may not only refuse to further accumulate the debt but they may be also strongly inclined to sell risky assets of the deficit country. In the context of the credibility crisis in the EU it was ECB's enormous purchases of Greek bonds, discussed in the third part of the chapter, that enabled investors to sell these risky assets without major losses and plummeting prices. "By buying up Greek debt, the ECB keeps the prices of the bonds artificially high. French banks, in particular, benefit from this policy because it enables them to sell their Greek bonds to the ECB, as an inexpensive way of cleaning up their balance sheets." (Reuter, 2010)

Table 12 presents current account deficits of some European Union member countries and Table 13 contains data on net international investment positions.

Country	2005	2006	2007	2008
Belgium	2.6	2.0	2.1	-2.4
Czech Rep.	-1.3	-2.5	-3.3	-3.1
Germany	5.1	6.5	7.9	6.7
Ireland	-3.5	-4.4	-5.3	-5.3
Greece	-7.5	-11.2	-14.4	-14.6
Spain	-7.4	-9.0	-10.1	-9.6
France	-0.4	-0.5	-1.0	-2.2
Italy	-1.7	-2.6	-2.4	-3.4
Netherlands	7.3	9.3	7.7	7.5
Austria	2.1	2.4	3.6	3.2
Poland	-1.2	-2.8	-4.7	-5.5
Portugal	-9.5	-10.1	-9.5	-11.2
Sweden	7.0	8.5	8.6	8.4
UK	-2.6	-3.3	-2.7	-1.7

Table 12 Current Account Deficits of Chosen EU Member Countries, % GDP

Source: IMF data.

Belgium	40	Czech Rep.	-31	Germany	31	Ireland	-23	Greece	-73
France	-23	Italy	-14	Netherlands	16	Austria	-15	Poland	-35
Spain	-81	Portugal	-84	Sweden	8	UK	6	Hungary	-74

Table 13 Net International Investment Positions of Chosen EU Member Countries, Approximated, % GDP, 2008 (Ireland, 2007)

Source: Own calculations, IMF and OECD data.

The data in the tables above show that countries which experienced most market pressure and which in particular were subject to rating downgrades had not only poor fiscal situation but also – and probably first of all – high or extreme and persistent current account deficits and very big negative net international investment positions. This is the case of Greece, Spain and Portugal but also some other countries would suit this pattern (Hungary, Romania and Baltic states).¹³ An exception is Ireland which had its government bonds spreads roaring in spite of a fairly good external position. In this case other factors, particularly very high exposure to financial losses, seem to have played a major role. Conversely, neither Belgium, nor the UK experienced strong mar-

 $^{^{13}}$ This chapter is not intended as a detailed country by country study and it rather gives only exemplifications of some processes which may have more general application.

ket pressures in spite of their very poor fiscal positions (extremely high public debt/high deficit and enormous deficit/high debt respectively). Also Italy was "saved" although it reached a record in public debt level; however it had still moderate current account deficits, not particularly high public deficits and quite good net international investment position.

These examples show there is no direct link between fiscal situation and external position. Although "twin deficits" mechanism might have played an important role, the developments in the private sector seem to be meaningful. Current account deficits and foreign debt may also result from high spending and borrowing of households, in particular. Table 14 presents data on increases in household liabilities in chosen EU member countries between year 2000 and 2008. Table 15 contains data on households net saving rates as a percentage of disposal income.

Belgium	168	Czech Rep.	543	Germany	101	Ireland	331	Greece	694
France	191	Italy	233	Netherlands	196	Austria	151	Poland	771
Spain	315	Portugal	209	Sweden	204	UK	215	Hungary	1244

Table 14 Households Liabilities (Loans) in Chosen EU Member Countries, Approximated, 2008 (100 for 2000)

Country	2005	2006	2007	2008
Belgium	9.7	10.9	11.4	12.0
Czech Rep.	3.2	4.8	6.3	5.8
Germany	10.5	10.5	10.8	11.2
Ireland	5.6	3.8	2.7	4.1
Greece	-8.0	-7.3		
Spain	4.7	4.2	3.6	6.1
France	11.4	11.4	12.0	11.6
Italy	9.9	9.1	8.2	8.6
Netherlands	6.3	6.0	8.1	6.8
Austria	9.7	10.9	11.4	12.0
Poland	7.1	6.8	7.4	
Portugal	2.5	1.1	-1.1	-0.9
Sweden	6.8	7.8	9.1	12.1
UK	-1.3	-2.9	-4.3	-4.5

Source: Own calculations, OECD data.

Table 15 Households Net Saving Rates as a Percentage of Households Disposable Incomes

Source: OECD data.

The data from Tables 14 and 15 show big differences among the countries. When it comes to increases in household liabilities, there is a group of countries with particularly high rates. This is Hungary, Poland and the Czech Republic, the representatives of the countries which had their economies reemerging from the communist era, with fast remonetization as a part of it. As Table 15 shows it was not combined with particularly low saving rates. I don't want to claim that the rise in the liabilities was never dangerously fast but neither in Poland nor in the Czech Republic it brought about internal financial tensions or current account imbalances. In the case of Hungary (and some other countries of the region), however, there were clear problems having the nature of the balance of payments crisis.

Another country which had outstanding rate of growth of households liabilities was Greece. This is in line with high negative saving rates in this country. Most importantly, it is with perfect harmony with its catastrophic external position. Other countries with very low, sometimes also negative, saving rates are the United Kingdom and Portugal. In the case of Portugal low saving rates are not mirrored in particularly high growth in liabilities (which deserves further research) but it again is well expressed in very high current account deficits. The case of the UK is different with respect to current account deficits: they remained on a moderate level.

To explain the difference between Greece and Portugal and the United Kingdom it is reasonable to point out that the UK still have it own currency; the pound sterling lost about one third of its value versus the Euro between January 2007 and October 2010. Earlier in this chapter we noticed also a good international investment position of the country. In fact it turned positive only in 2008 which reflects capital outflow from the United Kingdom. In a way, this country were subject to a mild credibility and currency crisis.

Other countries of which data are in the tables above had fairly modest rates of growth in households liabilities and reasonably high saving rates. This group includes in particular remaining PIIGS countries. Spanish current account deficits seems to be more related to public deficits than to the developments in the private sector. In the case of Ireland and Italy as external positions remained fairly good.

The problem of fast growing debts of private sector and their relations to current account deficits (and respectively surpluses of other countries) is well accentuated in (De Grauve, 2010): "(...) Prior to the emergence

of the financial crisis the government debt to GDP ratio in the Eurozone was declining. During the same period, private debt (households and financial institutions) increased in an unsustainable way." "(...) Spain and Ireland were spectacularly successful in reducing their government debt to GDP ratios prior to the financial crisis (...). These were the two countries, which followed the rules of the Stability and Growth Pact better than any other country – certainly better than Germany that allowed its government debt ratio to increase before 2007. Yet the two countries, which followed the fire code regulations most scrupulously, were hit by the fire, because they failed to contain domestic private debt."

When it comes to the balance of payments aspect of the rising debts De Grauve underlines the role of surplus countries (such reasoning is similar to the saving glut argument in the discussion of global imbalances in early 2010s). Anyway, in De Grauve's opinion current account imbalances which reflect private borrowing (and lending) play an important role. "Much of the financing of these unsustainable booms was done by 'virtuous' countries with current-account surpluses. These imbalances will occur even when all countries follow balanced budget rules."

The remarks on the role of private spending in the build-up of balance of payments imbalances are not intended to play down the impact of public deficits and debts on the credibility crisis. It is rather important to notice that - firstly - public deficits and debts do not provide a sufficient explanation of the credibility crisis and balance of payments must be taken into account and – secondly – public spending is not the only one and sometimes not even the most important reason for payments imbalances. The causality between public deficits and payments deficits is more complicated in the analyzed examples then the concept of "twin deficits" would suggest. Although high public expenditures and resulting public deficits might cause rising foreign trade deficits in some PIIGS countries it seems also true that loss of international competitiveness and economic slowdown resulted in difficulties to keep public finances under control. The risk of such a negative impact of rising and eventually excessive balance of payments imbalances on public finances, with a reference to the crisis in Argentina in 2001, was accentuated in Connolly (2005) and Koronowski (2009).

The analysis above shows that it is difficult to group countries as they have individual distinctive features. This reservation pertains also to PIIGS countries propitiously declared in the media as a distinct group. However, it is easy to notice, that credibility crisis is often combined with serious balance of payments problems (Greece, Portugal, Spain). An exemption is Ireland and – to a degree – Italy which, however, didn't experience particularly strong negative market pressure. Current account imbalances are most often interlinked with high public deficits but in some cases (Greece, Portugal) the developments in the private sector seem to play an important role. Finally, a major difference is having its own currency or being a member in the Euro area. Countries which are in the monetary union of course are saved from a classic currency crisis. This does not change the fact that they experience a balance of payments crisis with no simple - even if unpopular - remedy of devaluation. This is the case of Greece, Portugal, Spain, and to a lesser degree Italy. Also Estonia seems to match perfectly well this group. The other cluster contains of countries with high fiscal deficits and excessive private spending, which preserve their currencies and flexible exchange rates such as the United Kingdom and Hungary. In these countries the adjustment mechanism of exchange rates operates. Sometimes the adjustment is smooth and sometimes abrupt what reflects distinctive features of particular countries, their international credibility and liquidity of respective financial markets.

The observations made in this part of the chapter show that acute credibility problems emerge where fiscal tensions come hand in hand with current account imbalances. In the Euro area this kind of crisis finds no easy remedy. In the next part we will consider if economic policy in the monetary union offers a relief.

5.4 Policy Response to the Crisis

In the wave of the crisis there came an urgent need to support wobbly financial institutions and avoid a systemic collapse. This action took many forms which demanded either direct injection of public money or giving public guaranties. This cost was quite high in terms of GDP and brought about a considerable rise in public debt in some countries. Among members of the Eurozone Netherlands, Ireland, Luxembourg and Belgium were hit most; due to financial stabilization operations public debt rose in these countries in 2008–9 respectively by 11.4% of GDP, 6.7% of GDP, 6.6% of GDP and 6.4% of GDP. With the exemption of Ireland none of these countries were subject to major market pressure. What concerns other PIIGS group members the number for Greece was 1.6, for Spain 1.8, for Portugal it was 0.0 and for Italy 0.1; for all these countries

it was lower than the average for the Euro area (2.5% GDP). Also the impact of cumulated stabilization operations on government contingent liabilities for all PIIGS countries were lower than the Euro area average with the striking exemption of Ireland (ECB, 2010, p. 15). Ireland was the only country which experienced a major credibility problems and had high financial sector stabilization costs. These costs certainly were not a reason for bad market sentiment in the case of other PIIGS group countries. Moreover, these countries which incurred the highest costs of financial stabilization did not suffer much loss of credibility (except Ireland).

On 26 November 2008, the European Commission launched the European Economic Recovery Plan (EERP) with an aim to provide a coordinated short-term budgetary impulse to demand. It is a unique example of short-sighted economic policy which called for fiscal expansion without any respect for clear signs of either major imbalances in public finances of many member countries or their alarming current account deficits. It is also highly disputable if this plan was not in a major conflict with state aid rules enshrined in the Treaty (art. 126). Finally, this plan took no serious consideration of the Stability and Growth Pact which – as usually – allows enough room for interpretations by the mighty. It is not a surprise that this plan very quickly had to give room to fiscal "consolidation".

Any activist fiscal stimuli did not play an important role in deteriorating fiscal situation of the countries which experienced most market pressure. It is not an easy task to divide changes in budget deficits into different components such as automatic stabilizers, other cyclical components and activist change in fiscal stance, including expenditures which are clearly dedicated to alleviate the crisis. However, countries which underwent most market pressure and loss of credibility, PIIGS group in particular, don't seem to have been especially devoted to activist fiscal policies, probably with some exemption of Spain. The value of fiscal stimuli packages in Greece and Italy was zero and in Ireland and Portugal it was well below the average for the Euro area both in 2009 and 2010. In fact, these countries had little room for any fiscal expansion or activism.

Since I used above a term "room for fiscal expansion" it makes sense to refer to a similar notion of "fiscal space". According to Heller (2005) this is "room in a government's budget that allows it to provide resources for a desired purpose without jeopardizing the sustainability of its financial position or the stability of the economy". (European Commission, 2009,

p. 182) "Fiscal space" is subject to constructing an index which makes it measurable. It matters here that the index comprises not only explicit fiscal characteristics (government debt, contingent public liabilities to the financial sector, estimates of foreseeable revenue shortfalls, share of non-discretionary public expenses) but also current account balance. This seems to well combine both fiscal and current account imbalances referred to in the previous part of the chapter. However, since the index integrates both aspects, "fiscal space" is not useful to present their relative "contribution" to credibility problems. Moreover, the index does not take into consideration actual public deficits which determine possibilities to further expand fiscal policy and – of course – have an essential meaning for credibility. It would be wrong to interpret the notion and the index as if the imbalances could be reduced to the fiscal dimension, either. Values of the index for the European Union member countries are presented in (European Commission, 2009, p. 185).

What concerns the monetary policy of the ECB it was conventionally very easy during the crisis. However, such policy obviously cannot solve the asymmetric problems of some member countries of the monetary union. It would not help to reduce either public deficits or current account deficits of the countries which face such imbalances. Fortunately, low interest rates at least moderate the burden of interest rate payments of most indebted government/countries.

Even in this juncture the ECB found a rather unconventional way to deal with the credibility crisis. In particular, in May 2010 it changed its' internal rules with regard to the range of instruments accepted in open market operations; it decided to accept papers with lower rankings with a clear intent to buy Grrek (and possibly other) junk bonds (ECB, 2010b). The same month ECB engaged on a huge scale in buying up government bonds of the countries which faced the credibility problems most severely, Greece in particular (Reuter, 2010). The ECB did so not for any monetary policy reasons, the action was clearly a market intervention intended to bail out countries under strong market pressure and to alleviate financial strains which could lead to big losses of commercial banks. This way the ECB assumed a role of a "bad bank". Certainly, it did not have a good effect for its reputation. In a way it helped to calm down the situation and buy some time for any further policy action. However, it is not an easy question what this policy action should be like. Obviously, there are strong claims that problematic countries need particularly tough policy to balance their budgets which is much easier said than done.

The ECB's support came in the same time when the Eurozone countries' $\in 110$ bailout package for Greece started. This package was clearly a breach of "no bailout clause" worshipped since the creation of the monetary union. This package only preceded by a few days two other programs. During the weekend of 8–9 May Ecofin set up the European Financial Stabilization Mechanism with a volume of 60 billion Euros administered by the European Commission and backed by its budget and the European Financial Stability Facility EFSF), a special purpose vehicle which is to make loans to Euro area countries, should such a need arise, up to an amount of 750 billion Euro, including 250 billion Euro IMF commitment. This programs not only were raising serious questions about its legality but also their effects turned out to be rather short lasting (Sibert, 2010). Moreover, as an effect the EFSF the governments of participating countries acquired huge contingent liabilities beyond any democratic procedures. This is subject to constitutional complaint to the constitutional court in Germany. Anyway, as the bailout programs which assume a transfer of wealth among EU member countries are politically difficult to accept and legally doubtful, to say the least. As they are only temporary the European Commission and EU member countries are going to introduce a new, permanent mechanism of resolving sovereign default problems within the Eurozone. This plan includes another change of the Treaty.

It is doubtful if the "rescue packages" could help in any respect; they may only postpone necessary solutions and make problems even more severe. As Eichengreen (2010) puts it "the Irish 'programme' solves exactly nothing – it only kicks the can down the road". No doubt, the same could be said about the "Greek programme".

The economic policy of the European Union in the face of the crisis is erratic, in breach of important rules which were supposed to govern economic life in the UE and the Eurozone and it does not address in a perspective manner the specific problems encountered by these countries which experience most strain. The future looks misty and dark (Lacina, Rusek, 2010).

Countries which have big external debts, excessive current account deficits, accompanied by high public deficits and public debts have no easy solutions to their problems in the monetary union. Fiscal "consolidation" may be a reasonable postulate but it would not be easy to cut spending or raise taxes now when these economies are deeply in the crisis. Such fiscal steps would further negatively influence the incomes of the private sector which is heavily indebted, too. This could initiate an increase in private sector debt failures and bring about a new phase of the financial sector crisis. The medicine might be poisonous.

Moreover, the reason for which the problems are so severe in some countries is not necessarily their particularly strong fiscal expansion; fiscal consolidation is certainly not the remedy. Their weak fiscal stance is rather more an effect than a cause of the economic downturn and external imbalances. The trouble is that these countries which face negative, asymmetric developments have no economic instruments to deal with their problems; they gave up individual monetary and exchange rate policy. Devaluation could help a lot. It could restore external equilibrium, boost exports and thus raise incomes. Economic growth, even weak at the beginning, would much improve the fiscal situation – it would bring higher revenues to the budget but it would also allow for more taxation or fiscal cuts without a disastrous effect on the private sector. When it comes to "internal devaluation" which could help regain competitiveness it seems rather impossible, at least in Greece where there is a strong opposition to any cuts in real wages. In this context it should not be strange that a Greek retreat from the Eurozone is one of the options discussed in these days.

5.5 Conclusions

Fiscal situation in member states of the European Union worsened dramatically in the wave of the financial and economic crisis. High public debts and big public deficits are popularly recognized as a reason for credibility crisis that hit some of the countries. However, a closer look proves that fiscal situation is not the dominant factor which drives market sentiments. Extended fiscal positions gain weight only when combined with considerable net foreign liabilities and unsustainable current account deficits. External imbalances reflect not only unbalanced public finances but also excessive spending of the private sector. Moreover, these countries which experienced strong pressures generally did not run activist fiscal policies aimed at stimulating the economy. The credibility crisis is not only a fiscal crisis, it is in the first place a balance of payments crisis.

In this juncture fiscal "consolidation" does not seem to be a remedy to the problems. It would reduce imbalances in public finances and it could help cut current account deficits. It is highly improbable, however, that the countries which face credibility problems and which are deeply in the economic crisis could pursue adequate plans to balance their budgets; this is in fact the reason why their credibility is low. Since the external imbalances matter crucially, devaluation could help to regain international competitiveness, improve current accounts, boost the economies and increase revenues of the budget. Unfortunately, this is not possible in the Eurozone.

Instead, the economic policy of the ECB, the European Commission and particular member states of the European Union versus problematic countries is restricted to different forms of bailout programs. It violates the declared principles of the monetary union, it strains legal foundations of the European Union, it is pursued with no respect for the democratic control over public finances and – eventually – it does not solve the problems.

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6 How to Consolidate Government Budgets in View of External Imbalances in the Euro Area? Evaluating the Risk of a Savings Paradox

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6.1 Introduction

In the light of deteriorating public finances in the Euro area and increasing uncertainties on the stability of the Euro area several Euro area countries, for instance Greece, Spain, Italy and Portugal have announced tough measures such as spending cuts of salaries of public employees or increases of VAT to bring the budget into balance in the medium term. Nonetheless, it is not clear if these austerity measures prove successful. A purely 'thrift-based' consolidation strategy might lead to depressing economic growth and, paradoxically, to further worsening of public finances. This may cause a government savings paradox. As a consequence, a more growth-oriented consolidation strategy could be more effective. This is empirically analysed in this present chapter.

For a growth-based strategy recent research findings lend some support. For instance, Colombier (2011) provides empirical evidence that the composition of government expenditure is crucial for economic growth. Therefore, governments should not crowd out growth-enhancing public expenditure items to improve the public budget in the short run. Otherwise, governments may put the medium-term improvement of public finances at risk. Apart from further empirical research, which supports the thesis of the new growth literature that public investments in infrastructure and human capital can enhance economic growth (e.g. Colombier, 2009), recent research suggests that fiscal stabilization policies can be conducive even to long-run growth if price rigidities and other market frictions are present (Galí et al., 2005; Aghion and Marinescu, 2006). However, a recent contribution by Reinhart and Rogoff (2009) comes to the conclusion that a debt-to-GDP ratio of above 90% can dampen economic growth in advanced countries. This can be due the fact that at a certain debt-threshold non-Keynesian effects set in. In this case private agents expect a decrease in interest rates due to a reduction of public debt, which spurs private investments. Thus, the problem of a possible savings paradox produced by an 'austerity-based' consolidation would be resolved. In contrast, recent simulations of New Keynesian models give evidence for the fact that optimal debt policies should not aim at a specific debt target as is laid down in the Maastricht treaty (Kirsanova et al., 2007).

In order to evaluate the risk of a savings paradox this chapter carries out an empirical analysis on the growth impact of fiscal, including active stabilization, policies in the Euro area. We take government consumption and investment into account. In contrast to previous research in this area we include the external imbalances of the European Monetary Union (EMU). This is done because this reflects the divergent economic developments in the EMU. This study shows that fiscal contraction may exert an averted impact on economic growth in the longer term.

This chapter is organised as follows. The following section provides a brief overview how austerity measures might impact economic growth. As a large part of the literature deals with the thesis of the so-called expansionary fiscal policy Section 6.2 focuses on this issue. Section 6.3 outlines how the economies of the Euro area have diverged since the introduction of the Euro. Section 6.4 presents the theoretical model, on which the econometric analysis is based. In Sections 6.5 the econometric method, which is applied in this chapter is set out and the results of the estimations are presented before some conclusion are drawn in the closing part of this chapter.

6.2 Possible Impacts of Austerity Policy

Under the heading expansionary fiscal condition a vast amount of studies exists, which examines how expenditure cuts or tax increases might boost economic growth. This literature rests on the thesis that consumers and investors might react in non-Keynesian ways in response to budget cuts of the government. Conventionally, it is assumed that a contraction of government spending brings about a temporary slowdown of economic demand. This is a Keynesian view of the way austerity measures impact economic activity, at least, in the short-term (see e.g. Afonso, 2006, page 9). However, different channels of non-Keynesian effects are mentioned. The typical Ricardian view would be if cuts in government spending are perceived as long lasting, this implies a reduction in permanent tax burden so that the consumers are induced to spend more. Moreover, there is the so-called "expectational view of fiscal policy" (Blanchard, 1990: Summers, 1997). In the case of initially high levels of public debt private consumption might be increased if the attempt of the government to cut the public debt is viewed as credible by consumers. The latter may imply that consumers expect that the uncertainty of future fiscal policy and the probability of dramatic tax increases are reduced. If the expectations are strong enough consumers decrease precautionary savings. Moreover, the risk premium of sovereign debt might be reduced so that overall lower interest rates crowd in private investments. This is in line with the empirical study by Reinhardt and Rogoff (2009) who come to the conclusion that after the threshold a public-debt-to-GDP ratio of 90% non-Keynesian effects set in. In addition, Bertola and Drazen (1993) argue that the likelihood of fiscal consolidation efforts of the government keeps rising after certain debt level. When in this situation a fiscal consolidation occurs, this may foster expectations that the future tax burden will be lowered. Consequently, permanent income of consumers goes up. As a result, the probability of Ricardian behaviour of consumers could increase with the level of public debt to GDP. This would imply non-linear effects of fiscal policy.

However, Ricardian behaviour prerequisites that consumers are not liquidity constrained and capital markets are perfect.¹⁴ But capital markets are characterised by market failure due to asymmetric spread information among market participants and risk of default and non-liquidity (Greenwald and Stiglitz, 1993). If neither perfect foresight nor perfect information is available consumers and investors may use rule of thumbs. This could reinstate the old Keynesian proposition as Galí (2005, p. 7) argues. For example, if uncertainty about the future employment or investment rises budgetary constraints is biding and consumers as well as investors are likely to hold back their money. As a result, the demand of liquidity rises from a Keynesian view point. The story is different from a Ricardian angle. From this point of view consumers save and in-

¹⁴ The Ricardian consumption hypothesis hinges on the following assumptions: i) consumers must live forever or each generation of a dynasty must maximise the utility of the dynasty, ii) capital markets are perfect, iii) future taxes and income is certain, iv) taxes are lump-sum and v) full employment (see e.g. Arestis and Sawyer, 2004, page 70).

vestors are reluctant to spend because rising debt raises the uncertainty of future fiscal policy. Whereas under a Keynesian view a fiscal impulse could restore confidence, the effect would be right the opposite under a Ricardian view. But given the imperfections on the capital market Keynesian effects might be dominant in times of great uncertainty.

A further channel identified by authors who held the view of an expansionary fiscal contraction is the labour-market channel, or to be more precise, labour supply (Alesina and Perotti, 1997). What matters for this kind of expansionary effect of restrictive fiscal policy is the composition of the implemented measures. Alesina and Perotti (1997) discern two types of fiscal adjustment i) reducing the public deficit by cuts in social expenditure such as unemployment benefits and further social allowances and cuts in public sector wages, and ii) reducing the public deficit through increases in labour taxes and cuts in public capital spending. According to this view increases in labour market taxes causes unit labour costs to go up in unionised labour market, whereas reducing social allowances lowers unit labour costs. In addition, public infrastructure is viewed as conducive to economic growth so that a cutting of these expenditure may have a permanent adverse effect, This conclusion is supported by recent empirical evidence (e.g. Colombier, 2009 and 2011).

Consequently, the effects of a restrictive fiscal impulse may depend on the initial financial position of the government and the size and persistence of budgetary adjustments. The empirical evidence on the expansionary effects of fiscal contractions is mixed. For example, the well-known study by Giavazzi and Pagano (1996) find evidence for non-Keynesian effects of budgetary adjustments on private consumption for OECD countries in the period from 1976–1992. Others analyses such as Heylen and Everaert (2000) come only to inconclusive results as to OECD countries. As regards to EU countries also no clear-cut conclusion can be reached. Whereas Giudice et al. (2004) provide evidence for non-Keynesian effects on economic growth for 14 EU countries from 1990 to 2002, only little evidence of an impact on private consumption is ascertained by Afonso (2001) who studies a sample of 15 EU countries from 1970 to 2001, and by Weyerstrass et al. (2006) who study a sample of 9 EU countries for the period from 1970 to 2004.

Furthermore, some empirical studies show that old-fashioned countercyclical Keynesian fiscal policy can prove beneficial even in the long-term given market imperfections. For example due to macroeconomic fluctuations companies might be reluctant to invest in research and development (R&D) in a recession. This can be exacerbated by imperfect capital markets, for example, due to credit constrained companies. Aghion and Marinescu (2006) give empirical evidence that anti-cyclical fiscal policy mitigates the adverse impact of a recession on R&D expenditure. The conclusion can be drawn that under market imperfections stabilisation policy can have a positive impact on economic growth.

6.3 Growing Imbalances in the Euro Area and Fiscal Policy

More or less with the launch of the Euro as common currency in 1999 a diversion of current account balances within the Euro area can be observed (see Figure 20).

Whereas Germany, the Netherlands, Belgium Austria and Finland have piled up current account surpluses during the Euorpean Monetary Union (EMU), southern European countries, in particular, Spain, Greece and Portugal, and Ireland have accumulated considerable current account deficits. As the overall external balances of the 12 old Euro are countries



Figure 20 Current Account Imbalances in the Euro Area from 1992 to 2008

Source: Ameco data base April 2010, European Commission and own calculations.
fluctuates around zero, these imbalances reflect intra-Euro-area imbalances. This has not changed considerably through the crisis. However, prior to the crisis the external position of the main deficit countries Greece, Ireland, Portugal and Spain consists to a large extent of private sector deficits (see Bolliger et al., 2010, pages 8–9). In the crisis private savings rose sharply and due to stabilisation measures for the economy and the banking sector public deficits have soared. Consequently, after the crisis hit current account deficits are due to public deficits and not any more because of private sector deficits. But what are the origins of this development?

Usually, the story would go as follows. A country that starts from a lower level of economic development is expected to run external overdrafts because the country offers a lot of profitable investment opportunities and comparatively low labour costs. This leads to capital inflows and current account deficits. In the longer term productivity and wages go up so that investment inflows and the current account deficit diminish. The income of deficit and surplus countries should converge. But in the EMU convergence of per-capita income between surplus and deficit countries has been very modest (see Bolliger et al., 2010, page 7). Moreover, disparities in terms of macroeconomic indicators such as GDP growth, unemployment rate and inflation rate have remained high or even widened (see Mathieu and Sterdyniak, 2007, page 282). For example, the yearly average of the inflation rate in the Euro area country ranged between 0.7% in Germany to 3.9% in Ireland from 1999 to 2005 (see Mathieu and Sterdyniak, 2007, page 287, Table 3). Similar macroeconomic policies, a common monetary policy conducted by the European Central Bank (ECB) and fiscal rules set by the Stability and Growth Pact (SGP) would seem to have contributed to this divergent development. Given this institutional setting the only way left to accommodate macroeconomic differences in a monetary union would be rather flexible wages and a very mobile labour force (see e.g. Dullien and Schwarzer, 2009, page 156). However, the EMU does not fulfil these conditions due to language barriers and labour market institutions.¹⁵ Therefore some authors argue that stronger coordination or centralisation of fiscal policies is needed to mitigate macroeconomic divergences among Eurozone countries (see Baldwin and Wyplosz, 2006, page 358).

 $^{^{15}}$ Some Keynesian authors argue that fully downward flexibility of wages is not desirable because it bears the risk of prolonging and deepening a recession by exerting deflationary pressure (e.g. Greenwald and Stiglitz, 1993a).

Consequently up to now, macroeconomic divergences among Euro area countries could neither be mitigated by macroeconomic policies nor by market forces. On the contrary, due to a common currency the ECB must pursue a one-size-fits-all monetary policy. But due to differing inflation rate differing real interest rates result. For example, rather low interest rates have nourished the housing bubbles in Spain and Ireland and unsustainable spending booms in Greece and Portugal (see Bolliger et al., 2010, page 10). Germany, which lost competitiveness due to the re-unification has regained competitiveness by wage restraint, but at the expense of subdued domestic demand. Furthermore, empirical results show that in the run up to the EMU fiscal policies were pro-cyclical, probably, to meet the criteria of the SGP to join the EMU (Galí and Perotti, 2003; Dullien and Schwarzer, 2009). These studies provide empirical evidence that fiscal policy is a-cyclical since the start of the EMU. But Dullien and Schwarzer (2009, page 160) provide further evidence that discretionary fiscal policy even counteracted the working of automatic stabilisers in the Eurozone. This confirms a critique of SGP which hints to the fact that on the one hand the 3%-deficit-limit can be too restrictive in a recession and on the other hand, the SGP offers no incentives for restrictive fiscal policies during an upturn (e.g. Colombier, 2005). Thus, fiscal policy coordination could be beneficial to achieve convergence in the Euro area.

The financial and economic crisis has not caused a considerable shrinking of external imbalances among Eurozone countries. In contrast, public deficits of countries, which run an external deficit, soar (see Figure 21). Thus, several Euro are countries, in particular the countries with large current account deficits, have adopted severe austerity measures to restore confidence of investors. If these measures prove conducive to economic growth as is suggested by the camp of expansionary-fiscal "contractionists" these countries will gain in competitiveness and external imbalances could be reduced (see Section 6.2). But surplus countries try also reducing budget deficits. As a result, the macroeconomic situation of countries with an external deficit may worsen further. As all countries save simultaneously, a saving paradox might arise. Therefore, countries with a current surplus such as Germany would be well-advised to pursue an expansionary stance to support the rebalancing of current accounts in the EMU: Moreover, if consumers and investors react in a Keynesian way a saving paradox within a country can occur. Though the government deliberately tries cutting the budget deficit it grows larger when the recession is prolonged. In this case it would be most suited



Figure 21 Fiscal and External Imbalances in 2009 Source: Estimations of the European Commission, Ameco data base April 2010.

to install austerity measures when the upturn sets in. In the following sections an empirical analysis of 11 Euro area countries is undertaken to provide evidence how marked contractions of fiscal policy impact labour-productivity growth and if this impact interacts with external balances and the currency union.

6.4 Theoretical Model

In this section a theoretical model is outlined, which serves as a basis for the empirical estimations.

6.4.1 Supply Side

Evidence given by empirical studies on the growth effect of fiscal policies suggests that publicly provided inputs impact economic growth (see e.g. Colombier, 2009, page 910). Therefore, we assume a production technology for the economy, which includes a publicly provided input. Different specifications of publicly provided inputs are used in studies on endogenous growth. But Colombier and Pickhardt (2005, page 279) show that only two specifications, the unpaid factor and the factor-augmenting public input, are theoretically tenable. In the following we suppose that the government provides a factor-augmenting public input (G) Empirical evidence suggests that in particular these two publicly provided inputs are growth-enhancing (see Colombier, 2009, page 910). Apart from G, labour (L) and capital (K) are used to produce real output Y. B corresponds to the technology parameter. Assuming a Cobb-Douglas production function, productivity in real terms y, i.e. real output per worker, can be written as follows:

$$y = BG^{\alpha}k^{(1-\alpha)} \quad \text{with } k \coloneqq K/L \tag{8}$$

Furthermore, the i^{th} profit-maximising firms face the following individual demand function (Y_i) under monopolistic competition among *n* technologically identical firm (see Dixit and Stiglitz, 1977, page 249).

$$Y_i = \left(\frac{p_i}{p}\right)^{\frac{-1}{1-\Theta}} \frac{Y^d}{n} \quad \text{with } 0 < \theta < 1; \ p \coloneqq \frac{1}{n} \sum p_i; \ p_i \coloneqq \text{price of } Y_i.$$
(9)

The individual demand of firm *i* depends on the price-elasticity of demand with respect to *i*, the relative price of firm *i* (p_i/p) and aggregate demand (Y^d) . For example, if the elasticity parameter θ approaches one firms would face perfect competition. As to factor markets diverging assumptions are made. The labour market is assumed to be national, whereas capital markets are international. This seems to be intuitively plausible. As a result, the interest rate is exogenously given for the economy of an individual country. For the sake of simplicity, we assume that a national monopoly trade union sets the nominal wage rate of the economy of the respective country.¹⁶

The demand side can impact the supply-side equilibrium of our model economy under certain conditions, which is shown in the following. Taking account of Equations (8) and (9) the aggregate profit (π) of all firms can be derived.

¹⁶ Against the backdrop of economic globalisation the assumptions that trade unions set the wage rate may not seem to be plausible. However, the introduction of a more realistic assumption concerning the labour market, i.e. some bargaining power of firms, would leave the nominal wage rate indeterminate in our model. Since modelling a bargaining processes over the wage rate would not change the key results of this present analysis, we abstain from using this option. Therefore, we stick to the simpler, albeit possibly more unrealistic assumption that a national trade union sets the wage rate.

$$\pi = pB^{\Theta}G^{\alpha\Theta}K^{(1-\alpha)\Theta}L^{\alpha\theta}Y^{d^{(1-\Theta)}} - wL - iK \to \max_{L,K}$$
(10)

with $w \coloneqq$ nominal wage rate; $i \coloneqq$ nominal interest rate

Note that due to monopolistic competition in the goods market individual firms set the prices p_i . Firms set the prices by choosing the amounts of labour and capital optimally. Moreover, firms are price-takers in the factor markets. Consequently, maximisation of Equation (10) leads to the following well-known first order condition:

$$k = \frac{w}{r} \, \frac{1 - \alpha}{\alpha} \tag{11}$$

From Equation (8) along with Equation (11) one can infer that aggregate demand does not impact real output under monopolistic competition as is shown by Blanchard and Kiyotaki (1987) in a general equilibrium framework. Thus under monopolistic competition and wage-taking behaviour of workers aggregate demand does not impact long-term output per worker. But this result changes if labour supply is unionised as is shown in the following.

The trade union maximises the following Blanchard-Kiyotaki (1987, page 649) utility function subject to the aggregate labour demand function (L^d) , which can be derived from the maximisation of π (see Equation (10)): This implies that the trade union sets the equilibrium wage rate.

$$U = \frac{w}{p}L - \frac{\phi}{\sigma}L^{\sigma} \to \max_{w} \text{ s.t.}$$

$$L^{d} = B^{-1}G^{-\alpha}Y^{d}\left(\frac{r}{w}\right)^{1-\varepsilon}\left(\frac{\alpha}{1-\alpha}\right)^{\alpha-1-\frac{1}{1-\theta}}\left[\theta\frac{p}{r}\frac{p}{w}(\alpha-1)\right]^{\frac{1}{1-\theta}} (12)$$

$$L = L^{d}$$

with $\sigma \geq 1$

The trade union puts a positive weight on the sum of real wages, which is the first term on the rhs of Equation (12), and leisure, which corresponds to the second term of the rhs of Equation (12). The bargaining power of the trade union increases with an increase of σ . Substracting one from σ results in the marginal disutility to work. Maximisation of Equation (12) yields the following labour supply function:

$$\frac{w}{p} = \left(\phi + \frac{1-\theta}{1-\alpha(1-\theta)}\right) L^{\sigma-1}$$
(13)

If k in Equation (8) is substituted with the rhs of Equation (11) and one solves labour supply (see Equation (13)) and labour demand (see Equation (12)) equations for the wage rate, the following supply-side equilibrium results.

$$y = \left(G^{\alpha(\chi-\rho)} B^{\chi-\rho} \left(\frac{i}{p}\right)^{\frac{\rho\theta}{\theta-1}-\chi(1-\alpha)} \underbrace{\left(\frac{1-\alpha}{\alpha}\right)^{(1-\alpha)(\chi-\rho)+\frac{\rho}{\theta-1}}}_{=c_1>0} \right)^{\frac{1}{\chi}} \cdot \left[Y^d \underbrace{\left(\phi + \frac{1-\theta}{1-\alpha(1-\theta)}\right)^{\frac{\theta(\alpha-1)}{\theta-1}} \left((1-\alpha)\theta\right)^{\frac{1}{1-\theta}}}_{=c_2>0} \right]^{\frac{\rho}{\chi}} = (14)$$
$$= \left(c_1 * G^{\alpha(\chi-\rho)} B^{\chi-\rho} \left(\frac{i}{p}\right)^{\frac{\rho\theta}{\theta-1}-\chi(1-\alpha)} \right)^{\frac{1}{\chi}} \left(c_2 * Y^d \right)^{\frac{\rho}{\chi}}$$

with $\chi(\alpha, \theta, \sigma) > 1$; $\chi_{\alpha} > 0$, $\chi_{\theta} < 0$, $\chi_{\sigma} > 0$; $\lim_{\theta \to 1} \chi \to -\infty$; $\rho(\alpha, \sigma) > 0$; $\rho_{\alpha} < 0$, $\rho_{\sigma} > 0$; $\chi \gg \rho$; $\chi(1-\alpha) > \rho$; c_1 and c_2 are constants.

Equation (14) implies that under imperfect competition ($\Theta \neq 1$) and unionised labour supply output per worker, i.e. labour productivity, is affected by aggregate demand (Y^d) .¹⁷ Furthermore, Equation (14) shows that under perfect competition, i.e. $\theta \to 1$ and $\chi \to -\infty$, aggregate demand would not impact labour productivity. Thus, both, imperfect competition and wage-setting behaviour of a trade union in the labour market must be fulfilled for producing output effects of aggregate demand in

 $^{^{17}}$ This should come as no surprise since we assume a monopoly trade union, which is tantamount to having wage rigidity in the labour market. Blanchard and Kiyotaki (1987, p. 655) show that given a general equilibrium model price rigidities can explain why aggregate demand movements generate output effects.

our model. But one should bear in mind that further reasons for output effects of aggregate demand can be relevant, which are not included in our model. In particular, due to market failures such as asymmetric information and uncertainty about the future long-term output effects of aggregate demand might result (see Section 6.2). Thus, the demand side can impact productivity in the short as well as in the long run. The view that demand can affect the long-term position of an economy is hold by macro-economists who either think that it takes quite a long time before a long-term equilibrium is reached after a shock, parts of financial New Keynesians (e.g. Greenwald and Stiglitz, 1993) or think that market economists are inherently unstable, the Post-Keynesians (e.g. Hein, 2004).

We introduce the openness of the economy through the equation of the demand side, which is:

$$Y^{d} = f\left(c, t, G, C_{G}, \frac{i}{p}, \gamma \right) \quad \text{with } \gamma = \frac{p^{a}}{p}e, \tag{15}$$

For simplicity we do not differentiate between current-account and trade balances in Equation (15). As a result, domestic aggregate demand Y^d depends on the real exchange rate, γ , but not on the ratio between the foreign and domestic interest rate. Thus, we assume the comparative form of purchasing power parity. Since the focus of this chapter is the European Monetary Union (EMU) it is reasonable to assume a common nominal interest rate, i, across countries in the EMU. Additionally, we assume that the nominal interest rate, i, is controlled in the short-term by the central bank, i.e. the European Central Bank (ECB). Since inflation differs across countries, countries have differing real interest rates. One of the reason why the real interest rate r may adversely affect demand can be due to Ricardian consumers. The propensity to consume, c, in Equation (15) reflects Keynesian consumption. Demand is positively related to c. Moreover, foreign demand (Y^a) impacts demand through exports. Furthermore, the average tax rate, t, exerts a negative impact on demand. The impact of public investment, G, and consumption C_G , depends on the fact whether Ricardian consumption outweighs Keynesian consumption or vice versa. Nevertheless, an increase in government expenditure and a decrease of the average tax rate may exert a negative impact on net exports. Equation (15) is consistent with the assumption

that private investment behaviour depends negatively on interest rates and positively on an output variable, such as expected demand.

Since this chapter analyses how austerity measures impact economic growth, we take logarithms and first differences of the right-hand side of Equation (14). Furthermore, we substitute the first differences of aggregate demand, Y^d , by the growth rate of the demand function in Equation (15).¹⁸ These transformations lead to the following equation:¹⁹

$$\widehat{y} = \frac{1}{\chi} \Big((\chi - \rho) \widehat{b} + (\rho \eta_G + \alpha (\chi - \rho)) \widehat{g} \Big) + \frac{1}{\chi} \Big(\Big(\rho \Big(\frac{\theta}{1 - \theta} + \eta_r \Big) - \chi (1 - \alpha) \Big) \widehat{r} + \rho (\eta_\gamma \widehat{\gamma} + \eta_{cg} \widehat{C}_G + \eta_{Ya} \widehat{Y}_a) \Big)$$
(16)

 η_j ($j \coloneqq$ demand side variable) depicts the elasticity of aggregate demand, Y^D with respect to the diverse factors of demand such as government consumption, C_G , or the real interest rate, r (see Equation (16)).²⁰ According to Equation (16) the growth rate of productivity, \hat{y} , are driven by supply-side as well as demand-side drivers. Equation (16) serves as a basis for our estimations, which are outlined in the following sections.

6.5 Econometric Analysis

6.5.1 Method and Data

The sample, which is used for the estimations, consists of 11 developed Euro area countries within the time period from 1980 to 2008 (see Appendix, Section 6.8, page 127). As data has not been available across all countries for the entire time period the panel is unbalanced. In contrast to the usual procedure to analyse the effects of austerity policies we do not distinguish between short-run and long-run effects (see e.g. Afonso,

 $^{^{18}}$ Note it is supposed that neither the parameters α and θ nor the propensity to consume change over time. In addition, the output effects o changes in tax rates is not analysed.

 $^{^{19}\,\}mathrm{As}$ usual the growth rates of variables are dubbed y hat etc.

 $^{^{20}}$ Usually, η would be referred to as a short-run elasticity. Nonetheless, if under imperfect competition a long-term impact would be exerted by the demand side, dubbing η as short-run would be inadequate. Therefore, we prefer naming η demand elasticity.

2006, page 16). This is done for two reasons. Firstly, to distinguish between short- and long-run effects a panel error-correction model should be used. Necessarily, the variables applied to the estimations should be integrated of order one. However, as to unit roots the results in a paneldata framework seem to be inconclusive (see e.g Afonso, 2006, page 20). Secondly, the view that a fiscal consolidation is conducive to the long-run performance of the economy is more contested than the view that austerity policies generate short-term output losses. As outlined in Section 6.2, page 105, a considerable part of the literature subscribes to the view that austerity measures are conducive to long-term growth. For these reasons we concentrate on the longer-term impact of fiscal policies.

To capture the notion of the longer term I use five-year moving averages of the data. Using five-year moving averages is done to avoid the choice of a special period (see Colombier, 2009, page 901). An objection against the usage of smoothed is simply that in practice we do not know where the long-term path of economic might lead and it can only be exact by chance. Since our focus is on the longer-term in deviation to most other studies in this field we do not choose private consumption per capita but real GDP per worker as the dependent variable (e.g. Giavazzi and Pagano, 1996). In addition, this is in according with our theoretical model presented in the previous section.

Based on Equation (13), page 114, the basic stochastic equation can be written as follows:

$$\Delta \text{ real GDP per worker } (t)_i = \sum \beta_j \Delta X_{j,i}(t) + \sum \beta_h \Delta Z_{h,i}(t) + u_i(t)$$
(17)

with: $u_i(t) = \mu_i + e_i(t)$

where *i* stands for country *i* and *i* := 1, ..., 11, *t* represents time and $t := 1980, \ldots, 2008, \beta_j$ represents the coefficient of the macroeconomic variable X_j and β_h represents the coefficient of the fiscal variable Z_h . Macroeconomic regressors include private investment, the real short-term interest rate as a proxy for monetary-policy and the ratio of the nominal to the real exchange rate. As Figure 20, page 108, shows the Euro area ban be regarded as an domestic economy due to the fact the current account balances of the Euro area have been almost balanced from 1992 to 2008. Therefore, we choose as a proxy for foreign demand the real GDP of the US. This indicator can be viewed as export demand

for the whole area, but also for individual countries. Moreover, a proxy for the labour force is included in the estimations. Fiscal data represent the general government level. They include real public investment per capita and real public consumption per capita. Thus, in contrast to the common practice of using public expenditure ratios in terms of nominal GDP, public expenditure variables are expressed in real per capita terms. Proceeding in this way is justified by the fact that public expenditure ratios in terms of nominal GDP may have a negative correlation to GDP due to the following reversed causality problem, namely, that public expenditures are budgeted on the basis of GDP forecasts. Experience has shown, however, that GDP growth rates are overestimated in the case of an economic downturn, whereas the opposite is true in an economic upswing. This can establish a negative relationship between public expenditures and economic growth.

Unobserved time effects are not taken into account since we introduce several dummies to consider different economic episodes of Euro area countries. Firstly, a dummy for the period before the introduction the Euro and after the introduction of the Euro is added to the estimations. Furthermore, a dummy is included that takes different external positions of Euro area countries into account.²¹ The ratio of net exports to nominal GDP serves as a proxy for the external position of a country. Also, a dummy which indicates fiscal episodes of austerity policy in Euro area countries is taken into account. Crucial for the choice of fiscal episodes characterised by austerity is the way fiscal adjustments are measured. Usually, this is done by measuring an improvement of the primary cyclically-adjusted budget balance of the government. For example, according to Giavazzi and Pagano (1996) a fiscal adjustment which can be defined as austerity measure is implemented if either the primary cyclically adjusted budget balances is improve by at least 2 percentage point in a single year or at least 1.5 percentage points on average in two years. This kind of approach is criticised because fiscal episodes are defined in an ad-hoc manner (see Afonso, 2006, page 14). Therefore, Afonso (2006, page 14) uses the statistical distribution of the primary

 $^{^{21}}$ Note that a dummy variable is applied due to a practical reason, As a country's external position is necessarily given by a balance, such as the trade balance, it does not make sense to calculate five-year averages to eliminate short-run fluctuations. Moreover, using a dummy variable for the external position of Euro area countries seems to be rather well-suited due to the following reasons: i) the external positions of the Euro area are rather sustained, ii) fluctuations around balanced external position are merely observable so that, overall, one should be able to savely rule out short-term fluctuations.

structural budget balance to determine episodes of fiscal consolidation. Then, austerity measures depend on the size and an arbitrarily chosen multiple of the standard deviation. On top of this, substantial improvements in the primary structural budget balance may reflect budget cuts inadequately. For example, Ireland introduced sharp spending cuts and tax hikes amounting to 2% of GDP in 2009. But due to plummeting housing prices the primary deficit actually increased (IMF, 2010). By the same token, Japan worsened its budget balance by a one-time capital transfer amounting to 4.8% of GDP to the railways in 1998. In the following year the primary structural budget balance improved markedly without any austerity measure taken by the Japanese government. To avoid these difficulties we adopt another approach by concentrating on spending cuts. Though due to the neglect of tax increases this can be viewed as one-sided, one can argue that austerity policies are more often than not accompanied by sharp spending cuts. Fiscal austerity is identified by running a simple one-sample t test on the first difference of the ratio of total government spending to GDP. According to this test, the average reduction of public expenditure is statistically different from zero at a one-percent level (see Appendix, Section 6.8, page 127). In order to define an austerity policy we take the upper limit of the 95 confidence interval of the t test. According to the latter, a reduction in public expenditure is significant if the government reduces spending by at least 1 percentage point of GDP in a single year. Based on this definition the dummy of austerity measures is constructed.

Equation (17) represents an error-component model so that the error term can be decomposed into unobserved country effects, denoted by μ_i and a remainder error term $e_i(t)$. All variables are expressed in logarithms. Apart from the exchange-rate, private and public investment all variables are estimated in first differences. As the countries of the underlying sample are chosen deliberately estimations of Equation (17) are performed by applying a static one-way-fixed-effects model. By doing this, we use Arellano's version of White's covariance estimate, which is robust against serial correlation and heteroscedasticity (see Baltagi, 2008, page 16). In addition, we carry out instrumented regressions to deal with endogeneity or reversed causation. As instruments we use the lags of regressors. The relevance of the instruments is evaluated by applying the non-parametric Spearman's rank correlation. If a lagged variable is at least correlated by 80% with the contemporaneous variable. the instrument is viewed as relevant. Since we use only a single instrument for each variable an application of an over-identifying restriction test, e.g. Sargan's test, is not possible. So we do not test the validity of an instrument.

6.5.2 Results

In the following the results of our estimations regarding the impact of austerity policies and current account balances on the labour productivity growth are shown.²² The adjusted R^2 ranges from 34% to 51%. which is quite reasonable for panel data models (see Tables 16 and 17). It averages 44%. We carry out regressions based on the theoretical model as shown in Equation (16). Moreover, to test the sensitivity of results we run further estimations including an additional regressor, the unemployment rate. Overall, the regressions suggest no marked difference between regressions with and without the unemployment rate. At first turning to the regressions in Table 16 one can observe that out of the macroeconomic variables only the unemployment and the real exchange rate show a statistical significant coefficient. The result of the exchange rate would appear to be unstable as the statistical significance coefficient moves across the regressions. However, applying instrumented regressions confirms that the real exchange rate impact labour productivity growth adversely. Thus, although some Euro area countries, in particular Germany, could depreciate their real exchange rate through wage restraint they did not benefit from higher productivity growth. As a consequence, the boost in exports through a devaluation of the real exchange rate does not seem to have compensated for sluggish domestic demand in the past.

The results concerning the exchange rate along with the result that the GDP of the US does not impact productivity growth of the Euro area countries suggests that the principle trading partners of the Euro area countries lie within the Eurozone. Nonetheless, the coefficient of the US-GDP indicates a positive correlation to productivity growth of the Euro-countries in all regressions though the coefficient is not significant. From the results of the fiscal variables one can draw rather clear-cut, albeit surprising, results. Whereas the estimations suggest that public consumption is conducive to growth we do not find a statistical significant impact of public investment. This may be due to the well-known fact that the definition of public consumption in the systems of national

 $^{^{22}}$ Note that further regressions, in particular with tax variables and interactions between fiscal and dummy variables, should be carried out.

Model	One-way fixed-effects 5-year moving averages						
Dependent variable	Real GDP per worker						
Period	1980–2008						
Dummy current account	Surplus	Surplus	Surplus	Surplus	Deficit		
Private investment ratio	0.020 (0.023)	0.010 (0.018)	0.009 (0.016)	-0.006 (0.011)	-0.006 (0.011)		
US real GDP	0.070 (0.077)	0.101 (0.084)	0.058 (0.064)	0.080 (0.079)	0.080 (0.079)		
Real exchange rate	-0.121 (0.080)	-0.103 (0.074)	-0.091 (0.095)	-0.136* (0.072)	-0.136* (0.072)		
Real public investment per capita	0.002 (0.006)	-0.001 (0.004)	-0.003 (0.005)	-0.002 (0.004)	-0.002 (0.004)		
Real public consumption per capita	0.147** (0.070)	0.139* (0.073)	0.127* (0.067)	0.159** (0.068)	0.159** (0.068)		
Short-term real interest rate	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.002)	-0.002 (0.001)	-0.002 (0.001)		
Unemployment rate	0.0124* (0.007)	0.010* (0.006)					
Austerity dummy (AUST)	-0.007** (0.003)	-0.017*** (0.003)	-0.007* (0.004)	-0.020*** (0.005)	-0.00019 (0.0007)		
Current-account dummy (CA)	-0.002 (0.002)	-0.005** (0.002)	-0.001 (0.006)	-0.001 (0.002)	0.001 (0.002)		
Euro area dummy (EA)	-0.002 (0.002)	-0.006** (0.003)	-0.004** (0.002)	-0.003 (0.004)	-0.005*** (0.001)		
AUST * CA		0.017*** (0.003)		0.020*** (0.005)	-0.020*** (0.005)		
AUST * EA		0.017*** (0.003)		0.020*** (0.003)	-0.002** (0.001)		
CA * EA		0.006** (0.003)		-0.003 (0.004)	0.003 (0.004)		
AUST * CA * EA		-0.023*** (0.004)		-0.023*** (0.004)	0.023*** (0.004)		
Adj. R^2 (as %)	39	46	34	45	45		
Breusch-Godfrey test	106*** (0.0)	80*** (0.0)	108*** (0.0)	88*** (0.0)	88*** (0.0)		
No. of countries	11	11	11	11	11		
No. of observations	196	196	196	196	196		

Table 16 Austerity Policy, Current Account Imbalances and Labour Productivity Growth in the Euro Area

Note: Estimation technique: Within-estimator using Arellanos's HACestimator to deal with autocorrelations and heteroscedasticity; apart from dummies all variables are in logarithms; except for dummies, exchange rate and investment data variables are first differenced; heading current account "surplus" indicates that dummy current account selects only CAsurplus data points and v.v.

*** := 1% significance level; ** := 5% significance level; * := 10% significance level.

t-tests: figures in parentheses are SE; Breusch-Godfrey test on serial correlation, H0: no serial correlation, chi-square statistic.

Source: Ameco data base April 2010, European Commission and own estimations.

accounts does not correspond to the economic definition. In particular, government spending on human capital accumulation and research are regarded as public consumption. Moreover, rather than the flow the stock of public capital might be vital for productivity growth. The same reasoning can also be applied to the private-investment. Finally, the results concerning the public expenditure variables are confirmed by the instrumented regressions (see Table 17).

As regards the relevance of fiscal austerity, the current-account balance and the introduction of the Euro, the outcome of the estimations are remarkably stable. The majority of regressions in Table 16 and Table 17 suggest that independently from external balances the EMU austerity measures put a drag on productivity growth.²³ Nonetheless, if a country runs an external deficit in the EMU the effect of a sharp spending cut on productivity growth is either slightly positive, 0.1 percentage points if public expenditure is reduced by 1% of GDP (see Table 16, last column) or modestly negative (see Table 17, last column). Thus at first sight, consumers seem to behave in a Ricardian manner in Euro area countries, which face a current account deficit. However, in the run-up of the financial crisis the economies of deficit countries of the Euro area have grown rapidly. Thus, these spending cuts relate to spending cuts in a boom period. Therefore, expectations of consumers and investors should have been intact. Consequently, the tentative conclusion can be drawn that overall consumers and investors behave more in a Keynesian than a Ricardian way in the deficit countries. The regressions indicate a more pronounced decrease of productivity growth in response to a contraction of fiscal policy countries, which run a current account surplus (see Table 16 and 17, 3rd and 4th column). Depending on the regression, one can infer that a fiscal contraction that amounts to 1% of GDP can decelerate productivity growth by 0.2 to 2 percentage points. These results point to Keynesian effects of fiscal contraction in Euro area countries, which run a current account surplus.

 $^{^{23}}$ Note that if, for instance, austerity measures are adopted if a country runs current account surplus and takes account of the period of the Euro one has to add up the statistically significant coefficients of the respective dummies and the interaction terms in Tables 16 and 17. For example according to the results of the second regression shown in Table 16, the overall effect of austerity measures amounts to -0.017.

Model	One-way fixed-effects 5-year moving averages						
Dependent variable	Real GDP per worker						
Period	1980–2008						
Dummy current account	Surplus	Surplus	Surplus	Surplus	Deficit		
Private investment ratio	0.014 (0.022)	0.0004 (0.016)	0.003 (0.018)	-0.014 (0.010)	-0.014 (0.010)		
US real GDP	0.059 (0.084)	0.094 (0.100)	0.029 (0.070)	0.068 (0.091)	0.068 (0.091)		
Real exchange rate	-0.142* (0.075)	-0.137** (0.064)	-0.151* (0.077)	-0.205*** (0.046)	-0.205*** (0.046)		
Real public investment per capita	0.005 (0.005)	0.00003 (0.003)	-0.002 (0.005)	-0.002 (0.003)	-0.002 (0.003)		
Real public consumption per capita	0.178*** (0.068)	0.127** (0.064)	0.082 (0.065)	0.111* (0.061)	0.111* (0.061)		
Short-term real interest rate	-0.001 (0.001)	-0.0008 (0.001)	-0.001 (0.002)	-0.0003 (0.001)	-0.0003 (0.001)		
Unemployment rate	0.014* (0.007)	0.009** (0.004)					
Austerity dummy (AUST)	-0.007* (0.003)	-0.021*** (0.005)	-0.008 (0.005)	-0.032*** (0.005)	-0.0005 (0.0006)		
Current-account dummy (CA)	-0.002 (0.005)	-0.006*** (0.002)	-0.001 (0.002)	-0.002 (0.002)	0.002 (0.002)		
Euro area dummy (EA)	-0.002 (0.001)	-0.007*** (0.002)	-0.005*** (0.002)	-0.004 (0.004)	-0.005*** (0.001)		
AUST * CA		0.021*** (0.002)		0.031*** (0.005)	-0.031*** (0.005)		
AUST * EA		0.021** (0.004)		0.036*** (0.005)	-0.002** (0.001)		
CA * EA		0.006** (0003)		-0.001 (0.004)	0.001 (0.004)		
AUST * CA * EA		-0.027*** (0.004)		-0.037*** (0.005)	0.037*** (0.005)		
Adj. R^2 (as %)	39	49	38	53	53		
Breusch-Godfrey test	101*** (0.0)	73*** (0.0)	72*** (0.0)	51*** (0.0)	51*** (0.0)		
No. of countries	11	11	11	11	11		
No. of observations	193	193	185	185	185		
Spearman's rank correlation (as %)	Private investment (lag 2): 89; public investment (lag 4): 83; public consumption (lag 1): 89; unemployment rate (lag 1): 98						

Table 17 Austerity Policy, Current Account Imbalances and Labour Productivity Growth in the Euro Area – Instrumented Regressions

Note: Estimation technique: Within-estimator using Arellanos's HACestimator to deal with autocorrelations and heteroscedasticity; apart from dummies all variables are in logarithms; except for dummies, exchange rate and investment data variables are first differenced; heading current account "surplus" indicates that dummy current account selects only CAsurplus data points and v.v.; Baltagi's (2008) instrumental variables estimator; lagged variables as instruments; to avoid invalid instruments only lagged variables having a Spearman's rank correlation of at least 80% with current variable are chosen.

*** := 1% significance level; ** := 5% significance level; * := 10% significance level.

t-tests: figures in parentheses are SE; Breusch-Godfrey test on serial correlation, H0: no serial correlation, chi-square statistic.

Source: Ameco data base April 2010, European Commission and own estimations.

6.6 Conclusion

This present empirical analysis provides evidence that if governments in the Euro area countries introduce belt-tightening fiscal policies, as has been done in the aftermath of the financial crisis the Eurozone runs the risk of a Keynesian savings paradox. The estimations suggest that the Keynesian consumption hypotheses might better fit the data than the Ricardian hypothesis. Therefore, non-Keynesian behaviour would appear not to have been dominant in the EMU. However, a caveat might be that in times of high public debt such as in the post-crisis period consumers tend to behave in a non-Keynesian manner as they expect sharp tax rises in the future. But crisis and post-cisis levels of demand for liquidity and close substitutes of liquidity such as precious metals has exceeded pre-crisis levels by far, which indicates a typical Keynesian liquidity trap. This seems to confirm the hypothesis that growing uncertainty give rise to Keynesian behaviour.

According to the results of this present analyis, an optimal timing for adopting austerity measures would be during the course of an upturn. However, widening interest-rate spreads on government bonds among Euro area countries due to rising uncertainties in the financial markets in Spring 2010 but also conditioned credit lines from the International Monetary Fund and the European Union taken out by Greece and later on by Ireland has forced, Euro area countries such as Spain, Greece, Ireland, Italy and Portugal to adopt sharp budget cuts. Therefore, as a second-best solution Euro area countries, which run a current-account surplus, would mitigate the slump in demand in the Euro area by postponing restrictive measures until a sustainable upturn sets in.

But also governments of current account surplus-countries such as Germany have implemented budget cuts. Therefore, to avert a probable longer-term stagnation of the Euro area the recovery of the surplus countries, in particular Germany, should boost domestic demand. Nonetheless, risks from financial and commodity markets are still looming large so that the upturn in a few Euro area countries, in particular in Germany, which has begun in 2010, might end as abrupt as it has set in.

6.7 References

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6.8 Appendix

6.8.1 Data

All data stem from the Ameco database of the European Commission, version 20th April 2010.²⁴ The sample includes the following Euro area countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain. Luxembourg, which is also a western European country in the Eurozone has not been included because its population is much smaller than the smallest country of the sample, Ireland (4.4 million inhabitants Luxembourg: 450 000 inhabitants). All estimations are carried out with the statistical software \mathbb{R} 2.11.1. For this the \mathbb{R} packages MASS, dynlm, plm and lmtest are applied.

6.8.2 *t*-test on First Differences of Reductions in the Ratio of Total Government Spending to GDP

One Sample t-test

t = -10.7768, df = 104, *p*-value < $2.2 \cdot 10^{-16}$

alternative hypothesis: true mean is not equal to $0\,$

95 percent confidence interval:

 $-0.01498770 \ -0.01032915$

mean: -0.01265843

 $^{^{24}\,\}rm http://ec.europa.eu/economy_finance/db_indicators/ameco/zipped_en.htm$

7 The Impact of the Global Financial Crisis on Output Performance Across the European Union: Vulnerability and Resilience²⁵

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"The link between vulnerabilities and performance during crisis periods is neither simple nor straightforward."

Gardo and Martin (2010, pp. 15–16)

7.1 Introduction

After more than a year of strain in US financial markets, Lehman Brothers filed for bankruptcy in September 2008 and this came to signal the start of the global financial crisis.²⁶ In a short time the crisis spread to countries across the world and liquidity in global financial markets came under pressure, resulting in rapid de-leveraging, higher risk premiums and credit contraction (EC 2009). More difficult financing conditions, declines in stock and real estate markets and falling business and consumer confidence led to contractions in consumption and investment demand in many countries.²⁷ Meanwhile export demand fell, as global

 $^{^{25}}$ The authors would like to thank Martti Randveer and participants in the conference "Financial and Economic Crisis: Causes, Consequences and the Future" held 25–26 November 2010 at Mendel University, Brno, for useful comments. All errors remain the responsibility of the authors. The views expressed are those of the authors and not necessarily those of the institutions to which they are affiliated.

 $^{^{26}}$ The events and chronology of the global financial crisis have been discussed in e.g. Brunnermeier (2009), Blanchard (2009), EC (2009), IMF (2009) and Keeley and Love (2010).

 $^{^{27}\,\}mathrm{Hall}$ (2010) discusses theories linking financial distress and economic activity; Cecchetti et al. (2009) provide an empirical analysis of the real effects of different forms of financial crisis.

trade contracted very rapidly. In a short time the problems in the financial sector in the USA had spread to the real economy in countries across the world, often leading to substantial GDP declines.

Europe was among the hardest hit regions in terms of output decline. Figure 22 shows the output performance of the 27 EU countries from the third quarter 2008 to the third quarter 2009. The average output decline was 5.7 percent (unweighted), but there was substantial heterogeneity across the Union and eight of the 27 countries experienced output losses in excess of 5 percent. The countries in Central and Eastern Europe (CEE) exhibited the most diverse performance; the three Baltic States, Latvia, Estonia and Lithuania, stand out for their output declines of between 14 and 19 percent, while Poland was the only EU country to retain positive economic growth during the period.





This chapter seeks to explain the different output performance in the EU countries using measures of their pre-existing vulnerability and resilience. In other words, the objective is to cast light on the factors that have made countries particularly susceptible to the initial shock from the US and on the factors that have made countries more resilient to the shock. Output is an important measure of economic welfare as it mea-

sures average income in society, but it may also affect unemployment, economic deprivation, etc.

The econometric analysis consists of cross section estimations covering all or most of the 27 EU countries. The dependent variable is a measure of output performance during the global financial crisis, while the explanatory variables are different measures capturing the countries' initial conditions or vulnerabilities that existed prior to 2008.

Only a small number of studies use econometric methods to investigate the impact of the global financial crisis on output performance across different countries. Although the studies have used different country and time samples, the overall results are quite similar. The analyses find a robust association between credit growth prior to the crisis and GDP growth during the crisis. Pre-crisis financial leverage, openness to trade and the pre-crisis current account balance are typically also found to help explain the output performance during the crisis.

Berglof et al. (2009) analyse the effect of the global financial crisis on output in emerging Europe using a sample which includes Central and Eastern European countries inside and outside the EU, Central Asian countries and Turkey. The study finds that the size of the growth in the credit-to-GDP ratio 2005–2008, higher total external debt at the end of 2007, and hard pegs are predictors of larger declines in GDP during the crisis. In some specifications, the FDI stock as a share of GDP shows a positive association with GDP growth during the crisis.

Berkmen et al. (2009) analyse the impact of the crisis across a larger sample of developing and emerging countries. They compare the revisions of countries' growth forecasts before and after the crisis struck and find that the growth revision can be explained by rapid credit growth and high leverage, after controlling for the choice of exchange rate system.

Blanchard et al. (2010) also consider a sample of emerging markets, albeit consisting of only 29 countries. As dependent variable they use "unexpected growth", which is computed as the difference between actual GDP growth in 2009 and forecasts made prior to the crisis. They find that the financial channel, in the form of short-term foreign debt, and to a lesser degree the trade channel, measured by trade-weighed growth in partner countries, help explain the heterogeneity in outcomes across the 29 countries.

Claessens et al. (2010) use a sample of 58 emerging and developed markets and analyse the association between pre-crisis conditions and various

economic performance indicators such as the duration of the recession, whether there was a decline in GDP, the income loss during the crisis, and the change in the growth rate as compared to the average in the pre-crisis period. They find that housing price increases, credit growth, and the current account balance prior to the crisis are of importance for the performance indicators.

Lane and Milesi-Ferretti (2010) examine the effect of pre-crisis macroeconomic and financial variables on the incidence and severity of the crisis using different global samples of up to 160 countries. They find that pre-crisis variables that capture the level of economic development, the growth in private credit to GDP, the current account and openness to trade help to explain the intensity of the crisis.

Olafsson and Petursson (2010) use a dataset comprising 46 medium-tohigh income countries. They seek to explain the depth and the duration of the output loss along with the probability of different forms of financial crisis occurring. They find that a large part of the accumulated output loss can be explained by initial conditions such as pre-existing inflation, the size of the banking sector, the exchange rate system, international trade linkages and institutional factors.

This chapter follows the studies above by using cross-country estimations to explain the output performance of the 27 EU countries during the crisis, an exercise which has not hitherto been undertaken on this sample of countries.²⁸ The choice of sample has one major drawback, which is that the sample is relatively small, never exceeding 27 countries. The limited number of observations aggravates problems associated with outliers and multicollinearity, but other studies have gained important insights using similarly small datasets, e.g. Berglof et al. (2009) and Blanchard et al. (2010).

The choice of sample has several important advantages. First, most of the data can be sourced from Eurostat. The database covers all the EU countries and provides good data comparability since data are collected by national statistical offices following a unified set of rules and subsequently reported to Eurostat.

Second, the EU countries share an overall institutional structure, as they form a single market with free movement of goods, capital, services and

 $^{^{28}}$ An alternative approach is to use panel data estimations as in e.g. Brezinski and Stephan (2010). Such estimations assume, however, time-invariant effects from the explanatory variables to the dependent variable, which may not be satisfied given the fundamentally different economic regimes before and during the crisis.

people. The countries are in this sense equally susceptible to external economic shocks. There are nevertheless noticeable differences between the economies of the 27 EU countries as they differ in their economic development, economic structure, macroeconomic performance and financial exposure. Most notably, the EU consists of advanced economies that have been highly integrated for decades and the emerging economics from Central and Eastern Europe (CEE) that joined the EU in 2004 and 2007.

Third, despite the unified institutional structure, the EU countries have in practice often exhibited diverging cyclical performance as the countries have been hit by different shocks or symmetric shocks have affected the countries in different ways. This is corroborated in the survey by de Haan et al. (2008) which concludes that the business cycles of many Euro countries are unsynchronised and that there is no clear movement towards a single European business cycle. This conclusion appears to hold for countries even after they have joined the EMU (Giannone et al., 2009). The finding that the business cycles are not tightly synchronised in the EU countries suggests that the effects of a global financial crisis may have had different output effects across the EU countries.

A final argument for considering the different effects of the global financial crisis on countries across the EU pertains to the policy debates on economic governance that the crisis has fostered within the Union. The European Commission has proposed tools for enhanced economic policy coordination, which include broader macroeconomic surveillance in addition to further fiscal policy coordination (EC 2010). The aim is to establish a scoreboard of indicators and alert thresholds for each indicator to draw attention to countries with problematic levels of macroeconomic imbalances. Several indicators such as the current account balance, the net foreign asset position, the real effective exchange rate, government debt, real estate prices and the ratio of private sector credit growth to GDP have been proposed. Evidently, the relevance of each of these indicators rests on whether the indicator makes a country more susceptible to financial and economic crises (Caballero et al., 2006).

This chapter contributes to the literature in a number of ways. First, it analyses the spread of the global financial crisis to the 27 countries in the European Union. The sample comprises essentially the entire European region, a region sharing many institutional and structural features. Second, the available time sample is relatively long, covering the entire downturn from the collapse of Lehman Brothers until the beginning of 2010. This time sample allows us to examine the effect on output at different horizons. Finally, the explanatory power of a very large set of vulnerability measures is examined.

The rest of the chapter is organised as follows: Section 7.2 sets out a conceptual framework of the spreading of crises to guide the empirical analyses. Section 7.3 presents the data used in the empirical analyses. Section 7.4 reports the results of the econometric analyses using only variables that capture vulnerabilities that existed prior to the crisis. Section 7.5 reports the empirical results when concurrent trade partner growth is included as a control variable. Finally, Section 7.6 summarises the results.

7.2 A Conceptual Framework

To guide the empirical analyses, this section sets out a framework conceptualising the spread of the crisis from the US financial sector to the real economy in European countries. The starting point is the literature on contagion of economic and financial crises across countries as developed by Masson (1999).

Crises can occur simultaneously because the economies are hit by the same common shock. During the global financial crisis, economic developments in the USA directly affected the countries in Europe through trade and financial channels. Masson (1999) uses the term "monsoonal effect" to describe the occurrence of such common shocks. The contagion may also take place indirectly through a "spillover effect" if an economy which has been hit by the crisis subsequently affects other economies adversely through trade and financial channels. For example, during the global financial crisis, the economic downturn in Germany may have contributed to the downturn in many of its neighbours.

The monsoonal and spillover effect are fundamental causes of contagion, where changes in economic variables in the initial crisis country lead to changes in trade or financial flows. The original shock may, however, also set off changes in sentiment or expectations without underlying fundamental reasons, and the altered expectations may lead to a crisis and thus become self-fulfilling (Obstfeld, 1996, Masson, 1999). During the global financial crisis, information about economic and financial crises in other countries may have triggered downward sentiment shifts or panics which had no underlying or fundamental reason. A crisis in one country may thus be contagious if it triggers self-fulfilling expectations in other countries. Such expectations-based contagion can be labelled "pure contagion".

The distinction between different sources of contagion is important from a policy viewpoint. Policy coordination between affected countries may, for instance, be more effective if the contagion is expectations-driven (pure contagion) while less effective if caused by a common shock. The existence of pure or expectations-based contagion is *sui generis* hard to uncover empirically, but nevertheless of substantial importance from a policy point of view.

The individual country's economic circumstances at the outset of the crisis may also help explain differences in output performance. The degree of vulnerability or resilience may for instance be proxied by variables capturing the initial financial exposure, the public debt, the income level, etc. The vulnerability variables can play two roles:

- 1. The vulnerability variables may explain the *magnitude of the direct* contagion shock and of the ensuing policy. An example would be large pre-crisis external liabilities, which facilitate capital outflows in a crisis. Another example would be the initial government debt stock, as a low debt stock may allow expansionary fiscal policies, while a large debt stock may rule out such a policy response.
- 2. The vulnerability variables may explain the *sensitivity of output to* a given contagion shock or policy measure. A capital outflow may have little effect on output in an economy which relies primarily on domestic financing, but have a large effect in an economy with a history of relying on capital imports. Similarly, expansionary fiscal policy may be counter-productive in a country with a large pre-existing public debt as the result may be financing problems and loss of confidence.

7.3 Data and Variables

The variables used in the empirical analysis are shown in Table 18 together with their summary statistics. The source of the data is mainly the Eurostat database. For the banking sector, data are extracted from the Statistical Data Warehouse of the ECB, which uses data from all the central banks in the EU. Some other variables are taken from the OECD, the Bank for International Settlements and the International Monetary

Variable	Denomination	Mean	S.D.	Min.	Max.	Obs.
GDP growth 2008:3–2009:3	%	-5.68	4.45	-19.10	1.20	27
GDP growth 2009	%	-5.51	4.24	-18.00	1.70	27
GDP growth 2008:3–2010:1	%	-5.44	5.01	-19.59	3.22	27
Unexpected GDP growth 2009	%	-8.13	4.62	-20.30	-2.75	27
Private loans 2007	Share of GDP	1.06	0.62	0.28	3.00	27
Private loans growth 2005–2007	Share of 2005 private loans	0.51	0.40	0.04	1.54	25
Loans-to-deposits 2007	Ratio	1.26	0.42	0.63	2.38	27
Gross international liabilities 2007 ^a	Share of GDP	2.96	2.57	0.78	13.10	26
Net international investment position 2007	Share of GDP	-0.31	0.48	-1.02	1.02	27
Current account balance 2007	% of GDP	-5.06	9.44	-26.80	9.70	27
Exports 2007	Share of GDP	0.59	0.32	0.23	1.77	27
General government debt 2007	% of GDP	43.34	26.71	3.80	103.50	27
General government balance 2007	% of GDP	-0.18	2.73	-5.10	5.20	27
GDP 2007	Trillion EUR	0.46	0.69	0.01	2.43	27
GDP per capita in PPS 2007	Thousand EUR	24.63	11.44	9.40	68.60	27
Real effective exchange rate change 2003– 2007	%	11.42	16.19	-5.89	60.99	26
Average annual HICP inflation 2003–2007	%	3.09	1.91	1.02	9.56	27
Exchange rate dummy: euro		0.59		0.00	1.00	27
Exchange rate dummy: float		0.22		0.00	1.00	27
Partner growth 2008:3–2009:3 ^b	%	-2.27	1.45	-5.90	-0.74	27
Unexpected partner growth 2009 ^b	%	-3.22	1.80	-7.99	-1.05	27

Table 18 Variables and Summary Statistics

 $^{\rm a}$ Luxembourg is excluded as its gross international liabilities in 2007 amounted to 117.98 times GDP.

 $^{\rm b}$ Export-weighed GDP growth of export partners in the given period, scaled by the export share of GDP in 2009.

Source: Database (see Appendix A, page 157), authors' calculations.

Fund. The precise data source for each variable is given in Appendix A (Section 7.8, page 157).

7.3.1 Dependent Variable

The dependent variable is the percentage change in real GDP computed at different time intervals. As default, the dependent variable is the change in real GDP from the third quarter of 2008 to the third quarter of 2009. For robustness analyses, three other measures are computed, including the average change in real GDP growth in 2009 or the GDP growth over six quarters from the fourth quarter of 2008 to the first quarter of 2010. The growth rates of the EU countries differed considerably *before* the crisis, and to isolate the effect of the crisis a measure of the "unexpected GDP growth" is used which is meant to provide an estimate of the effect of the crisis. Following Blanchard et al. (2010) the unexpected GDP growth in 2009 is computed as the actual growth rate in 2009 minus the IMF forecast for 2009 published in the April 2008 issue of the *World Economic Outlook* (IMF 2008a).



Figure 23 GDP Growth and Unexpected GDP Growth, Percent, Different samples

Source: Database (see Appendix A, page 157).

The four different measures of GDP growth after the global financial crisis are shown in Figure 23. The three measures of actual GDP growth are closely correlated although it clearly follows that the timing of the declines in GDP varied across the countries. The unexpected GDP growth broadly follows the actual GDP growth in 2009, but the discrepancy is larger for the CEE countries than for the EU countries in Western Europe (EU-15), since in April 2008 the CEE countries were forecast to have higher growth rates than the EU-15 countries.

7.3.2 Vulnerability Variables

Many proxies of vulnerability may help explain the output performance following the global financial crisis. The crisis started by financial distress in the USA spreading to Europe, which makes it reasonable to include variables depicting the exposure and leverage of the financial sectors in the EU countries, both externally and internally. Other variables depicting the openness and size of the economy and the pre-crisis macroeconomic stance and policy may also be of importance. As discussed in Section 7.2 (page 133), each of the vulnerability variables may affect the size of the contagion shock or the size of the effect on output of the contagion shock.

The variables are typically from 2007 or earlier, i.e. prior to the outbreak of the global financial crisis, which essentially makes the vulnerability variables exogenous to the unfolding of the crisis.

The private loans variable is a stock measure of loans to the private sector *excluding financial institutions* and is calculated as the growth in private loans 2005–2007 as a share of private loans in 2005. This measure of the financial sector depth generally attains higher values for the EU-15 countries than for the CEE countries. The variable can be seen as a measure of financial development, but potentially also of vulnerability to financial shocks. The private loans growth from 2005 to 2007 takes large values in many countries that experienced credit-led bubbles prior to the crisis. Due to data availability problems from 2005, the variable is not available for Cyprus and Slovakia. The loans-to-deposits ratio may signal financial fragility if deposits are more stable than others sources of funding. The variable is above 1 for many countries, i.e. loans exceed deposits, suggesting that loans are financed by other means than deposits.²⁹

Gross external liabilities are included as liquidity strains in financial markets may be of particular importance if a country has large foreign liabilities.³⁰ The variable is also a proxy of the openness of the financial sector. Luxembourg is a special case as its gross external liabilities as share of GDP are many times larger than the second largest observation. The current account balance is another measure of external vulnerability. Calvo et al. (2003, 2006) argue that sudden stops in countries with initially large current account deficits can lead to severe economic

 $^{^{29}}$ Kindleberger and Aliber (2005) and Reinhart and Rogoff (2009) provide comprehensive historical narratives of the making of financial crises. Both studies emphasise that crises often follow periods of excessive optimism in which financial vulnerabilities are built up through rapid financial deepening and increased leverage.

 $^{^{30}}$ We also obtained data on cross-border loans as a percentage of GDP, but the variable is not included as it is very closely correlated with the gross external liabilities variable (correlation coefficient = 0.95).

downturns. Some EU countries, including the Baltic States, Bulgaria, Romania and Greece, had very large current account deficits prior to the crisis. The last measure of external vulnerability is the net international investment position.

The export share measures the openness of an economy in terms of trade and its dependence on exports. Luxembourg has a very open economy, as exports in 2007 amounted to 177.3 percent of GDP, while the second highest value for exports as a share of GDP was 89.6 percent for Malta.

Government finance variables may be other measures of vulnerability. The debt and balance of the general government exhibit large variation across the EU countries. The variables may be seen as affecting capital flows and country ratings, but also the ability of governments to use fiscal policies to counteract the effects of the crisis.

The size and income level of each of the 27 EU economies are included among the explanatory variables. The size of their economies may have shielded some large countries and made them less susceptible to shocks in the financial and goods markets. Wide differences between the per capita income levels reflect the fact that the EU contains both advanced and emerging economies.

The change in the real effective exchange rate in the years preceding the crisis is also included. The rate of real appreciation was higher than the EU average for most CEE countries, with the exception of Poland and Slovenia. The appreciation of the real effective exchange rate may reflect a process of those countries catching-up with the EU-15 countries, but may also indicate a loss in competitiveness, as seen in the accompanying economic bubbles in many countries. Inflation over the five years to 2007 was also above the EU average in most CEE countries.

Two dummy variables capturing the different exchange rate regimes in the EU are included. One dummy variable equals 1 for the members of the Eurozone and 0 otherwise, while the other takes the value 1 for countries with a floating exchange rate regime and 0 otherwise. The data for the exchange rate regimes are from the *De Facto Classification* of Exchange Rate Regimes and Monetary Policy Frameworks produced by the International Monetary Fund (IMF 2008b).

7.3.3 Partner Growth

Finally, the partner growth variable captures the GDP growth of each EU country's eight biggest export partners weighted by their share of

total exports to all eight countries in 2009. The variables are scaled by the export share of GDP to take account of openness of the individual countries. A similar variable is used in Blanchard et al. (2010) to capture the direct impact of the trade collapse and has the advantage of being largely exogenous to the output performance of each individual country.

Many of the vulnerability variables are closely correlated. This applies in particular to the financial variables, which in many cases are correlated by definition. GDP per capita in purchasing power terms is highly correlated with several other variables such as the current account balance (0.70), net international investment position (0.74), loans as a share of GDP (0.82) and gross external liabilities (0.80). These variables are also highly correlated with exports as a share of GDP (0.76).

The correlation coefficient between private sector loan growth and the current account balance is -0.72 for the 25 countries for which data are available (see Figure 24). These variables are again correlated with the change in the real effective exchange rate and the inflation rate. The pattern is largely driven by the CEE countries which experienced economic booms and in many cases overheating in the years prior to the global financial crisis, in part facilitated by easy access to foreign capital.





Source: Database (see Appendix A, page 157).

Taking the explanatory variables together it is possible to paint a simplified picture of the European economies immediately prior to the outbreak of the global financial crisis. The EU-15 countries generally exhibited economies with high incomes, considerable financial depth (both internally and externally) and relatively large governments. The CEE countries exhibited economies with lower per capita income, which in many cases had experienced substantial financial deepening, current account deficits and substantial real appreciation in the years prior to the crisis.

7.4 Empirical Results with only Vulnerability Variables

This section presents the results of different econometric analyses in which the output performance during the crisis is modelled as a function of different pre-crisis vulnerabilities. The analysis is complicated by the presence of multicollinearity between several of the explanatory variables and a small number of observations (maximum 27). The identification problems that emerge from multicollinearity show up in the form of coefficients that are imprecisely estimated and very sensitive to specification changes. The upshot is that it is difficult or nearly impossible to identify the relative importance of different explanatory factors (Mankiw, 1995).

We address the multicollinearity issue pragmatically by initially regressing the output performance on one or at most two explanatory variables at a time. In this respect we follow the methodology used in all of the econometric studies discussed in Section 7.1, page 128. The estimations are undertaken using four different dependent variables, i.e. GDP growth 2008:3–2009:3, GDP growth in 2009, GDP growth 2008:3–2010:1 and unexpected GDP growth in 2009. As might be expected given the correlation of these four variables (see also Figure 23, page 136), the results are very similar across the four different dependent variables. With very few exceptions, the signs, the sizes of the coefficients and the statistical significance levels concur across the four specifications. Table 19 therefore only shows the results when the dependent variable is the rate of GDP growth 2008:3–2009:3; the full results are reported in Appendix B (Section 7.9, page 158).

Column (19.1) shows the results of the OLS estimations. The estimation using private loans in 2007 as the explanatory variable returns a coefficient that is positive and statistically insignificant. In contrast, the private loans growth variable attains a coefficient that is negative and

	(19.1)		(19.2)		(19.3)	
	OLS, all countries		LAD, all countries		OLS, Baltics excluded	
	Coef.	Pseudo <i>R</i> ²	Coef.	Pseudo <i>R</i> ²	Coef.	R ²
Private loans 2007 ^a	1.894 (1.388)	0.044	0.855 (1.718)	0.039	0.414 (1.070)	0.009
Private loans growth 2005– 2007	-7.791 ^{***} (2.702)	0.456	-9.703 ^{***} (2.461)	0.183	-2.150 ^{**} (0.932)	0.080
Loans-to-deposits 2007	-7.492 ^{***} (2.352)	0.509	-8.214 ^{***} (1.495)	0.204	–2.591 [*] (1.256)	0.139
Gross international liabilities 2007 ^a	0.250 (0.336)	0.021	0.347 (0.330)	0.016	-0.055 (0.204)	0.004
Net international investment position 2007	3.239 [*] (1.671)	0.122	1.833 (1.169)	0.071	0.772 (0.814)	0.026
Current account balance 2007	0.220 [*] (0.110)	0.217	0.061 (0.092)	0.033	0.011 (0.041)	0.002
Exports 2007 ^a	0.598 (2.059)	0.001	-1.761 (4.524)	0.032	-2.288 (2.014)	0.051
General government debt 2007	0.094 ^{**} (0.034)	0.317	0.048 ^{**} (0.018)	0.156	0.036 ^{**} (0.016)	0.156
General government balance 2007	-0.261 (0.233)	0.026	-0.176 (0.197)	0.019	-0.157 (0.172)	0.038
GDP 2007	1.655 [*] (0.815)	0.066	0.634 (1.009)	0.026	0.423 (0.414)	0.017
GDP per capita in PPS 2007	0.117 [*] (0.064)	0.091	0.056 (0.036)	0.091	0.200 (0.039)	0.010
Real effective exchange rate change 2003–2007	-0.166 ^{**} (0.074)	0.360	-0.086 (0.069)	0.131	-0.047 ^{***} (0.016)	0.079
Average annual HICP inflation 2003–2007	-0.921 (0.542)	0.156	-0.413 [*] (0.214)	0.078	-0.407 ^{**} (0.155)	0.110
Exchange rate dummy: euro	7.774 ^{***} (2.735)	0.460	10.500 ^{***} (1.793)	0.210	1.143 [*] (0.575)	0.029
Exchange rate dummy: float	7.163 ^{**} (2.944)	0.400	9.200 ^{****} (2.097)	0.219	0.533 (1.239)	0.028

Table 19 Regressions with GDP Growth 2008:3–2009:3 as Dependent Variable

Note: White heteroskedastic robust standard errors are shown in brackets; normal standard errors in the MAD estimations. Superscripts ***, **, * denote that the coefficient is statistically different from 0 at the 1, 5 and 10 percent levels of significance respectively. The constant term is not reported.

^a Luxembourg is excluded due to extreme values for the explanatory variable.

Source: Database (see Appendix A, page 157), authors' calculations.

statistically significant at the 1 percent level.³¹ The coefficient to the loans-to-deposits ratio is also negative and economically significant. The implication of these results is that the size of the loan stock did not in itself make the country more vulnerable, but changes in the loan stock and the loan stock relative to deposits were associated with larger output declines after the outbreak of the global financial crisis.

The estimations for the external financial variables suggest that the gross international liability position was unimportant, while a negative net international investment position and current account deficits prior to the crisis were associated with a weaker GDP performance during the crisis.

Surprisingly, the openness of the economy measured as a ratio of exports to GDP does not correlate with the output performance during the crisis in a statistically significant manner in this simple specification. The positive coefficient of the government debt variable suggests that countries with large stocks of accumulated government debt were not "punished" by larger GDP contractions during the crisis. The government balance seems unimportant. Countries with large economies and high per capita income have done relatively well in terms of output performance, but the effect is estimated imprecisely.

Real exchange rate appreciation during the period 2003–2007 is associated with lower GDP growth during the crisis. The effect is relative modest in economic terms, as a 10 percentage-point appreciation is associated with growth that is around 1.5 percentage points lower. High inflation and a fixed exchange rate are also correlated with lower growth.

Two main observations transpired from the OLS estimations in (19.1) where GDP growth during the crisis is explained by pre-existing vulnerabilities taken individually. First, the *level* or depth of domestic and international financial intermediation appears not to have affected the output performance in the EU countries, whereas pre-crisis financial deepening and financial leverage are negatively correlated with GDP growth. Figures 25 and 26 illustrate the latter findings.

The second finding is that the results involving statistically significant coefficients chart a broad picture of the economies that experienced the largest output declines after the global financial crisis. As discussed in

 $^{^{31}}$ The coefficient estimate implies that private loans growth of 100 percent instead of the average of 50 percent is associated with a 4 percentage-point larger GDP decline.



Figure 25 Private Loans Growth 2005–2007 and GDP Growth 2008:3–2009:3; Percent

Source: Database (see Appendix A, page 157).



Figure 26 Loans-to-deposits 2007 and GDP Growth 2008:3–2009:3; Ratio and Percent

Source: Database (see Appendix A, page 157).

Section 7.2 (page 133), a number of EU countries, in particular the CEE countries but also other countries in the European periphery, experienced substantial economic booms in the years leading up to the crisis. These booms were typically fuelled by large capital inflows and rapid growth in lending to households and companies and coincided with real appreciation and, in the countries with fixed exchange rates, high inflation. The results in (19.1) suggest that these countries were vulnerable to the shocks of the global financial crisis, and this resulted in substantial output declines.

It follows from Figures 25 and 26 that there is substantial heterogeneity across the countries in the sample and this raises the possibility that outliers affect the results unduly. Column (19.2) shows the results when the models are estimated using Least Absolute Deviation (LAD) instead of OLS. The results are very similar to those in (19.1) obtained using OLS; the sign to the export variable is now negative but the estimated coefficient is highly insignificant.

The downturn in the wake of the global financial crisis was more pronounced in most of the CEE countries than in the EU-15 countries. The three Baltic States represent the most extreme case, with output falling by 14 percent or more from 2008:3 to 2009:3. Column (19.3) shows the results when the Baltic States are excluded. The results of the estimations change somewhat. The coefficients generally become smaller (in numerical terms), but the sign and statistical significance are retained in many cases. The coefficients to the private loans growth 2005–2007 and the loans-to-deposits remain statistically significant at the 10 percent level, but the estimated coefficients are smaller (in numerical terms) than those in the full sample. The coefficients to the current account balance 2007 and the net investment position 2007 remain positive, but they are not statistically significant.

The conclusion is that the added variability from the Baltic States is important for the baseline results in both statistical and economic terms, although removing them from the sample does not lead to conclusions that fundamentally contradict those obtained using the full sample. Moreover, the exercise of removing countries with large variation brings in an element of randomness, which can be illustrated in Figure 26. If the Baltic States are removed the negative correlation between the loans-to-deposit ratio and GDP growth 2008:3–2009:3 is weakened, but if alternatively Denmark and Sweden are removed, the correlation would have become even stronger.
The explanatory variables are entered individually in the regressions reported in Table 19. This leaves the possibility that an omitted variables bias affects the results. To address this issue we proceed by undertaking an estimation in which all the explanatory variables are included simultaneously. The degrees of freedom are very low and the subsequent step is therefore to apply different backward stepwise procedures. Table 20 shows the results.

Column (20.1) shows the result when all explanatory variables are included simultaneously. (Luxembourg has been excluded due to extreme values for some of its explanatory variables.) The coefficients to all the variables attain the same sign as in Column (19.1) with one noticeable exception: the coefficient to the export variable is now negative and statistically and economically significant. The many statistically insignificant coefficients are a consequence of the low number of degrees of freedom.

We address the issue of insignificant coefficients by applying a backward stepwise reduction procedure. All variables are initially included and at each successive step the variable with the lowest numerical *t*-value is removed, while it is examined whether previously excluded variables attain sufficiently high *t*-values to warrant re-inclusion in the model. The procedure continues in as many steps are required to ensure that only variables that are statistically significant at a predetermined significance level enter the model.

Column (20.2) shows the result of the general-to-specific procedure in which all variables are statistically significant at the 5 percent level. The results correspond largely to those attained in the regressions in which the explanatory variables were included separately. The coefficient of the stock of private loans is positive, which suggests that deep financial markets did not worsen the downturn. Domestic leverage and current account deficits are associated with deeper downturns. The coefficient to the export share in GDP at the outset of the crisis is negative as was also found in the model with all variables included. As before, the coefficient to the government debt variable is positive.³² Interestingly, large economies do not seem to have performed better during the crisis when the specification conditions are a number of other variables, including the export share. The effect of membership of the Eurozone appears to be negative in this specification.

 $^{^{32}\,\}mathrm{A}$ possible interpretation is that a large accumulated debt is an indication that active fiscal policies have been pursued in the past and that this policy has been continued during the crisis.

	(20.1)	(20.2)	(20.3)	(20.4)	(20.5)	(20.6)
Private loans 2007	3.442 (2.936)	3.291 ^{**} (1.459)				
Private loans growth 2005– 2007	-5.528 (5.659)			–9.257 ^{***} (1.433)		-5.187 ^{**} (2.008)
Loans-to-deposits 2007	-12.779 ^{***} (3.090)	-8.804 ^{***} (1.671)	-7.954 ^{***} (2.532)	-7.641 ^{***} (1.292)	-7.038 ^{***} (1.913)	-5.938 ^{***} (2.018)
Gross international liabilities 2007	0.250 (0.420)					
Net international investment position 2007	-0.632 (3.310)			4.036 ^{***} (1.159)		
Current account balance 2007	0.426 (0.248)	0.188 ^{**} (0.066)				
Exports 2007	-13.348 ^{***} (4.051)	–8.955 ^{***} (2.182)	-5.571 ^{***} (1.813)	-12.893 ^{***} (2.467)	-4.247 ^{**} (1.800)	-5.398 ^{**} (1.880)
General government debt 2007	0.068 (0.060)	0.057 ^{***} (0.017)		x	0.081 ^{***} (0.024)	x
General government balance 2007	0.459 (0.549)			x	0.622 ^{**} (0.294)	x
GDP 2007	-2.403 ^{***} (0.803)	-0.597 ^{***} (0.151)		–2.724 ^{**} (0.953)	x	x
GDP per capita in PPS 2007	-0.239 (0.180)				x	x
Real effective exchange rate change 2003–2007	0.087 (0.077)					
Average annual HICP inflation 2003–2007	0.644 (0.399)			0.512 ^{**} (0.220)		
Exchange rate dummy: euro	-8.522 ^{**} (3.095)	–3.708 ^{**} (1.748)		–3.333 ^{**} (1.438)		
Exchange rate dummy: float	-5.470 (2.920)				2.697 ^{**} (0.974)	
No. observations	24	24	24	24	24	24
<i>R</i> ²	0.922	0.840	0.563	0.866	0.747	0.734

Table 20 Regressions with GDP Growth 2008:3–2009:3 as Dependent Variable

Note: Luxembourg is excluded due to extreme values for some of the explanatory variable. x indicates that the variable has been omitted prior to a general-to-specific procedure. White heteroskedastic robust standard errors are shown in brackets. Superscripts ***, **, * denote that the coefficient is statistically different from 0 at the 1, 5 and 10 percent levels of significance respectively. The constant term is not reported.

Source: Database (see Appendix A, page 157), authors' calculations.

Column (20.3) gives the results when only coefficients that are significant at the 1 percent level are retained. Only two variables "survive", i.e. the variables of domestic financial leverage and trade openness.

The application of a general-to-specific methodology entails a number of complications, in particular if multicollinearity is present (Hamilton 2009, pp. 202–203). Because of the mechanical removal of the variable which with the lowest numerical t-value, the final results may be very sensitive to changes of the initial specification; inclusion or removal of an irrelevant variable in the model prior to the general-to-specific procedure may lead to very different results. To assess the sensitivity of the results, we undertake a number of estimations in which some of the explanatory variables are removed *before* the general-to-specific methodology is applied.

Columns (20.4)–(20.6) show the results when different variables are excluded from the original model before the backward stepwise procedure is applied. Variables are retained if they are statistically significant at the 5 percent level. Column (20.4) shows the results when the fiscal variables are excluded. The results change somewhat, but the main findings remain: the stock variables measuring financial depth seem to be of limited importance, while measures of financial deepening and leverage prior to the crisis help explain the output performance during the crisis. Column (20.5) displays the result when the two income variables are excluded and Column (20.6) when both government and income variables are excluded. Only three variables are statically significant in (20.6), which are private loans growth, loans-to-deposits and the export share. It is notable that the latter two variables are statistically significant in all specifications in Table 20. It is also notable that exactly the same model as that in (20.6) emerges if a *forward* stepwise procedure at the 5 percent level is applied (not shown explicitly).

We have experimented with a sample excluding the Baltic States (as well as Cyprus, Slovakia and Luxembourg). Using a general-to-specific methodology starting with all the explanatory variables listed in Table 20 yields results that are difficult to interpret. However, if the income variables are excluded, the resulting reduced model contains the loans-to-deposit variable, the export share and inflation, all with negative coefficients. If the government variables are excluded the only variable that "survives" is private loans growth. These results must, evidently, be interpreted with great care given the very low number of degrees of freedom, but the results basically confirm the finding from the analysis using only one explanatory variable, namely that measures of financial deepening prior to the crisis possess explanatory power and help explain the output performance during the crisis.

	(21.1)	(21.2)	(21.3)	(21.4)	(21.5)
Loans-to-deposits ratio 2007	-8.025 ^{***} (2.499)	-5.938 ^{***} (2.018)	-7.421 ^{***} (1.906)	-6.394 ^{***} (2.263)	-6.458 ^{***} (2.201)
Exports 2007	-5.642 ^{***} (1.664)	-5.642*** (1.664)	-6.210 ^{***} (1.474)	-5.216 ^{***} (1.854)	-5.432*** (1.883)
Private loans growth 2005–2007		-5.247 ^{**} (2.233)			-6.222 [*] (3.102)
Current account balance 2007			0.171 ^{**} (0.068)		0.062 (0.083)
Real effective exchange rate change 2003–2007				-0.094 [*] (0.049)	0.064 (0.074)
Constant	7.476 ^{***} (3.263)	3.755 [*] (1.987)	7.980 ^{***} (2.504)	6.234 ^{**} (2.948)	8.074 ^{**} (2.881)
R ²	0.569	0.672	0.687	0.660	0.750
Observations	26	24	26	26	24

Table 21 Regressions with GDP Growth 2008:3–2009:3 as Dependent Variable

Note: Luxembourg is excluded due to extreme values for some of the explanatory variable. White heteroskedastic robust standard errors are shown in brackets. Superscripts ***, **, * denote that the coefficient is statistically different from 0 at the 1, 5 and 10 percent levels of significance respectively.

Source: Database (see Appendix A, page 157), authors' calculations.

As argued above, the general-to-specific methodology suffers from a number of methodological problems. The substantive or theoretical implications of the reduction choices are not considered, and there is no evaluation of the possible weaknesses of the models produced at each step. We therefore complement the general-to-specific estimations in Table 20 with some exploratory estimations in which different subsets of vulnerability variables are used, including variables that reflect possible overheating of the economy. The results are shown in Table 21.

Column (21.1) shows the results when the loans-to-deposits ratio and the exports ratio are included. The result differs marginally from that in Column (20.3) in Table 20 because more countries are included in the sample. Columns (21.2)–(21.4) show the results when the three main vulnerability measures are added to the model individually. Each of the variables is statistically significant at least at the 10 percent level and the coefficient estimates appear reasonable. Private loans growth 2005– 2007, the current account balance 2007 and the real effective exchange rate 2003–2007 are highly correlated and it is therefore not surprising that the results are quite similar in qualitative terms. The correlation partly reflects the fact that the economic booms in many EU periphery countries in the years prior to the global financial crisis were characterised by substantial capital inflows and rapid private loans growth, which coincided with appreciation of real effective exchange rates.

If all three variables are included in column (21.5), only private loans growth retains statistical significance, while the other variables become statistically insignificant and the estimated coefficients change markedly. This suggests that private loans growth, domestic financial leverage and export dependence are the principal variables explaining the output performance during the global financial crisis, although other variables may also have played a role. These results are broadly in accordance with the results from the general-to-specific procedure shown in Table 20.

7.5 Controlling for Trade Partner Growth

In Section 7.4 the output performance during the crisis was explained using only variables that reflected vulnerabilities existing at the outset of the global financial crisis. Part of the immediate impact of the global financial crisis may, however, also relate to developments outside the individual country. The prime example would be economic setbacks in traditional trading partners, which affect export demand and, consequently, output performance without any immediate vulnerabilities explaining such a fall (Bems et al., 2010). Following Blanchard et al. (2010) we include the variable of export-weighted partner GDP growth, which captures trade collapse and the size of the crisis in partner countries.

Column (22.1) in Table 22 shows the results of regressions when precrisis vulnerability variables are included individually along with partner growth as a control variable. Overall the qualitative results from Table 19, page 141, are preserved. The private loans growth 2005–2007, the loans-to-deposits ratio, the current account balance and the real effective exchange rate retain their significance with the control variable included, and the models explain up to 2/3 of the variance in output performance. The stock of private loans is insignificant while the coefficient to the gross international liabilities is positive and statistically significant. It is notable, however, that the estimated coefficients of the partner growth vary substantially across the different estimations, although they are all positive and above 1.

		(22.1)		(22.2)			
	A	I EU countrie	S	Baltic States excluded			
	Coef. Coef.		Coef.	Coef.	2		
	vuln. variable	partner growth	R²	vuln. variable	partner growth	R ²	
		1.757 ^{**} (0.845)	0.329		0.261 (0.486)	0.018	
Private loans 2007 ^a	0.486 (1.156)	2.625 ^{***} (0.501)	0.587	0.228 (0.968)	1.081 ^{***} (0.370)	0.168	
Private loans growth 2005– 2007	-6.167 ^{**} (2.443)	1.099 (0.717)	0.563	-2.128 ^{**} (0.970)	0.192 (0.473)	0.090	
Loans-to-deposits 2007	-6.284 ^{***} (2.133)	1.232 ^{**} (0.545)	0.658	-2.853 ^{**} (1.343)	0.405 (0.452)	0.181	
Gross international liabilities 2007ª	0.375 ^{**} (0.171)	2.732 ^{***} (0.450)	0.629	0.098 (0.179)	1.122 ^{***} (0.416)	0.175	
Net international investment position 2007	3.959 ^{**} (1.646)	1.918 ^{***} (0.530)	0.508	1.308 (0.866)	0.496 (0.378)	0.079	
Current account balance 2007	0.195 ^{**} (0.094)	1.634 ^{**} (0.599)	0.499	0.025 (0.043)	0.318 (0.488)	0.026	
Exports 2007 ^a	10.318 ^{***} (2.645)	3.683 ^{***} (0.504)	0.750	4.508 (3.451)	2.112 ^{**} (0.784)	0.219	
General government debt 2007	0.056 ^{**} (0.022)	1.116 (0.847)	0.398	0.040 ^{**} (0.017)	-0.153 (0.547)	0.161	
General government balance 2007	-0.041 (0.206)	1.739 ^{**} (0.839)	0.330	-0.141 (0.179)	0.190 (0.538)	0.057	
GDP 2007	-0.156 (0.661)	1.793 [*] (0.975)	0.330	0.286 (0.551)	0.182 (0.567)	0.024	
GDP per capita in PPS 2007	0.187 ^{***} (0.064)	2.134 ^{***} (0.439)	0.544	0.054 (0.053)	0.573 (0.410)	0.047	
Real effective exchange rate change 2003–2007	-0.090 ^{**} (0.040)	2.161 ^{***} (0.326)	0.668	-0.038 (0.023)	1.006 ^{**} (0.361)	0.216	
Average annual HICP inflation 2003–2007	–0.694 [*] (0.366)	1.585 [*] (0.806)	0.415	-0.396 ^{**} (0.156)	0.211 (0.471)	0.122	
Exchange rate dummy: euro	6.062 ^{**} (2.810)	1.033	0 551	1.160 [*] (0.573)	0.264	0.046	
Exchange rate dummy: float	5.452 [*] (2.826)	(0.687)	0.331	0.550 (1.255)	(0.482)	0.040	

Table 22 Regression with GDP Growth 2008:3–2009:3 as Dependent Variable and Weighted Partner Growth as Control Variable

Note: White heteroskedastic robust standard errors are shown in brackets. Superscripts ***, **, * denote that the coefficient is statistically different from 0 at the 1, 5 and 10 percent levels of significance respectively. The constant term is not reported.

^a Luxembourg is excluded due to extreme values for the explanatory variable.

Source: Database (see Appendix A, page 157), authors' calculations.

Column (22.2) shows the results when the Baltic States are excluded. The results correspond to those in Table 19, page 141, i.e. the estimated coefficients generally retain their sign but become smaller (in numerical terms) and are estimated less precisely. Interestingly, when the Baltic States are excluded, the coefficient for partner growth regressed individually with the dependent variable is insignificant. But again the results are dependent on the inclusion of Luxembourg – when the observations for both the Baltic states and Luxembourg are excluded, the coefficient for partner growth is 1.095 and it is significant at the 1 percent level (the standard error is 0.346). The variables for private loans growth and loans-to-deposits remain statistically significant although their coefficients fall substantially in numeric terms.

Analyses that use unexpected growth, i.e. actual growth in 2009 minus forecast growth for 2009, as dependent variable give qualitatively the same results as when the actual output performance is used (not shown). Interestingly though, when unexpected partner growth is added to the models as a control variable, then contrary to other time periods, the co-

	(23.1)	(23.2)	(23.3)	(23.4)	(23.5)
Partner growth 2008:3-	1.996**	1.527***	1.571***	1.758***	1.746***
2009:3	(0.710)	(0.243)	(0.272)	(0.304)	(0.329)
Loans-to-deposits ratio	-3.629	-4.371**	-4.050**	-4.700***	-4.168**
2007	(2.422)	(1.680)	(1.586)	(1.529)	(1.625)
Exports 2007	2.863 (4.116)				
Private loans growth	-3.334	-3.822	-3.290**		
2005-2007	(2.622)	(2.680)	(1.301)		
Current account balance	0.023	0.036		0.102**	
2007	(0.059)	(0.052)	••	(0.044)	••
Real effective exchange rate change 2003–2007	0.028 (0.056)	0.034 (0.056)			0.064 (0.074)
Countrate at	2.988	4.732***	4.322**	4.482**	8.074**
Constant	(3.785)	(1.627)	(1.650)	(1.622)	(2.881)
<i>R</i> ²	0.816	0.811	0.806	0.792	0.750
Observations	24	24	24	26	24

Table 23 Regressions with GDP Growth 2008:3–2009:3 as Dependent Variable

Note: Luxembourg is excluded due to extreme values for some of the explanatory variable. White heteroskedastic robust standard errors are shown in brackets. Superscripts ***, **, * denote that the coefficient is statistically different from 0 at the 1, 5 and 10 percent levels of significance respectively.

Source: Database (see Appendix A, page 157), authors' calculations.

efficient for partner growth is close to zero, as opposed to around or more than one in other time periods, and the coefficient is not statistically significant, except in the model with the loans-to-deposits ratio and current account balance. This would suggest that the pre-crisis fundamentals of each country explain the unexpected fall in output performance, making partner growth less relevant

Table 23 shows the results of estimations in which the explanatory variables from Table 21 are augmented by partner growth. Column (23.1) shows the results when all the variables are included simultaneously; it is notable that the coefficient to the exports in 2007 attains what should be the "wrong sign". The variable is therefore excluded in Column (23.2), but the three additional explanatory variables, the private loans growth, the current account balance and the real effective exchange rate, are still statistically insignificant. When the variables are included separately, the first two attain significance, while the real effective exchange rate remains insignificant. Overall the results from Table 21 appear also to hold in this case in which partner growth is included as a control variable.

7.6 Final Comments

The bankruptcy of Lehman Brothers in September 2008 led to extreme instability in global financial markets and, therefore, represents an important milestone in the unfolding of the crisis. The shock spread rapidly to the EU and eventually resulted in substantial downturns. It is noticeable, however, that the effect on output differed markedly across the 27 EU countries. The idea of this chapter was to examine the extent to which differences in pre-existing economic fundamentals, measures of vulnerability and resilience, can explain the different economic performance across the 27 countries.

A number of papers have examined the importance of various measures of pre-crisis vulnerabilities for output performance after the global financial crisis using different datasets, mostly consisting of emerging economies. This chapter set out to assess whether the results of these econometric analyses are also applicable to the 27 countries in the European Union. The EU countries share many institutional characteristics, but exhibit substantial heterogeneity regarding economic development and their economic performance prior to the crisis.

In the light of the limited number of observations, the empirical approach had to be kept simple; GDP growth during the crisis was regressed on explanatory variables individually or jointly. The use of explanatory variables that are dated mainly to the time before the outbreak of the global financial crisis reduced concerns about reverse causality. The main problem facing the empirical analysis was the difficulty in identifying the effects of individual vulnerabilities given substantial multicollinearity and the small sample size. Our estimation procedures and the interpretation of the results seek to take account of the identification problems that emerge from multicollinearity and the small number of data points.

The main finding in this chapter is that the results for the EU countries are largely commensurable to those attained using different datasets mainly consisting of emerging economies. The determinants of output performance after the outbreak of the global financial crisis in the EU countries can be summarised as follows:

- Variables depicting financial leverage and financial deepening, both domestically and externally, appear to have substantial explanatory power. This includes variables such as private loans growth, current account deficits, loans-to-deposits and the net international investment position.
- Variables depicting the level of financial depth have either little explanatory power or may even have contributed to a better output performance. This may signify that countries with deep financial markets have been better able to take measures counter-acting the effects of the crisis.
- Variables directly or indirectly capturing the effects on trade also proved to be of importance. Countries with large trade volumes prior to the crisis or with trading partners that suffered from large output contractions have been adversely affected.
- Government deficits or government debt stocks do not seem to have affected output negatively, signifying that countries with more profligate governments have not been punished in terms of output losses in the early stages of the global financial crisis.
- Variables proxying the economic stance or the degree of overheating prior to the crisis, i.e. the real effective exchange rate, inflation and the exchange rate system, do not provide consistent results in the estimations. The financial sector variables have more explanatory power, possibly because the pre-crisis economic stance in large part was determined by financial developments.
- The Baltic States stand out for their very large output contractions during the global financial crisis. Unsurprisingly the inclusion of these countries matters a lot for the results, but this is also the

case for other countries which are outliers in some of the regressions presented in this chapter.

Much research remains to be done before the causes of the global financial crisis and its effect on output performance will be thoroughly understood. One unanswered question is whether it is possible to produce composite measures of crisis vulnerability, which would be able to explain output performance or other variables of interest. The indicators of vulnerabilities may be computed using principal components or other factor methods. Research suggests, however, that even if it is possible to construct such indicators for the global financial crisis, they may have little power in forecasting or predicting the next crisis (Rose and Spiegel, 2010). The factors behind one crisis supposedly differ from those behind the next crisis.

Another unanswered question is whether it is possible to model the output effects of the global financial crisis directly, i.e. based on concurrent variables such as export and capital flows that denote or reflect changes in demand. These variables directly affecting output may in turn be explained by vulnerabilities and other country-specific factors. We hope to pursue this issue in future research on the economic performance in Europe after the global financial crisis.

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[All links valid on 31 March 2011.]

7.8 Appendix A: Data Sources

Variables	Source
GDP growth	Eurostat; namq_gdp_k
"Unexpected GDP growth"	IMF (2008a), Eurostat; namq_gdp_k
Private loans 2007	SDW: MFI balance sheets: non-MFIs excluding general government
Private loans growth 2005–2007	SDW: MFI balance sheets: non-MFIs excluding central government
Loans-to-deposits 2007	SDW: MFI balance sheets: total loans/total deposits
Gross international liabilities 2007	IMF International financial statistics: financial account
Net international investment position	IMF International financial statistics: financial account
Current account balance 2007	Eurostat: tec00043
Exports 2007	Eurostat: nama_exi_c
General government debt 2007	Eurostat: gov_dd_edpt1
General government balance 2007	Eurostat: gov_dd_edpt1
GDP 2007	Eurostat; nama_gdp_c
GDP per capita in PPS 2007	Eurostat; nama_gdp_c
Real effective exchange rate change 2003–2007	Eurostat; tsdec330
Average annual HICP inflation 2003–2007	Eurostat: tsieb060
Partner growth	Eurostat ComExt: traditional external trade
Unexpected partner growth	Eurostat ComExt: traditional external trade, IMF (2008a)

Table 24 Variable Names and Sources

Note: SDW denotes the Statistical Data Warehouse of the European Central Bank, http://sdw.ecb.europa.eu/. MFI is an abbreviation for Monetary Financial Institution.

7.9 Appendix B: Regression Results Using Different Measures of GDP Performance

	(25.1)		(25.2)		(25.3)		(25.4)	
	GDP gro 2008:3–2	wth 009:3	GDP growt	h 2009	GDP growth 2008:3–2010:1		Unexpected growth 20	I GDP 009
	Coef.	R ²						
Private loans 2007 ^a	1.894 (1.388)	0.044	1.782 (1.439)	0.042	2.365 (1.782)	0.055	3.519 ^{**} (1.524)	0.138
Private loans growth 2005–2007	-7.791 ^{***} (2.702)	0.456	-7.218 ^{***} (2.522)	0.439	–9.502 ^{***} (2.508)	0.540	-9.378 ^{***} (2.240)	0.617
Loans-to-deposits 2007	–7.492 ^{***} (2.352)	0.509	-7.029 ^{***} (2.208)	0.495	–7.757 ^{***} (2.584)	0.431	-6.015 ^{**} (2.485)	0.305
Gross international liabilities 2007 ^a	0.250 (0.336)	0.021	0.227 (0.323)	0.018	0.293 (0.418)	0.022	0.375 (0.429)	0.042
Net international investment position 2007	3.239 [*] (1.671)	0.122	2.464 (1.641)	0.078	3.992 ^{**} (1.725)	0.146	3.321 [*] (1.830)	0.119
Current account balance 2007	0.220 [*] (0.110)	0.217	0.183 [*] (0.104)	0.166	0.290 ^{***} (0.098)	0.298	0.251 ^{**} (0.092)	0.264
Exports 2007 ^a	0.598 (2.059)	0.001	-1.533 (3.066)	0.006	–0.178 (3.639)	0.000	–3.595 (3.518)	0.028
General government debt 2007	0.094 ^{**} (0.034)	0.317	0.089 ^{***} (0.032)	0.316	0.099 ^{**} (0.037)	0.280	0.116 ^{***} (0.030)	0.452
General government balance 2007	-0.261 (0.233)	0.026	-0.258 (0.213)	0.028	-0.178 (0.235)	0.010	-0.175 (0.241)	0.011
GDP 2007	1.655 [*] (0.815)	0.066	1.285 (0.783)	0.041	1.709 [*] (0.893)	0.056	2.415 ^{***} (0.860)	0.131
GDP per capita in PPS 2007	0.117 [*] (0.064)	0.091	0.078 (0.065)	0.044	0.142 [*] (0.074)	0.105	0.122 (0.084)	0.092
Real effective exchange rate change 2003–2007	-0.166 ^{**} (0.074)	0.360	-0.157 ^{**} (0.067)	0.348	-0.188 ^{**} (0.067)	0.364	-0.193 ^{***} (0.056)	0.440
Average annual HICP inflation 2003–2007	-0.921 (0.542)	0.156	-0.840 (0.494)	0.143	-1.221 ^{**} (0.523)	0.217	-1.154 ^{***} (0.410)	0.227
Exchange rate dummy: euro	7.774 ^{***} (2.735)	0.460	7.229 ^{**} (2.613)	0.450	8.852 ^{***} (2.706)	0.490	7.960 ^{***} (2.808)	0.420
Exchange rate dummy: float	7.163 ^{**} (2.944)	0.400	7.060 ^{**} (2.843)	0.450	8.542 ^{**} (3.087)	0.400 -	6.777 ^{**} (2.976)	0.439

Table 25 Regressions Explaining GDP Growth After the Global Financial Crisis

Note: White heteroskedastic robust standard errors are shown in brackets. Superscripts ***, **, * denote that the coefficient is statistically different from 0 at the 1, 5 and 10 percent levels of significance respectively.

^a Luxembourg is excluded due to extreme values for the explanatory variable.

Source: Database (see Appendix A, page 157), authors' calculations.

8 Economic Crisis and Potential Growth: European Tendencies and Possibilities

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8.1 Introduction

The dramatic decline in the actual output of the European economy is considered to be more than a cyclical discrepancy from the potential output. Both level and growth rate of the potential output show an unfavourable development. On the one hand the economic performance is getting closer to its potential level only slowly after combating the recession. On the other hand if the crisis has a negative impact on the short-term and long-term growth potential, Europe will follow a more unfavourable growth path for a long time. (The erosion of the European growth potential has progressed particularly during the last one and half decade.) Previous financial and economic crises had lasting negative impact on the output and the employment.

It is an important task of economic research to identify the channels through which the financial crisis might have an impact on the level and growth rate of the potential output. The European economic policies face major challenges while trying to find those effective answers which contribute to the mitigation of the potential output losses.

The impacts of the crises on the potential growth need to be reviewed in regard to the potential growth factors (labour utilization, capital accumulation and total factor productivity). It is essential to reveal the transmission channels and the experiences gained during previous financial and economic crises.

The chapter is based on broad mid-term quantitative analyses using the production function approach. In the end alternative long-term scenarios are analyzed.

8.2 Potential Impact of the Crisis on the Potential Growth

The financial and economic crisis has a significant impact on the potential growth. (The impacts on the long-term potential growth are particularly difficult to reveal.)

In the short run significant decrease in the level of the potential output is the result of the decrease in the productive capital stock (increasing capital depreciation), and the negative impact on the labour supply and the structural unemployment. The decisive question is the impact of the crisis on the *long-term potential output growth*. If the potential growth will be strengthened following the crisis, then the loss caused by the decrease in the output level might be compensated after a while. The economy might get on a higher, sustainable growth path due to the effects of the crisis forcing out structural transformation. (As for these processes, the development in Sweden and Finland following the crisis at the beginning of the 1990s might serve as a good example.)

8.3 Transmission Channels of the Financial Crisis. Past and Present Experiences

The last financial crisis has had an impact on the economy of the EU mainly through three channels:

- Connections within the financial system. Although the crisis started in the US the banks in Europe (especially in the United Kingdom and in the Eurozone) have suffered higher write-downs. These losses result in a significant contraction in economic activities. In the deleveraging process the banks reduced remarkably the share of emerging markets. (Through closing further credit lines and capital repatriation.) As the crisis progressed the financing has decreased to a significant extent in the emerging European economies.
- Confidence and wealth effect on the demand. During the period of the strengthening lending standards the declines in the wealth of households and the fall in the asset prices (particularly stocks and housing prices) the savings have increased the demand for consumer durables (among them cars) and the residential investments have decreased. This process was strengthened by the inventory cycle: the cutback of previous involuntary stock building resulted

in further decrease in production. All these factors have had an unfavourable feedback effect onto the financial markets.

• International trade. The global trade collapsed basically in the last quarter of 2008. The business investments and the demand for consumer durables – both depend significantly on credit granting and both are trade intensive – have remarkably decreased. The fall in trade was greater than it could have been expected according to previous experiences. Its main causes are considered the composition of the demand shock (which affected mainly trade intensive capital goods and consumer durables), the cessation of the trade finance and the fall in the economic activity.

GDP fall in the EU exceeded in average 4% in 2009. This recession has been the most serious since WWII. (Table 26 and 27)

	2008	2009	2010	
GDP (change, %)	0.5	-4.2	1.8	
Private consumption (change, %)	0.7	-1.7	0.8	
Public consumption (change, %)	2.3	2.2	0.7	
Total investment (change, %)	-0.8	-12.0	-0.7	
Unemployment rate (%)	7.0	9.0	9.6	
Inflation (core inflation, %)	3.7	1.0	2.1	
				_

Table 26 Main Macroeconomic Indicators in the EU

Country	2008	2009	2010
Bulgaria	6.2	-5.5	0.2
Czech Republic	2.5	-4.1	2.3
Estonia	-5.1	-13.9	2.4
Latvia	-4.2	-18.0	-0.3
Lithuania	2.9	-14.7	1.3
Hungary	0.8	-6.7	1.2
Poland	5.1	1.7	3.8
Romania	7.3	-7.1	-1.3
European Union	0.5	-4.2	1.8

Table 27 Development in Actual Economic Growth (2008–2010)Source: Eurostat.

The financial crises have deep impacts on the long-term output growth. According to Cerra and Saxena's analysis (2008) the recession was not followed by rapid recovery. The loss of trend output has not been fully recovered later on. The loss of the GDP level was generally not set off by a higher growth after the crisis. In the countries analyzed (in the case of 7 countries out of 14) the growth pace experienced during the decade following the trough of the crisis is somewhat lower than that prior to the crisis.

The bank crises and the bigger recessions share several common peculiarities. Both are characterized by decline in the activity and industrial reallocation and significant decrease in the investment. All these have remarkable impact on the potential growth.

Recessions following a financial market crisis are deeper than 'ordinary' recessions. Those are generally associated with significant decrease in the housing prices and the construction output. (Reinhard and Rogoff, 2008, Claessens et al., 2009) The decrease in consumption is high during recessions. It reflects also the loss of assets (e.g. decrease in the housing prices).

During the past decades the impacts of the economic recessions (not only the financial crises) are mixed as regards the long-term potential growth in the European countries.

The dynamics of the capital accumulation has decelerated in most European economies in the short- and medium term. (Haugh et al., 2009, European Commission, 2009b) In the long run the contribution of the capital accumulation to the potential growth has basically not changed in most EU member states. The dynamics of the capital intensity has slowed down dynamically and continuously in a small group of the countries considered (FI, SE, IE). Although the recession affected the capital accumulation in the short run, in the long run the structural factors played a decisive role. The growth model of these economies changed significantly in the 1990s. Due to the change in the industrial structure the capital accumulation declined and the contribution of the TFP to the potential growth increased.

After the severe recession the contribution of labour to the potential growth increased in most countries analyzed. During the decade following the recession the contribution of labour increased in 7 countries out of 10 countries analyzed. The level of NAIRU grew during recessions but it generally declined after it.

After the big recessions the dynamics of the total factor productivity was different, but it was considered the main driving force behind the long-term output growth. In certain countries (EL, FI, SE and UK) the dynamics

of TFP intensified and in other countries (BE, DE, ES, FR, IT, and PT) declined. The TFP and the increasing dynamics of the potential growth coincided in the countries considered. (The only exception was Spain, where the participation rate grew significantly. Thus the contribution of labour to the potential growth increased.) TFP growth is considered a key factor as regards the differences of the potential growth among countries during recessions.

Output losses after banking crises are 2 to 3 times higher. It takes on average twice as long for output to recover back to its potential level. (Haugh et al., 2009) In comparison with other financial and real-estate crisis driven recessions the current slump is considered to be severe as regards both output and investments. It might be compared with the Great Depression in the 1930s.

In terms of the *demand components* the main factor of the downturn was the *collapse in fixed capital formation*. The household consumption, stock formation and net-exports contributed to the recession as well. The deleveraging has continued in the household and the corporate sector (financial and non-financial sector) also during the deepening of the recession. After the crisis hit the bottom the *recovery has started* both in the global economy and the economy of the EU. The economic policy measures (liquidity enhancement through monetary policy, additional fiscal demand stimulus etc.) have played a significant role in the moderation in the downturn and the initial boom. The pace of the recovery is, however, lagging behind the dynamics experienced following previous recessions. (Reinhart, 2010, IMF, 2009) Differences between countries are significant.

At the same time the fiscal stimulus applied broadly while handling the crisis has led to an increase in current account deficit and public debt. In 2010 the government deficit might reach 6.5% expressed as percentage of the GDP and the public debt might excess 80% of the GDP in 2011. (European Commission, 2010) Adjustment of the public finances is unavoidable. The fiscal consolidation might result in the fall of economic growth in the short run. In the long run its impact is positive, especially if it comes also to the introduction of growth enhancing structural reforms. The high ratio of public debt causes significantly lower growth both in developed and emerging economies. (Reinhart and Rogoff, 2010) (Besides the crowding out effect also the financing of the deficit through distorting taxation and the increase in the government risk premium need to be underlined in its mechanism.)

The current crisis leads to potential output loss in the European Union. While the effect on the potential growth is much more uncertain, the decline in the dynamics of the potential output – by having basically the same policies – is unavoidable in the medium and long run, due to the decrease in the TFP dynamics in particular.

The likelihood of the lasting effects on potential growth is much higher in the case of the current crisis than of previous recessions. The length of the crisis its global characteristics and the change in the risk related behaviour might explain that. According to the Spring 2010 forecast of the European Commission, the crisis is expected to be longer than the previous crises. (European Commission, 2010) It will have an adverse effect on the investments – on intangible investments in particular (namely R&D) – which has a severe impact on the TFP growth and the potential output. On the one hand the NAIRU might increase due to the hysteresis effect (see Blanchard et al., 1989) resulting in further drop in the potential output level and slowing down the potential growth in the short and medium term. Many discouraged workers leave the labour market decreasing this way the labour supply.

As the crisis is a global one the possibilities of recovery through rechanneling of resources from sectors producing non tradable goods into sectors producing for export is limited, because global trade declined remarkably. In the middle of the 1990s – following the financial crisis – the essential factor of the Finnish and Swedish 'miracle' was the structural transformation, the reallocation of resources based on effectiveness and competitiveness into ICT sectors.

The risk-related output losses can be estimated only vaguely. The long recession has a severe and drown-out effect on the main factors of the production function. On the potential growth path negative structural changes might occur, none the less the downturn will gradually stop.

The current crisis leads to *potential output loss* in the European Union. While the effect on the potential growth is much more uncertain, the decline in the dynamics of the potential output – by having basically the same policies – is unavoidable in the medium and long run, due to the decrease in the TFP dynamics in particular.

8.4 Slowdown in Potential Growth (Medium-term Quantitative Analysis)

In the medium term estimations the uncertainty is considerably high as regards the forecasts on investments and total factor productivity. The moderate investment dynamics of the recovery period due to the financial market problems, the growing cost of capital, the shocked capital allocation system – that is more unfavourable than it would be in an optimal case – and because of all of these the slower dynamics of the inevitable structural transformation intensify the uncertainty and the possibility of adverse trends. So there are several factors having significant impact through the capital accumulation channel. Thus the change in the TFP or the capacity utilization can be measured only loosely. Considerable depreciation rate and at the same time the impacts of the crisis on the innovation and the structural transformation of sectors need to be taken into account.

In 2009–2010 the potential growth rate of the old Member States (EU-15) will drop to nearly half of that measured in 2007–2008.³³ (I.e. the annual growth rate of 1.3–1.6% is likely to decrease to 0.8–0.9%.) The new MSs (EU-12) show the same situation, the growth rate is, however, higher in their case as they are catch-up countries (in average 2.8–3.1% per year in 2009–2010). In the EU-15 the decrease in the potential output is to be explained mainly by the significant decrease in labour and capital factors. The structural unemployment is expected to rise by 1–1.5% and the investment as a share of GDP might decrease by more than 3%. The dynamics of TFP is in average low in the EU-15 (0.5% per year) and it is increasing only slightly – by approximately 0.1% per year – between 2011 and 2014. (This TFP assessment is relatively conservative. It does not take into account that there is a one-off downward shift in the TFP level related to the change in the industrial structure.)

In the EU-12 – the financial crisis is likely to result in a strong decrease in the potential growth rate: from an annual 4.1% in 2008 to 2.8% in 2009 and 2.8% in 2010. The different factors of the potential growth react basically similarly to the financial crisis both in the Eurozone and the EU-15.

As regards the direction of the growth dynamics in 2009–2010 it is to be considered similar both in the old and the new MSs. *There is, however,*

 $^{^{33}}$ The analysis is based on the database calculated according to the production function methodology of the EPC Output Gap Working Group (OGWG). The data were grouped and processed by the authors.

a significant difference in the case of the medium term trends of 2011–2014. The potential growth rate in EU-15 is expected to be recovered by and large in this period. (The dynamics will be similar to that prior the crisis.) The prospects of the EU-12 are more unfavourable. The contribution of the investments and the TFP won't be recovered fully from the 2009–2010 level. The labour market trends are also unfavourable. (Primarily, due to the significant deceleration of the growth rate of the working age population.)

8.4.1 Potential Growth in the Main Country Groups

The financial crisis has affected the different MSs to different extent. *The symmetric shock has had asymmetric consequences.*

The intensity of the impacts of the financial crisis depends on the *initial* circumstances and the vulnerability originating from them. The overestimation of the housing markets, export dependency of the economies, their current account position, the size of the financial sector and the exposure to risky assets might have a significant role. In the individual MSs – in relation to the factors mentioned – the potential growth rate, the investment rate, the structural unemployment (NAIRU) etc. differ to a great extent.

In our quantitative analysis the countries of the EU-27 are categorized into 5 groups based on the potential growth dynamics, the investment as a share of the GDP, the main economic and economic policy peculiarities, the advancement in the field of the Lisbon Agenda.

The 'continental countries' (BE, DE, FR, LU) are members of the Eurozone. The potential growth rate fell remarkably prior the crisis. These are countries with current account surplus (with the exception of FR). The Lisbon-type reforms have been carried out restrainedly.

The 'reform countries' (AT, DK, FI, IE, NL, UK, SE) have shown significant improvement as regards the structural reforms. The 'Anglo-Saxon' and the 'Scandinavian' model have proved to be more competitive than the continental one during the globalization period. The potential growth rate exceeded that of the continental countries. At the same time the growth dynamics moderated preceding the crisis and it converged towards the dynamics of the continental countries. The smaller countries belong mainly to the Eurozone. 3 MSs (DK, SE, UK) are not members of the Eurozone. Characteristically there is a current account surplus (with the exception of UK and IE). The potential growth dynamics was very low in some 'Mediterranean' countries for years (IT, PT), but it fell also in the others (EL, ES, CY, MT) at the outset of the crisis. The current account deficit and significant structural deficiencies are typical in these MSs.

In the 'catch-up' group there are the MSs joined the EU in 2004 which showed favourable growth and convergence prior the crisis (CZ, PL, SK, SL). 2 smaller countries among them are members of the Eurozone, but the two bigger countries are not. All the countries classified as 'catch-up' countries have current account deficit. (It is, however, relatively moderated in this group.)

The 'vulnerable' group contains the Baltic States (EE, LT, LV) and Hungary which joined the EU in 2004 and Bulgaria and Romania which joined the EU in 2007. With the exception of these two countries (BG, RO) the potential growth rate decreased before the crisis. There is relatively little advancement as regards the structural reforms. None of the countries is a member of the Eurozone.³⁴ The current account deficit is mostly high (two digit!), the dependency on the external financing and their vulnerability is very high.

The characteristics of the groups and the countries in the groups are indicated in Table 28 and the potential growth is shown in Figure 27.

The following consequences offer themselves based on the analysis of the medium-term growth processes of the country groups (the main factors of which are listed in Table 29).

Summarising: the financial crisis might generate significant decrease in the potential output and it might have a remarkably negative impact on the labour (on the non-demographic driving-forces, such as the NAIRU), capital and TFP.

As regards the potential growth the individual country groups show substantially different trends. While the more developed countries and those being a member in the Eurozone will get close to their previous growth performance,³⁵ the potential growth rate will decrease in the Member States which are less developed than the average. Due to that the growth dynamics of the country groups will converge compared to the period preceding the crisis. (But it cannot occur as regards the level of the potential

 $^{^{34}\,\}mathrm{Estonia:}$ a member of the Eurozone from 1^{st} of January 2011.

 $^{^{35}}$ At the same time there is a significant difference in the potential growth rate. The trend of the 'reform countries' is better -1.9% in 2014 according to the simulations – than that of the 'continental countries' -1.5% in 2014.

Country group	Potential growth rate		Current accor (as percentage	unt deficit of the GDP)	Investment ratio (as percentage of the potential output)	
	2005)5 2008 2005 2008		2005	2008	
`Continental' ^(a) (BE, DE, FR, LU)	0.8–1.9 ^(a)	1.0-1.7 ^(a)	2.2–5.2 ^(a)	0.2–6.6 ^(a)	18.7-22.0 ^(a)	21.2-23.5 ^(a)
(==, ==, :::, ==)			(except FR)			
`Reform countries' (AT, DK, FI, IE,	1.4–3.6	1.4–2.6	3.9–7.5	2.2-8.3	17.7–22.3	18.6-22.0
NL. UK, SE)			(except IE, UK)			
'Mediterranean' (CY, EL, ES, IT,	0.6–3.3	0.4–2.6	-1.2-11.0	-3.0-13.8	20.3–28.3	15.7–28.2
MT, PT)			(except CY)			
`Catch-up' (CZ, PL, SK, SL)	3.5–5.4	3.3–5.0	-1.2-8.6	-3.3-5.1	18.7–28.0	22.8–31.2
`Vulnerable' (BG, EE, HU, LT, LV, RO)	3.1–7.0	0.8-5.1	-7.1-12.5	-6.6-22.9	24.8–37.0	24.6–40.0
EU27	1.8	1.5	-0.3	-1.1	20.5	21.8
USA	2.5	1.8	-5.9	-4.9	19.9	18.0

Table 28 Potential Growth, Current Account and the Investment Ratio in the Country Groups

Note: ^(a) Without the date for LU.

Source: Own calculation.



Figure 27 Potential Growth in the Country-groups of the EU Source: Own calculation.

growth.) That is: a surprising convergence might develop in the growth rate of the basically different country groups. (See Figure 27.)

The contribution of the individual factors to the potential growth is very *different*. The structural unemployment (NAIRU, Figure 28) will slightly decrease in the catch-up countries, it won't change in the continental group, it will increase by about 2% in the reform countries and it will increase by about 2.2-2.5% in the Mediterranean and the vulnerable country groups. The investment $ratio^{36}$ in the continental and the reform countries will be recovered by and large at the level preceding the crisis. It decreases by 2% in the catch-up countries, by about 4% in the Mediterranean group and by more than 6% in the vulnerable countries. The contribution of the labour input is modest on the whole, while its contribution is negative in the case of the catch-up and vulnerable countries. The contribution of the capital factor is the most modest in the continental and Mediterranean countries. The TFP as the decisive factor of the potential growth in structural terms will grow after the crisis has hit the bottom but it will remain at a low level on the whole. The most unfavourable dynamics of this structural component is to be expected in the Mediterranean and vulnerable country groups.

As regards the potential growth and the contribution of the individual factors the most unfavourable trends can be experienced in the case of the Mediterranean and vulnerable countries. (Figure 27–29) In the period analysed the catch up with the average of the EU-27 will practically stop in the country groups indicated.

The decrease in the dynamics of the potential output to be predicted for the coming years shows a dramatic size. (Figure 30-31)

In the Baltic States the annual increase in the potential output is expected to fall from 5–6% to 1.6–2%. In the case of Hungary the potential growth rate of 3–4% might fall under an annual 1%! That is: in certain new member states the real convergence might stop in the short and medium run. (In certain cases even divergence might occur compared to the more developed countries.) This convergence crisis might cause severe tensions in the broader medium-term period both in the countries affected and the EU.

 $^{^{36}}$ Investment ratio is expressed as percentage of the potential output.

	Potentia	growth	Contribution to the potential growth						
	rate		Labour		Capital		TFP		
	2010	2014	2010	2014	2010	2014	2010	2014	
Continental	1.1	1.5	0.1	0.2	0.5	0.5	0.5	0.8	
Reform countries	0.9	1.9	-0.2	0.2	0.4	0.7	0.7	1.0	
Mediterranean	0.4	1.5	-0.2	0.3	0.4	0.6	0.2	0.6	
Catch-up	3.5	3.0	0.3	-0.1	1.5	1.5	1.6	1.6	
Vulnerable	1.4	1.8	-0.6	-0.3	1.4	1.3	0.5	0.7	
EU27	1.0	1.7	-0.1	0.1	0.6	0.7	0.5	0.9	
USA	1.4	2.1	0.0	0.2	0.5	0.9	0.9	1.0	

Table 29 Potential Growth and Its Factors in the Country Groups Source: Own calculation.



Figure 28 Development of NAIRU

Source: Own calculation.



Figure 29 Development of Investment Ratio

Source: Own calculation.



Figure 30 'Vulnerable' Countries

Source: Own calculation.



Figure 31 EU-27

Source: Own calculation.

8.4.2 Potential Growth in the EU and the USA

In a broader context it is to state that the potential growth rate shows in general a downward trend both in the USA and the Eurozone countries. (There is an exception in the USA from the mid 1990s onwards.) The potential growth rate represented a downward trend both in the Eurozone and the USA prior the financial crisis.

The current crisis is linked with the repeated mitigation that occurred on the supply side earlier both in the USA and the Eurozone. The potential growth rate was much lower in 2008 than in 2000 (It is lower by 1.5% in the USA and by 0.8% in the Eurozone.) The current financial crisis decreases these rates by 0.25–0.50% in 2009–2010. (See Table 30.) According to Table 30 the deterioration induced by the financial crisis might be relatively short-lived. The main scenario of the *medium-term simulation based on the production function indicates the recovery of the*

	Potential growth (as percentage of the annual	Contribution to the potential growth		NAIRU (as percentage of the labour	Investment rate (as percentage of the potential	
	change)	Labour	Capital	TFP	force)	output)
		Eu	ıro area (E	A-16)		
2001-2005	1.8	0.5	0.7	0.6	8.5	20.9
2007-2008	1.4	0.2	0.8	0.4	8.5	22.5
2009-2010	0.7	-0.2	0.5	0.4	9.3	19.5
2011-2012	1.3	0.2	0.5	0.6	9.9	19.7
2013-2014	1.7	0.4	0.6	0.8	10.0	20.5
			USA			
2001-2005	2.5	0.2	1.1	1.2	4.9	19.2
2007-2008	1.9	0.1	0.9	0.9	6.1	18.6
2009–2010	1.3	0.0	0.4	0.9	7.2	15.5
2011-2012	1.8	0.2	0.6	1.0	7.7	16.7
2013–2014	2.1	0.2	0.9	1.0	7.9	18.2

Table 30 Potential Growth in the Euro Area and the USA

Source: Own compilation based on the OGWG database.

potential growth rate (annual 2%) until 2013 in the USA. In the EU-15 the potential growth rate might reach the level of 1.7%.

According to the analyses carried out using the production function method, the financial crisis might strengthen the models that differ between the Eurozone and the USA as regards the contribution of the growth factors to be experienced. The contribution of labour exceeds that of the USA further on, while in the latter the *increase in the investment* is expected to be significantly stronger from 2011 onwards.

The annual contribution of the TFP to the potential growth decreased from 1.5% prevailing at the end of the 1990s to approximately 0.8% in 2007–2008. But this dynamics was still more than twice as high as the rate in the Eurozone. In both regions the TFP contribution will be moderated due to the financial crisis in 2009–2010. These contribution rates return to the level prior the crisis. According to the forecast the contribution of the TFP to the potential growth in the USA will be significantly higher during the period from 2009 to 2013 than in the Eurozone. In order to explain why the performance of the USA is continuously higher there is a need to analyse the key driving forces of the tangible and intangible investments.

8.5 Erosion of the European Growth Potential. Alternative Long-term Scenarios

Due to severe structural productivity problems of the EU-15 and insufficient adjustment to the globalization a permanent and significant decline in the potential growth rate is to be expected. (Carone et al., 2006, Halmai, 2007) The unfavourable investment environment promotes a higher level of capital outflow and a notable increase in the share of imported products and services.

Applying the *production function* approach the longer-term simulations indicate that the potential growth rate both in the EU-15 and the EU-27 falls.³⁷ (EC, 2008, 2009b) According to the base scenario this reduction will be continuous, moving from an annual 2.4% in 2004–2020 to an average 1.7% in 2021–2030 and then down to 1.3% in 2031–2060.

The forecast decline in the potential rate of growth is far greater in the EU-10 and EU-12 countries than in the EU-15 states. Output in the EU-12 between 2007 and 2030 will expand far more rapidly than in the EU-15 countries, i.e. the convergence process will continue. But as time passes the pace of convergence will slow down, and then stop after 2030. (Based on the simulations, annual GDP in the EU-10 will grow by only 0.6% in 2041–2060, compared to a figure of 1.5% for the EU-15 countries. That is there is a switch from convergence to divergence, see Figure 32.)

In the new MSs the potential growth rate will decline at a greater pace, thus the real convergence will stop from 2030 onwards and even a moderate divergence from the EU-15 might occur. It can be explained by the following factors: on the one hand the productivity growth rate might be rebalanced by 2050, on the other hand the demographic simulation are significantly more unfavourable in the NMSs than in the old ones.

The long-term paths indicating the erosion of the European growth potential could be considered rather optimistic based on the analysis of the impacts of the current crisis on the potential growth.

In order to calculate the impacts of the current crisis alternative scenarios need to be set up. In view of the large uncertainty regarding the length of the slump in economic activity the case of the temporary shock and the case of the permanent shock needs to be defined.

 $^{^{37}}$ In this section we used the quantitative analysis – based on the production functions – that was carried out for the European Commission (2008, 2009b); Carone et al. (2006); Denis et al. (2006).



Figure 32 Potential GDP Growth Rate (Annual Average as Percentage) Source: EC, 2009b.

Two temporary shock scenarios can be described: a 'lost decade' and a 'rebound' scenario.³⁸ Those figures are much lower than the baseline projection for the period until 2014. Therefore the annual potential GDP growth in the EU-27 included in the latest analysis carried out by the European Commission is lower by around -0.9% in both scenarios than in the baseline scenario.

The potential growth components will then converge to reach the growth rate projected in the baseline:

- In the 'lost decade' scenario, labour productivity is assumed to reach the baseline growth rate in 2020. Labour input is assumed to reach the baseline growth rate in 2020, too.
- In the 'total rebound' scenario, labour productivity and labour input are expected to reach the baseline level in 2020.

Given the current economic crisis and a very considerable degree of uncertainty, the impact of a permanently worse situation of the growth potential can also be analyzed. This is the 'lasting and increasing loss' (or '*permanent shock*') scenario. These numbers are much lower than the values calculated until 2014 in the comprehensive long-term baseline scenario. According to this analysis the annual potential GDP growth

 $^{^{38}}$ The analysis is based on the database applying the production function method of the EPC Output Gap Working Group and the database of the Ageing Report. See EC (2009b).

in the EU-27 countries is lower in both scenarios by about 0.9% than in the baseline scenario.

The potential growth rate converges to the growth rate of the baseline scenario following these corrections:

According to the 'lasting and increasing loss' scenario from 2014 to 2020 the labour productivity growth and labour input growth will reach the baseline figures, but the unemployment rate will be permanently 1% higher than in the baseline from 2020 onwards; and the labour productivity growth rate will be 0.25% lower than that from 2020 onwards.

The 'lost decade scenario' causes a lower per-capita GDP level at the end of the period examined compared with the baseline. It implies a lower expected potential growth up to 2020. This period is 'lost' in terms of accumulated wealth creation. The loss in GDP per capita in the EU-27 is around 11% in 2020. This scenario carries over the loss in the rest of the projection period. The growth projection remains broadly unchanged between 2020 and 2060. In the 'total rebound' scenario, the GDP per capita by 2060 is the same as in the baseline (the deterioration relative to the baseline up to 2014 is offset by the improvement between 2015 and 2020). (EC, 2009b)

A more marked reduction in the GDP per capita level occurs in the 'lasting and increasing loss' scenario. In that case the GDP per capita is 12%lower than in the baseline in 2020, 16% lower in 2040 and 20% lower in 2060. It means that this scenario reflects significant lower growth



Figure 33 Potential GDP Growth Under Different Shocks (Annual Growth Rate)

Source: EC, 2009f.

throughout the projection period than it was assumed before. (The growth path of the different variables is summarized by Figure 33.)

The permanent shocks would result in the complete collapse of the growth and catch-up models in Europe. In the long-term one fifth of the GDP would fall out and the chances of real convergence would deteriorate dramatically, though differently country by country.

8.6 Some Conclusions

The main conclusions are summarized as follows:

- 1. Applying the supply side approach the recession has an impact on growth through three different channels: capital accumulation, labour input and total factor productivity. The probability of the lasting impacts on the potential growth is much higher as regards the recent crisis than it was in the case of previous recessions. It has to be particularly highlighted, that the *risk related* behaviour might change permanently.
- 2. The present global crisis resulted in the deepest recession we have seen since WWII. New risks appeared. In the EU the new MSs have been experiencing a continuous fall in potential growth since 2008. The potential decrease in the dynamics of the potential growth in the medium term is of dramatic size in certain new NMSs. In these countries real convergence might stop in the short run and it might even come to a divergence. We call it 'convergence crisis'.

The financial crisis hit the different countries to different extent. The symmetric shock resulted in asymmetric consequences. As regards the potential growth and the contribution of the individual factors the most unfavourable trends were to be experienced in the case of the Mediterranean and vulnerable countries. In the period analysed the catch up will practically stop in the country group indicated.

3. It is important to compare the European and the US growth model. In the long run the potential growth rate shows a declining trend both in the USA and the Eurozone countries. The TFP growth rate is much higher in the USA from the middle of the 1990s onwards than in the Eurozone. This higher dynamics is expected to last also in the medium term.

- 4. In relation with challenges of the globalisation and competitiveness problems of the European Union's economy – the current average annual rate of *potential growth in the European Union of 2.4% could fall to half this level on average in the coming decades.* The potential growth rate will be cut in half, despite the prognosis containing relatively benign development in labour productivity. This may also indicate adverse demographic changes. But its decisive structural element is the decreasing dynamics of the total factor productivity.
- 5. The risk of shock repetition is high. These changes project further erosion of the growth potential in Europe. That is: due to the crisis and its potential long-term impacts there might be scenarios which are more unfavourable than those indicating decreasing potential growth in the previous point. If the scenario of permanent shocks becomes a reality, that would threaten with the complete collapse of the European growth and catch-up model.

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9 Impact of the World Economic Crisis on Unemployment in Spain

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9.1 Introduction

Before the economic crisis started in the second half of 2008³⁹ Spain enjoyed a growing phase within the business cycle with economic growth and prosperity over the past two decades between 1989 and 2008. It was among the stable countries in terms of real GDP compared to EA-12 countries⁴⁰. Considering the 10 year period, starting with the entry of the EA-12 into the common monetary union,⁴¹ Spain experienced the 4th fastest average economic growth of 3.45% in terms of real GDP compared to the EA-12. Spanish public finances also experienced long-term sustainability in terms of a fairly "balanced" budget and reduction of public debt during the 10 years of growth under the EMU. This relatively good economic performance was accompanied by changes in labour market conditions.

Spain experienced the biggest increase in aggregate labour supply within the EA-12 (around 6 million new workers in absolute terms). There was approximately twice as high an inflow of new workers into the Spanish labour market compared to the other bigger labour markets of Germany,

³⁹ The chapter summarizes the most important results of the diploma thesis with the title "Impact of the world economic crisis on unemployment in Spain".

⁴⁰ EA-12 group is represented by the founding members of the EMU (Euro area) in January, 1999. These countries are Germany, Italy, France, Spain, Netherlands, Belgium, Finland, Luxembourg, Ireland, Austria, Portugal and Greece entering the monetary union in January 2001.

⁴¹ All the statements in the introduction part are based on the 10 year long-term comparative analysis of EA-12 countries. The chosen decade covers 10 years of common monetary union, starting with the entry of 11 countries into the Eurozone on January 1st 1999 (The 12th country being compared is Greece, which joined the Eurozone on January 1st 2001. However, it is also included mainly due to recent economic problems and it may be beneficial to see its development during the last decade compared to other members of the EA-12). This period shows the long-term characteristics, performance and position of the Spanish economy and its labour market during the 10 years development under the common currency.

France and Italy. One of the main reasons for such a significant increase was the inflow of immigrants attracted by the vision of a better life, jobs and new life opportunities in the economically booming country. Another potential cause was a long-term improvement in Spanish participation rates being the result of several factors such as lower fertility rates and changes in the role of Spanish women (Jimenez 2002, page 12). These long-term trends were also partially consequences of previouslymentioned economic growth which generated a new aggregate labour demand in the Spanish labour market. The aggregate labour demand followed the growth phase of the business cycle with improvements in employment and employment rates within the 10 year period. The Spanish labour market had capacity to generate around 5.77 million new job opportunities, which was again the highest number within the EA-12 countries and almost twice as many as in the cases of France, Italy and Germany. It seemed that the Spanish labour market had improved the conditions and long-term capacity to create working opportunities within the EA-12 and thus, significantly reduce unemployment. However, the labour market conditions in terms of unemployed people remained the "worst" within the EA-12 countries. Even though Spain experienced a long-term decline in unemployment rates such as another 8 analysed countries, it remained the "leader" having the highest rate of 11.4% in 2008. Therefore, the issue of higher unemployment is definitely a longlasting (around 40 years) weakness and problem of the Spanish labour market.42

After a 2 year period characterized by the global economic crisis, Spain is recently experiencing the highest unemployment rate within EA-12 coun-

 $^{^{42}}$ When speaking about the weaknesses, it must also be mentioned that Spain and its labour market have been facing several long-term problems. One of them is definitely the estimate of the size of shadow economy because Spain is considered to be among the countries with the highest proportion of underground economy in terms of % of GDP and within the EA-12. Although it experienced a decline during 10 years development under the common currency, Spain ranked 3rd position, having around 18.7% in 2008. Another problem that can be pointed to is the low labour productivity which has certainly been a factor influencing the macroeconomic performance of Spain. In other words, it may mean that the Spanish economy has been losing international competitiveness in terms of low productive labour within the EA-12. This finding is also supported by taking a look at other competitive indicators. Especially one dealing with cost competitiveness such as REER deflated by unit labour costs and the nominal unit labour cost, which showed a long-term problem of bigger increases in wages compared to increases in productivity. A more comprehensive look at Spanish international competitiveness was provided by the Global competitive index according to which Spain also figures among the less competitive countries within the EA-12.
ties (see Table 31). The Spanish unemployment rate is more than twice as high compared to the average of EA-12, EU-27 and more than three times higher than other European countries such as Germany, Netherlands, Austria and Luxembourg. After the brief economic summary (with special focus on the labour market) of the Spanish "stable" precrisis period it appears to be very attractive to ask economic questions such as: What can be considered as the main causes and determinants of such high unemployment in Spain? What are the main weaknesses of the Spanish labour market? Why has the Spanish labour market so badly adjusted to the economic crisis compared to other European countries? Why are there such big differences between Spain and other European countries? What possible and appropriate measurements and policies can be recommended to lower the unemployment rate in Spain?

Country	2010Q3
Spain	20.5
Ireland	13.9
Greece	12.2*
Portugal	11.1
EA-12	10.0
France	9.9
EU-27	9.6
Belgium	8.6
Italy	8.4*
Finland	8.2
Germany	6.7
Luxembourg	5.0
Netherlands	4.5
Austria	4.4

Table 31 Total Unemployment Rates in 3Q of 2010 (Age Group 15–74, in Spain 16–74, in %)

Note: $3^{\rm rd}$ Q of 2010 are the last available, in time period of finishing this thesis. * $2^{\rm nd}$ Q of 2010.

Source: Eurostat, data isseasonally adjusted, worked out by author.

The structure of the chapter is as follows. Section 9.1 (introduction part) focuses on a summary of the long-term development of the Spanish economy within the EA-12, related mainly to labour market performance, overall productivity and competitiveness during the "pre-crisis" decade period 1999–2008. Section 9.2 will be devoted to a summary of short-term characteristics of the Spanish economy during the "recession" period 2008–2009/2010. Again, special attention is paid mainly

to the labour market indicators which are compared to selected EA-12 countries. Section 9.3 puts emphasis on two possible recommendations, which may help to improve functioning of the Spanish labour market, even the whole economy. Section 9.4 is the concluding one.

9.2 Impact of the Crisis on the Economic Performance and Spanish Labour Market Compared Within the EA-12

Despite a bad performance of the product market based on the GDP indicator of countries such as Finland, Austria, Netherlands or Germany within the recession period $2008-2009^{43}$, the changes in unemployment were not so severe, unlike in the cases of Spain and Ireland (see Figure 34). In other words, the Spanish labour market has been less flexible, compared to other EA-12 countries, in terms of adjustment of its labour market to the unfavourable business cycle conditions under which companies were shedding jobs at a much faster rate and the proportion of unemployed people grew much rapidly in these two countries. The biggest number of cyclically unemployed workers has been observed in Spain. It has increased by nearly 2.1 million, (from 2.7 to 4.8 million), between the third quarter of 2008 and the third quarter of 2010. There had been around 56% of people, who became unemployed in the EA-12 and within the same period, of Spanish nationality! Another conclusion worth noting concerns the increased dispersion of unemployment rates over the recession period and within the EA-12 countries. Dispersion between the highest unemployment rate of Spain (20.6%) and the lowest one of Austria (4.4%) has doubled from 8.1% (3rd Q of 2008 – defined beginning of recession) to 16.2% (in 3rd Q of 2010). An important finding also concerns the impact of the recession on the willingness of workers to supply their work. In 8 out of 12 countries a slight decrease in rates was observed which may be partly a result of the "discouragement worker effect^{"44}. However in the rest of the countries, including Spain, there were

 $^{^{43}}$ These summarized short-term findings are also based on results of comparative analysis within chapter 4 in the Diploma thesis "Impact of the world economic crisis on unemployment in Spain". However, the short-term conclusions come from results mostly of the period 2008–2009/10.

⁴⁴ Substitution effect or "discouragement effect" occurs when unemployed workers give up on job searching and withdraw from the labour market, while potential labourforce entrants or re-entrants may be discouraged to even start looking for a job during the recession. The income effect or "added worker effect" occurs when additional workers enter the labour market to support declining family income in a recession.

more new labour market entrants than those of who were leaving it. This may be, on the other hand, partly a result of the so-called "worker added effect" during the recession in Spain.



- 70 Change III OD1 2008-2009

Figure 34 Changes in GDP and Unemployment Rates During the Crisis (in %)

Source: Eurostat, calculated by the author. Total unemployment rates are averages of quarterly seasonally adjusted data.

Concerning the influence of the economic crisis on the Spanish shadow economy, it is estimated by Professor Schneider that it is one of the economies of EA-12 that may experience the highest increase in shadow economy proportion in terms of % being 19.8% in 2010 (3rd highest shadow economy within the EA-12). Thus, it also has to be considered this both long-term and short-term problem that the Spanish economy has to face because many people may have preferred to cheat while claiming unemployment benefits and working "underground" during the crisis. Therefore the estimated number of really unemployed people may be inaccurate. When speaking about labour productivity, Spain experienced the biggest increase (within the EA-12) in labour productivity level during the recession which may be considered as a "positive impact" of the crisis. This factor may have also positively influenced Spanish cost competitiveness which improved during the crisis. However, it remains one of the countries with the highest level of the selected REER index which means one of the worst cost international competitiveness.

There is no doubt that the economic crisis has had a big impact on many economies and their labour markets. Spain is one of the EA-12 countries that have been facing the biggest impacts of the crisis, especially in terms of the currently bad labour market conditions defined by:

- Sharpest increase of unemployment rate from 11.8% (3rd Q of 2008) to 20.6% (3rd Q of 2010).
- Biggest number of cyclically unemployed workers which increased by nearly 2.06 million (from 2.71 to 4.78 million) between the 3^{rd} Q of 2008 and the 3^{rd} Q of 2010).
- 16.2% dispersion between the highest unemployment rate of Spain (20.6%) and the lowest one of Austria (4.4%) in the 3rd Q of 2010. When considering comparison to Germany (6.8%), with the biggest labour market in terms of labour aggregate supply and demand, there is a dispersion of 13.8% in unemployment rates!
- Lack of flexibility in terms of slower adjustment to the unfavourable business cycle conditions.
- Highest increase in the shadow economy during recession (based on the results of Professor Schneider).
- Despite the increase of the competitiveness of Spanish products during the crisis, a permanent problem with lack of competitiveness.
- Lower productivity despite its increase during the economic slow-down.
- One of the highest government's cyclical budget deficits.

9.3 Discussion and Possible Recommendations

"Countries that experience a high divergence in output and employment growth need much flexibility in their labour markets if they want to benefit from monetary union and if they wish to avoid a major adjustment problem."

Economics of Monetary Union (2005, page 89) Paul De Grauwe⁴⁵

Based on results of the comparative analysis of selected macroeconomic indicators, we support the argument that the Spanish labour market has been experiencing a lack of flexibility compared to other EA-12 countries in terms of its "bad" response and slower adjustment to the unfavourable business cycle conditions. Supporting arguments were also presented by several studies such as The Global Competitiveness report 2010–2011 which emphasized discouragement of Spanish companies increating jobs. Based on deductive reasoning, it was concluded 46 that both EPL and collective bargaining may be considered as "labour market rigidities" that has partly prevented the Spanish labour market from flexibly absorbing the crisis without firing less employees. According to the OCA theory, it can be stated that Spain experienced a high divergence in employment growth⁴⁷ and recently faces one of the biggest adjustment problems within the Eurozone (EA-12). This may be again due to lack of labour market flexibility. Therefore it is appropriate to formulate possible recommendations which will be based mainly on a New Keynesian approach. One of the most influential economists of this approach was J. E. Meade whose idea to fight and lower unemployment was through labour market reform (based on institutions determining wage setting, especially unions and wage bargaining) which should establish such conditions that would help to restore the ability of the labour market to better adjust (restore equilibrium with full employment) thelabour

 $^{^{45}\,{\}rm Is}$ Professor of Economics, Centre for Economic Studies, University of Leuven, Belgium. His specialization is monetary union and the theory of optimum currency area.

 $^{^{46}}$ See more in chapter 5 (Labour market institutions of Spain and its response to the crisis) within the Diploma thesis "Impact of the world economic crisis on unemployment in Spain".

 $^{^{47}}$ The Spanish labour market and firms were able to increase its aggregate labour demand by 5.77 million persons (1999–2008), which is almost twice as much as in case of France, Italy and Germany. In other words, it means that the Spanish labour market was able to create most of the new jobs with an average employment growth of 2.94% within the 10 years of common currency.

supply and demand disequilibrium (Sojka and Kouba, 2008, page 97). What needs to be stressed is that Spain and all Eurozone countries cannot, since the Euro introduction in 1999, use the tool of devaluation of the domestic currency and monetary policy compensating the loosening in competitiveness.⁴⁸ Therefore, all the recommendations should be made in such a way which increases the labour market's flexibility, productivity and/or reduces companies' costs.

9.3.1 Recommendations Concerning Collective Bargaining

We suggest that Spanish policy makers focus on policies based on the New Keynesian approach to fight unemployment. We support Meade's proposed measurements focusing on policy dealing with issue of reforms of collective bargaining in Spain. There is no doubt that it has played a key role in the determination and setting of wages in labour markets. However, it seemed to have also played a significant role in long-term losses of Spanish competitiveness compared to other European countries, mainly Germany. Therefore we propose that Spanish policy-makers focus on issue of the collective bargaining system and negotiate with both labour unions and employers' associations about possible change. We recommend taking a look, as inspiration, at the wage bargaining system in Germany. The main reason is that German labour unions and employers consider the main determinant of wage negotiations to be the development of labour productivity, both national and sectoral while Spanish labour unions put strong emphasis on linking wage increases to past price increases.

According to our point of view, such a reform in collective bargaining and setting wages may improve:

- Labour market performance in terms of "inefficient" coordination between labour unions and employers.
- Adjustment process (flexibility) during future unfavourable business cycle conditions.
- Cost competitiveness of Spanish products on international markets. Such positive changes may from the medium and long-term point of view help to create new employment opportunities which could finally result in lowering unemployment in Spain.

 $^{^{48}}$ Devaluation of the peseta (Spanish currency before the Euro) was one of the main tools for fighting economic slowdowns in terms of increasing exports in the 70s and 80s. See Thames (2005).

We would also like to put greater emphasis on the possible improvement of communication among the Spanish social partners and government. I refer to better focus on the common effort resulting in compromises and objectives which would improve and secure not only employment, but also competitiveness of companies located in Spain.

9.3.2 Recommendations Concerning the Employment Protection Law (EPL)

Even though the Spanish government approved labour market reform in June 2010, it has to be highlighted that it was done without the support of labour unions and employers. A survey was carried out (October 2010) among Spanish citizens about their opinions of labour market reform and 6 out of 10 surveyed Spaniards did not believe that unemployment would decrease until the year 2013. Therefore the Spanish economy and labour market remains a big issue for many economists,⁴⁹ policy-makers but also for the rest of the Spanish population. Taking into account employment protection legislation, there was concluded that it "failed" to smooth Spanish labour market adjustment during the current crisis and probably contributed to its stagnation in terms of manager's unwillingness to create employment. There has also increased proportion

⁴⁹ One recent comprehensive study (published 1st December 2010), carried out by the research center FEDEA (Fundación de estudios de economía aplicada) in collaboration with the global management consulting firm McKinsey&Company, reached an interesting conclusion. According to their results, Spain has the potential to create 3 million new sustainable jobs if appropriate and suggested measures are taken and the level of productivity will reach that of the USA. In the case of achieving at least the average European productivity, the Spanish economy and labour market could generate 1 million new jobs. 2 "engines" are identified which should be focused on and may contribute to future sustainable growth:

[•] Exportation – Goods produced for export and tourism which should be boosted by external demand, especially of Asian countries. They believe that it can create 0.6 million jobs.

[•] Services – for example retail trade and wholesale distribution of goods and services, internet services, advertising services, legal services, information technology etc. As they pointed out, Spain created a fewer jobs within these economic activities compared to Europe (1999–2005). Their estimation is, in the case that Spain reaches the average level of productivity of the USA or European average, that it can create 2.5 million new sustainable jobs. Improved productivity in this sector could be accompanied by an increase in productivity of companies in other sectors.

of long-term unemployed. We are in favour of empirical finding of Scarpetta (1996) that EPL has positive impact on unemployment and the worst scenario (concerning the level of unemployment) would be strong EPL with uncoordinated bargaining and generous unemployment benefits. We have already made recommendation dealing with improvement of coordination of collective bargaining and now we recommend to Spanish policy-makers to:

• Focus on policy reducing the strong EPL and considering measures such as the reduction of severance payments of indefinite contract to levels of European average (currently 20 days' wages per year of service in the case of fair individual dismissal and 33 days in the case of unfair dismissal.⁵⁰

Such a policy may reduce companies' firing costs, eventually labour costs and improve competitiveness which should result in an increase in employment and reduction of unemployment from the medium and longterm point of view. It can also contribute to a reduction of such a big duality⁵¹ of the Spanish labour market and improve the productivity of workers, especially with temporary contracts. Managers of companies may have more incentives to offer an indefinite contract to temporary employees in the case of satisfaction with their performance. Spanish employers should really use temporary contracts only under defined conditions and provide more opportunities to transform to the permanent employee. On the other hand, there has to be taken into account the possible impact on productivity of permanent employees. In our opinion, there may also be some employees who do not put such a big effort into work when they feel such strong job security. In other words, such high

 $^{^{50}}$ Recently approved labour market reform decreased severance payments in the case of unfair dismissal from 45 to 33 days' wage per year of seniority up to a maximum of 42 months.

⁵¹ The proposal of 100 Spanish economists and professors who created the group called "Manifesto de los 100" must be mentioned. This group is financed mainly by some Spanish banks and the CEOE. They propose to recover and make more efficient the labour market through "contracto unico" with increasing severance pay according to years worked. Severance pay could start at 8 days / year worked for the first 2 years. Then it would start increasing with years worked up to 24 days / year worked. This type of contract would be the only contract on the labour market and all other types would be cancelled. Therefore, it would reduce the big difference between temporary and indefinite employees. They have performed simulation and deep research which resulted in the conclusion that unemployment in Spain would decrease from 20% to 10% within 10 years. Even though this proposal was rejected by unions and government it is worth keeping it in account during future discussions. See more at: http://www.crisis09.es/propuesta/.

severance payments may protect "inefficient" jobs. However, we believe that as far as it does not concern a reduction of their wages, they should not be against such a measure. We also believe that this could actually improve their productivity in a company because there would be greater competition from temporary employees who should have increased their motivation and productivity to obtain an indefinite contract. We also consider the wide usage of temporary contracts in construction and manufacturing sectors and we believe that defined conditions for temporary contracts are sufficient. We are aware of the fact that such institutional reforms need to be carefully designed in order to help to improve productivity and to smooth adjustment during a future crisis. Therefore, we suggest that such measures should be agreed by all the significant "players" (government, labour unions and employers' associations) when it comes to determination of employment in the Spanish labour market.

To make a last note regarding the proposed institutional changes; there were high severance payments and strict employment protection law even in times of low unemployment in Spain. We refer to the period of Franco until the 1970s when the average unemployment rate was, according to employment office records, below 2% (1971–75). However, strikes were forbidden and considered as a crime and associating in labour unions was also forbidden! Nowadays, the institutional situation is different and the Spanish economy faces many strikes and labour unions.

Taking into account other weaknesses of the Spanish economy, we suggest focusing on policies dealing with improvements of labour market institutions, compettiveness and credibility of Spanish economy:

- Companies' competitiveness in terms of lower labour costs. This could be achieved through further discussion over the Spanish employers' association (CEOE) proposal of 5% decrease in social security contributions.
- Proportion of the shadow economy which is still one of the highest in Europe. Again this feature should support discussion over a decrease in social security contributions. The question is whether such a decrease in labour costs would be "efficient" and contributed to the state budget by new revenues from income and value added taxes.
- Unemployment of less educated people and immigrants. Efficient active labour market policies and training could help them to gain new abilities which would also be demanded in other sectors than construction and manufacturing.

- Promotion of companies to create employment, through subsidies.
- Youth unemployment.
- Cyclical deficit back to reasonable levels in order to regain credibility.

9.4 Conclusion

"We are in the middle of a crisis."

Financial and Economic Crisis: Causes, Consequences and the Future. International conference: Mendel University in Brno, November 25, 2010

Antonin Rusek, Professor of Economics⁵²

Overall, we conclude that the Spanish labour market is definitely one of those that has experienced the severe negative impacts of the current economic crisis and is still in a "bad" condition, compared to other EA-12 countries, after 2 years since the official start of recession in the Eurozone (3^{rd} Q of 2008). We support he hypothesis saying that *lack of flexibility* of the Spanish labour market is one of the main reasons responsible for the "bad" response to the crisis and is also one of the main causes of the rapid increase in unemployment rates. We also believe that possible implementation of recommended policies may partially contribute to an improvement of currently "bad" labour market conditions, eventually the overall future competitiveness and economy of Spain.

Has the world economic crisis ended? Such a question is hard to answer because some economists are saying that the crisis is over. Some of them, including Professor A. Rusek, are saying that we still face crisis. Regarding Spain, we agree more with arguments saying that Spain still faces crisis in terms of its recently "bad" labour market conditions. Even though the first signs of recovery in terms of real GDP have appeared, the Spanish economy's recovery is slow and fragile. However, economic recovery should be accompanied by rising employment and decreasing unemployment. This is definitely not the case of Spain and its labour market which faced increasing unemployment in 12 consecutive quarters (from 3rd Q of 2007 to 2nd Q of 2010) and currently (3rd Q of 2010)

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covers the highest number of unemployed people within EA-12 countries. Therefore, it seems to us that the crisis in Spain is not over.

Koopman and Székely (2009) have defined 3 possible scenarios of the impact of crisis on the level of potential output and on long-term potential growth rates. The most optimistic "full recovery" scenario is theoretically feasible if "lost" Spanish growth⁵³ is fully recovered in future years. As pointed out in the study of FEDEA and McKinsey (2010), Spain has the potential to create 3 million new sustainable jobs if the levels of productivity increase and focus on exportation and service sectors. This estimate would lead to the recovery of "lost" Spanish growth and to new future sustainable growth. However, there has to be kept in mind that if the past "engine" (construction sector) does not generate significant part of output and employment as in the period (1999–2008), an industry and sector reallocation of labour has to occur. Will more than 2 million newly (cyclically) unemployed people (mainly less educated, immigrants, young, \ldots) be able to reallocate mainly from the construction and manufacturing industry? Such a question remains open. However, it can be stated that if the Spanish competitiveness does not improve, it will have much less chance to reach this "full recovery" scenario and more likely will experience the 2nd or even 3rd and worst scenario with "continuous widening loss".

The third potential and worst scenario means that potential growth rates in the post-crisis era will be permanently lower than their pre-crisis levels either as a direct consequence of the crisis (e.g. shift in risk aversion) or due to inappropriate policy responses, this is a "continuous widening loss". Such a scenario of protracted recession may distort incentives to seek jobs and reduce the labour input by discouraging some workers from seeking a job. It could also reduce migration flows. High joblessness and long spells of unemployment may also cause permanent destruction in human capital, provoking further losses in the level of potential output.

Again it is worth emphasizing Spanish membership in Euro area since 1999 and its "lost" tool of devaluation of the domestic currency and independent monetary policy which used to be a significant tool to compensate losses in competitiveness before entering the MU. Recently it is still matter of discussions whether Spain and other European countries

 $^{^{53}}$ Remember that Spain experienced the 4th fastest average economic growth of 3.45% in terms of real GDP compared to the EA-12 (1999–2008). Its labour market had a capacity to generate around 5.77 million new job opportunities – the highest number within EA-12 countries and almost twice as many as in the cases of France, Italy and Germany.

would benefit from leaving the Eurozone and obtaining again the "lost" tool.⁵⁴ However, it should be kept in mind that there are other possible tools that have to be taken into account when considering the improvement of Spanish competitiveness! Not only does the Spanish government need to be fully aware of these alternatives but also labour unions and employers who should together cooperate and create a background for future economic growth, increases in employment and reductions in unemployment. To conclude, the current "bad" labour market situation represents a big challenge for all mentioned parties and the mentioned recommendations may contribute to deal with it.

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 $^{^{54}}$ For example, one of the world's largest bond investors, Pimco, suggests financially troubled Greece, Ireland and Portugal should temporarily leave the Eurozone to put their economies back on track. According to Andrew Bosomworth, Head of Portfolio Management at Pacific Investment Management Company (Pimco), if these three nations reverted to their own currencies, they would be able to sell their products abroad more competitively and use export revenues to drive further economic growth and repay their heavy debt loads. Available at:

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III The Financial Crisis and "New Member Countries"

10 Business Cycle Similarity and Convergence of Central and Eastern European Countries Towards the Eurozone: Is There a European Business Cycle?⁵⁵

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10.1 Introduction

In this chapter we try to find some evidence of the European business cycle shaping during the recent years of economic and monetary integration in Europe. We start with the endogenity hypothesis that intensive integration processes will lead to more synchronized business cycles. (Artis et al., 2008) Economic integration in Europe includes mainly trade and capital flows liberalization, and policy harmonization. There were few important milestones in recent integration processes in Europe. Firstly, we should name the intensive preparations of the candidate Central and Eastern European (CEE) countries and consequent EU enlargement in 2004. Secondly, the monetary unification process including creating the monetary union in 1999 and its further enlargement during next two decades also moved the integration process forward. On the other hand we are also aware of other important factors such as trade and investor activity by the rest of the world mainly USA in Europe and also the global economic crises influence in recent years.

Therefore we ask the research question whether the integration processes are so dominant to bring the European cycle into existence during the analyzed period. We assume that the European cycle could be identified through historical correlation analyses using different consecutive time spans. The convergence tendencies towards the European and simultaneous divergence towards the US benchmark in line with continuing

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integration processes will give an evidence of European cycle profiling in our research. We follow the approach by Artis and Zhang (1997, 1999) who used two separate consecutive periods to measure business cycle correlation to give some evidence on influence of the ERM system on business cycle convergence in period 1961–1995. Using other complementary techniques such as Kendall coefficients they concluded that the business cycles of EU countries become much more correlated since the early 1980s. They attribute this result to the influence of the ERM system in Europe and thus suggest carefully emerging European cycle in the ERM period.

"Our findings confirm that a higher degree of synchronization in business cycles is indeed associated with lower volatility in exchange rates as all Kendal coefficients are negative; and it can be seen that a group-specific European Business cycle for the ERM countries during the ERM period follows the German cycle more closely and becomes more detached from the US cycle. Low rankings of the ERM countries with the US business cycle become high rankings with the German cycle and it appear that the European business cycle only emerges in the ERM period." (Artis and Zhang, 1999, p. 130)

Considering a critique by Inklaar and de Haan (2001) who doubted the findings by Artis and Zhang we also enlarged the analysis with using four different time spans. Accordingly we set a sample of selected old EU countries as well as new EU countries from Central and Eastern Europe. We included Germany and France as the EU core countries. Austria as a small open economy and Portugal representing the periphery of the Eurozone.⁵⁶ We also included the Visegrad group countries Hungary, Czech Republic, Poland, Slovakia and dynamically integrating Slovenia. To identify the business cycles we use quarterly GDP in 1996–2009 detrended by three techniques. We use first differencing (FOD) in order to identify the classical cycles (Burns and Mitchel, 1946) who consider the business cycle as a cyclical fluctuation covering the decline and growth in an absolute level of aggregate economic activity of a nation. In addition to that we apply the Hodrick-Prescott filter and Christiano-Fitzgerald band-pass filter which is in line with growth business cycle definition by Lucas (1977). He defined growth (deviation) business cycles as cyclical fluctuations in the cyclical component of an economic variable around its trend.

 $^{^{56}\,\}rm We$ use the terms , ,core" and ,,periphery" countries following the approach by Artis and Zhang (2001).

In the first part of the analysis we estimate static cross correlation describing actual business cycle similarity during the whole analyzed period. To find the convergence trends we then measure correlations in two consecutive periods 1996–2002 and 2003–2009. Increasing correlation with satisfactory significance level proves business cycle convergence. We suggest two benchmarks to identify European business cycle shaping. The Euro-area average (EA-2000, EA12-2006, EA13-2007, EA15-2008, EA16) of quarterly GDP and US economy quarterly GDP representing the rest of the world economy are used as benchmarks for correlation measuring. Increasing correlation towards the Eurozone cycle and simultaneous decrease in correlation of majority of selected countries towards the US is considered as emerging European business cycle estimation in our research.

10.2 European Business Cycle Similarity

Before we start analyzing the dynamics in business cycle similarity among CEE and Eurozone countries we focus on rather static picture of actual business cycle correlation to the Eurozone and USA. It is interesting to compare the changing picture of seemingly correlated or uncorrelated economies when analyzing data in details in different time spans. Let's just recall that US economy was chosen as a rest of the world representative opposing the EU economy. These two benchmarks should simply help us to recognize the influence of global European economy and US economy respectively upon analyzed economies. Table 32 shows actual correlation of selected European economies' cycles towards the Eurozone average and US economy. To get more robust results we adjust the cycles approximated with GDP quarterly data in time span 1996Q1-2009Q4 with three filtering technique. First order differencing we used to estimate the classical cycles. On the contrary we also used the Hodrick-Prescott filter and the band pass Christiano-Fitzgerald filter to dissect the cyclical component of analyzed time series in order to identify the growth cycle as was explained above.

The correlation coefficients presented in Table 32 give no clear evidence of profiling European cycle when comparing correlation to US economy to those towards the Eurozone. The European cycle emerging would by evident from significantly higher correlation coefficients to the Eurozone economy. Higher correlation coefficients of growth cycles using both filters are apparent only in case of Czech Republic, France (almost

Countries/ filters		Eurozone			USA			
	HP	BP	FOD	HP	BP	FOD		
AT	0.81***	0.85***	0.68***	0.83***	0.84***	0.59***		
cz	0.82***	0.91***	0.42***	0.66***	0.55***	0.28**		
DE	0.95***	0.97***	0.85***	0.68***	0.66***	0.55***		
FR	0.88***	0.88***	0.79***	0.83***	0.87***	0.66***		
HU	0.73***	0.83***	0.67***	0.75***	0.84***	0.66***		
PL	0.51***	0.63***	0.22	0.67***	0.75***	0.16		
PT	0.75***	0.85***	0.48***	0.67***	0.83***	0.44***		
SI	0.85***	0.91***	0.65***	0.72***	0.67***	0.49***		
SK	0.58***	0.68***	0.20	0.54***	0.38***	0.31**		
US EA	0.61***	0.63***	0.49***	0.61***	0.63***	0.49***		

Table 32 Business Cycle Correlation of Selected CEE and EurozoneCountries to Eurozone and US Economies in 1996–2009.

Note: */**/*** denote significance at the 10%, 5%, 1% levels. Source: Eurostat + authors' calculations.

identical values with both EA and US benchmarks), Germany, Portugal and Slovakia. Moreover the higher correlation of Germany or France is expectable due to its high share in Eurozone GDP. Other countries reveal unclear or opposite results. The classical cycle correlation results are more in accordance with the hypothesis of profiling European cycle since all selected countries apart from Slovakia show higher correlation coefficients to the Eurozone than to US economy.

Other general conclusion obvious from comparing the results deals with different filtering technique influence. The first order differencing reveals lower correlation coefficients in case of all countries generally since this technique stresses the high frequencies in the time series spectra. Contrary the Hodrick-Prescott filter and Christiano-Fitzgerald filter work as band pass filters providing rather smooth cyclical component series. This observation is in line with our previous work in Rozmahel (2011) and Rozmahel and Najman (2011) or in studies by Canova (1998, 1999), Baxter and King (1999) or Christiano and Fitzgerald (2003). Also our table shows lower correlation coefficients using first differencing in both cases of the Eurozone and US benchmark comparing to coefficients resulting from using band pass filters. Whereas majority of countries show correlation to Eurozone higher than 0.5, US economy classical cycle is less correlated to Europe. Only Austrian, French, German and Hungarian classical cycles reveal correlation slightly above 0.5 level.

Assessing results of actual cross correlation of selected European economies towards the Eurozone and US averages one my doubt possibility of European cycle identification. Our hypothesis is based on an influence of economic and integration processes in Europe on business cycle correlation in European countries. Higher level of integration including a common currency adoption should increase correlation among European economies relatively to association with the rest of the world. It is mainly due to fostering trade intensity in Europe resulting from reduced trade barriers, exchange rate volatility within the Euro area, macroeconomic policy harmonization in line with monetary unification process etc. Also influence of the financial crisis beginning its influence fully in 2008 should be dissected in the analyzed data sample. Accordingly we intend to assess influence of common European cycle through dynamic convergence analysis using measuring correlation in separate subsequent time spans Analyzing business cycle correlation from a historical perspective using time series analysis allows identifying convergence or divergence tendencies. We simply try to find out whether the business cycle correlation increases over time in Europe contrary to correlation to US economy. Our intention is to seek for bottlenecks of such a historical correlation analysis using comparison of time spans of varying length as described in Inklaar and de Haan (2001) In addition to that we also try to dissect an influence of global financial an economic crisis which act as a kind of worldwide symmetric shock.

10.3 Business Cycle Correlation in Different Time Spans

We begin our business cycle convergence analysis with the less complicated approach splitting the whole time series into two consecutive time periods covering 1996Q1–2002Q4 and 2003Q1–2009Q4. The Figures 35, 36 and 37 describe compare correlation coefficients of selected European economies towards Eurozone and US economy in two consecutive periods. Let's recall that the US economy represents a rest of the world in our analysis. The arrows directing to the right hand side along the horizontal axis indicate rising correlation of European economies over time towards the Eurozone and unchanged correlation towards US Economy. The arrows aiming upwards suggest rising correlation towards the Eurozone. The rising influence of the European business cycle would be identified with rising correlation towards the Eurozone and stagnating or decreasing correlation coefficients with the US economy.



Figure 35 Correlation Towards Eurozone and US Economy 1996Q1-2002Q4 and 2003Q1-2009Q4 (HP Filter)

Source: Eurostat + authors' calculations.



Figure 36 Correlation Towards Eurozone and US Economy 1996Q1-2002Q4 and 2003Q1-2009Q4 (BP Filter)

Source: Eurostat + authors' calculations.



Figure 37 Correlation Towards Eurozone and US Economy 1996Q1–2002Q4 and 2003Q1–2009Q4 (FOD)

Looking at Figures 35, 36 and 37 describing correlation of classical and growth cycles using all three filtering techniques one might get impression of rising influence of global business cycle during the analyzed period. In all cases the coefficients raise towards the Eurozone and US economy as well. Similarly to results of a static cross correlation analysis the pictures give an evidence of different influences of applied filtering technique. The first differencing technique identifying classical cycles in our analysis provides generally lower levels of correlation comparing to using band pass filters. Despite relatively lower coefficients the classical cycles analysis as well as growth cycle analysis give quite clear evidence of convergence trends towards to both Eurozone as well as US benchmarks.⁵⁷ There is no evidence of European cycle influence. Comparing to our results, Artis and Zhang (1997, 1999) who used Germany as the European average found out much clearer evidence of the European business cycle emerging in the ERM period. They estimated generally higher correlation coefficients in almost all selected countries towards the German cycle and lower coefficients towards the US cycle. Hence they conclude that the ERM establishment contributed to more correlated European cycles significantly.

We may explain increasing correlation to the Eurozone with intensifying economic and monetary integration processes in Europe during the analyzed time periods. The EU enlargement by 10 CEE countries in 2004 could be identified as a main convergence factor. The Eurozone enlargement by Slovenia and Slovakia in the second period is also expected to contribute to converging tendencies somehow. On the other hand we can hardly explain rising correlation towards the US economy that much as presented in the pictures above. We doubt that the trade intensity between European countries and US considered as a main factor of business cycle convergence increased at the same scale as the trade intensity within Europe. We estimate that the factor of global economic crisis in the second analyzed period and exaggerated influence of EU enlargement upon business cycle similarity are the reasons of unclear common European cycle identification.

Similarly to Inclaar and de Haan (2001) we adjusted the convergence analysis by splitting the analyzed time series into four consecutive time periods. Comparing to these authors, who simply doubted the twoperiod approach of convergence analysis, we add a factor of global eco-

 $^{^{57}}$ The resultant correlation coefficients with statistical significant levels for all periods are presented in the Tables 33 to 38 in the Appendix, pages 209 to 211.

nomic and financial crisis to justify the four-period approach. In the next analysis we divide the time series into four consecutive periods 1996Q1–1999Q2, 1999Q3–2002Q4, 2003Q1–2006Q2 and 2006Q3–2009Q4. Figures 38, 39 and 40 give some evidence of convergence and divergence tendencies over analyzed time period towards the Eurozone and a rest of the world. We illustrate the convergence analysis results for the old EU and new EU countries separately to get better arranged overview of the convergence trends and also to find some common convergence patterns in case of the new and old EU countries. Three filtering techniques are applied to analyze both classical as well as growth cycles. Another reason is to improve the significance and robustness of the results as well.

It is not as easy to come up simply with a general conclusion looking at all pictures. Nevertheless, we consider a sharply rising correlation towards both benchmarks in the last analyzed period as a clear evidence of a global economic crisis influence upon all selected economies. The global crises starting at 2008 acted initially as a kind of common shock. The global decline of aggregate demand pushed the world economy in the same phase of a business cycle. This resulted in rising correlation of business cycles worldwide indicating temporarily higher similarity of the cycles' movements.

Previous three consecutive time periods do not provide as clear results. To analyze the convergence trends it will be useful for us to observe the Eurozone and CEE countries separately. Starting with CEE countries one can notice sharply rising correlation to US economy during the first and second analyzed periods of 1996–1999 and 1999–2002. Apart from Slovakia all remaining CEE countries including Czech Republic, Hungary, Poland and Slovenia showed unchanged or even rather declining correlation towards the Eurozone average. On the contrary there is obvious convergence towards the US. Strong trade liberalization and activity of US firms seeking for new markets lead to increase of trade intensity between all the candidate countries and US. Since the second period the CEE countries began converging also towards the Eurozone average. The EU enlargement in 2004 by the CEE countries included in the third analyzed period is characterized with obvious continuing convergence in Europe. However one might doubt the real factors of European cycle in the last period since the global financial crises influence as mentioned above. Slovakian cycle reveal rather spurious behavior since it converges strongly towards the Eurozone average and diverges to US in the very first analyzed period contrary to other CEE countries. It actually begins to converge to US economy only during the last analyzed period which



Figure 38 Correlation Towards Eurozone and US Economy in Four Consecutive Periods (HP Filter)

Source: Eurostat + authors' calculations.



Figure 39 Correlation Towards Eurozone and US Economy in Four Consecutive Periods (BP Filter)

Source: Eurostat + authors' calculations.



Figure 40 Correlation Towards Eurozone and US Economy in Four Consecutive Periods (FOD)

we attribute to the financial crises influence acting as a global common shock. All three used filtering techniques provide very similar results though with different scale.

The results for traditional EU and also Eurozone countries are surprisingly similar. Portuguese cycle behaves as an outlier among other selected Eurozone member countries including Austria, Germany and France. Portugal cycle shows similar patterns like Slovakia in case of CEE countries. One might ask whether their periphery position in the Eurozone and EU respectively and small size could by the cause. Germany, France and Austria converged significantly to the US cycle in the very first analyzed period of 1996–1999. The correlation to the Eurozone rather stagnated at relatively low levels in cases of Austria and in cases of France. On the contrary, Portugal shows divergence trends towards the US economy when converging significantly towards the Eurozone (mostly with HP and BP filters). The Portuguese cycle starts converging towards the Eurozone during the second and third periods.

10.4 Conclusions

In our analysis we tried to find some evidence on European business cycle existence under conditions of monetary and economic integration. We also tried to dissect expected influence of recent global financial crises since 2008. To avoid spurious results we used the historical convergence business cycle analysis using the correlation approach in two and more consecutive time spans. In addition to that we tried increase the significance of our results by using three detrending techniques to identify classical and growth cycles in analysed time periods. Starting with dynamic analysis let's recall that we used the Eurozone and US economy as the benchmarks to identify the converging or diverging tendencies of selected countries towards Europe or rest of the world. The static cross correlation of growth cycles approach does not give any evidence of the analyzed countries' business cycles convergence towards the Eurozone than the US economy during the whole period of 1996–2009. We even cannot find any significant differences between the core and periphery countries of old and new members in terms of European or global cycle identification. Apart from Slovakian case the correlation of classical cycles in all analyzed economies towards the Eurozone is higher than to US cycle but still the correlation coefficients do not provide a clear evidence of strong European cycle influence.

The correlation analysis in two consecutive time spans showed very clear convergence tendencies to both benchmarks. In fact this would mean that there is no evidence influence of autonomous European cycle. The results support rather a hypothesis of global economic cycle influence. Nevertheless we can hardly dissect an influence of recent global economic crisis in the second analyzed period, which we consider very influential. The crisis puts all world and consequently also smaller economies into more or less same phase of a business cycle and thus acts like a kind of a common shock. This might affect the resulting correlation coefficients and identification of European or global cycle might be spurious.

One might still attribute the rising correlation in the second period to an impact of EU enlargement and continuing monetary integration and also to higher trade intensity of EU member countries with USA. Accordingly we tried to give some more evidence of the convergence factors through dissecting the period to four shorter time spans as in the study by Inclaar and de Haan (2001). The results of correlation trends are surprisingly similar for old and new EU countries proving common tendencies in different periods. The robustness of results is supported by providing similar evidence using all three detrending techniques. Apart from two EU and Eurozone periphery countries Slovakia and Portugal, all remaining analyzed countries show clear convergence towards the US economy whereas the level of correlations to the Eurozone remains stable or even decreases between the first two periods. Between the second and third period all countries slowly converge to the Eurozone cycle and diverge to the US economy. This moment fulfils conditions for European business cycle identification when all or majority of countries converge to European benchmark and diverge to US. However, the diverging tendency of old EU member countries including Austria, Germany, France and Portugal are not so clear as in case of old EU countries. We assume the factors of intensive preparations to EU enlargement in the second period 1999–2002 and the act of joining the EU by new CEE countries in the third period 2003–2006 to be the main determinants of clear European business cycle convergence identified in those time spans. However, we could identify the European business cycle existence in these periods just only if we omit stable high correlation of old EU countries namely France and Austria to US cycle. Germany proves the hypothesis of European business cycle in those time spans similarly to new EU member countries.

The final two periods give an evidence of the global economic crises influence. The correlation coefficients between periods of 2003-2006 and

2006–2009 increased significantly in all analyzed countries to both benchmarks. We attribute these clearly common patterns to a global common shock influence when all major economies fell down into the recession or stagnation phase in the last analyzed period of 2006–2009.

To interpret the results in a sense of an initial research question we have to reject our hypothesis of existing or emerging European business cycle under conditions of integration processes during analyzed time periods. Whereas the factors of continuing integration provided some evidence on an existence of European cycle during the periods of EU enlargement, other factors including global crisis acted against these tendencies during other analyzed periods. We would also like to point out the diverse behavior of the peripheral countries Portugal and Slovakia which did not follow fully the common patterns of remaining European economies. The geographical position, smallness and trade openness might be the reason. In terms of further research incentives in this topic we consider useful to increase the sample of analyzed economies and apply the rolling window correlation analysis to observe more details about the convergence dynamics.

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10.6 Appendix

Countries	1996Q1 2009Q4	1996Q1 2002Q4	2003Q1 2009Q4	1996Q1 1999Q2	1999Q3 2002Q4	2003Q1 2006Q2	2006Q3 2009Q4
AT	0.81***	0.17	0.97***	-0.10	-0.15	0.57**	0.99***
cz	0.82***	0.37*	0.95***	0.57**	0.50*	0.68***	0.97***
DE	0.95***	0.81***	0.98***	0.72***	0.69***	0.89***	0.99***
FR	0.88***	0.62***	0.97***	0.49*	0.39	0.68***	0.99***
HU	0.73***	0,00	0.86***	0.46*	0.02	0.71***	0.95***
PL	0.51***	0.03	0.9***	-0.05	-0.10	0.22	0.96***
PT	0.75***	0.37*	0.94***	-0.71***	0.29	0.57**	0.97***
SI	0.85***	0.12	0.97***	-0.04	-0.03	0.88	0.98***
SK	0.58***	-0.53***	0.92***	-0.64**	0.00	0.53*	0.92***
US	0.61***	-0.05	0.85***	-0.76***	-0.15	0.35	0.96***

Table 33 Busienss Cycle Correlation of Selected CEE and Eurozone Countries to Eurozone (HP Filter)

Note: */**/*** denote significance at the 10%, 5%, 1% levels. Source: Eurostat + authors' calculations.

Countries	1996Q1 2009Q4	1996Q1 2002Q4	2003Q1 2009Q4	1996Q1 1999Q2	1999Q3 2002Q4	2003Q1 2006Q2	2006Q3 2009Q4
AT	0.83***	0.77***	0.87***	0.32	0.92***	0.77***	0.95***
cz	0.66***	0.02	0.87***	-0.67***	0.45	0.67***	0.93***
DE	0.68***	0.34*	0.80***	-0.41	0.46	0.11	0.95***
FR	0.83***	0.58***	0.94***	-0.31	0.79***	0.86***	0.98***
HU	0.75***	0.20	0.90***	-0.46	0.83***	0.87***	0.93***
PL	0.67***	0.67***	0.74***	0.11	0.95	0.40	0.91***
РТ	0.67***	0.43**	0.83***	0.79***	0.26	0.61**	0.94***
SI	0.72***	0.48***	0.82***	0.17	0.84***	0.36	0.91***
SK	0.54***	-0.04	0.76***	0.72***	-0.51*	-0.10	0.87***
EA	0.61***	-0.05	0.85***	-0.76***	-0.15	0.35	0.96***

Table 34 Busienss Cycle Correlation of Selected CEE and Eurozone Countries to USA (HP Filter)

Note: */**/*** denote significance at the 10%, 5%, 1% levels. Source: Eurostat + authors' calculations.

Countries	1996Q1 2009Q4	1996Q1 2002Q4	2003Q1 2009Q4	1996Q1 1999Q2	1999Q3 2002Q4	2003Q1 2006Q2	2006Q3 2009Q4
AT	0.85***	0.46**	0.98***	-0.24	0.00	0.61**	0.99**
CZ	0.91***	0.74***	0.98***	0.37	0.92***	0.81***	0.99***
DE	0.97***	0.91***	0.99***	0.87***	0.83***	0.9***	0.99***
FR	0.88***	0.67***	0.96***	0.08	0.43	0.6**	0.99**
HU	0.83***	0.34*	0.93***	-0.34	0.26	0.83***	0.96***
PL	0.63***	0.33*	0.88***	0.39	0.03	-0.09	0.99
PT	0.85***	0.55***	0.94***	-0.85***	0.63**	0.29	0.99
SI	0.91***	0.65***	0.97***	-0.15	0.28	0.69***	0.97***
SK	0.68***	-0.29	0.9***	-0.91***	0.16	0.10	0.95
US	0.63***	0.13	0.81***	-0.80***	-0.04	0.21	0.97

Table 35 Busienss Cycle Correlation of Selected CEE and Eurozone Countries to Eurozone (BP Filter)

Note: */**/*** denote significance at the 10%, 5%, 1% levels. Source: Eurostat + authors' calculations.

Countries	1996Q1 2009Q4	1996Q1 2002Q4	2003Q1 2009Q4	1996Q1 1999Q2	1999Q3 2002Q4	2003Q1 2006Q2	2006Q3 2009Q4
AT	0.84***	0.77***	0.88***	0.55**	0.98***	0.85***	0.96***
CZ	0.55***	0.07	0.79***	-0.75***	0.19	0.07	0.96
DE	0.66***	0.26	0.79***	-0.94***	0.34	-0.10	0.97
FR	0.87***	0.75***	0.93***	0.29	0.87***	0.88***	0.99***
HU	0.84***	0.77***	0.89***	0.72***	0.95***	0.7***	0.94***
PL	0.75***	0.79***	0.76***	0.16	0.98***	0.04	0.94
PT	0.83***	0.58***	0.93***	0.91	0.39	0.99***	0.99***
SI	0.67***	0.56***	0.74***	0.43	0.76***	-0.50*	0.89*
SK	0.38***	-0.45**	0.63***	0.81***	-0.85***	-0.94***	0.85***
EA	0.63***	0.13	0.81***	-0.80***	-0.04	0.21	0.97

Table 36 Busienss Cycle Correlation of Selected CEE and Eurozone Countries to USA (BP Filter)

Note: */**/*** denote significance at the 10%, 5%, 1% levels. Source: Eurostat + authors' calculations.

Countries	1996Q1 2009Q4	1996Q1 2002Q4	2003Q1 2009Q4	1996Q1 1999Q2	1999Q3 2002Q4	2003Q1 2006Q2	2006Q3 2009Q4
AT	0.68***	0.17	0.91***	0.47	0.14	0.55**	0.93***
cz	0.42***	-0.09	0.80***	-0.25	-0.13	0.28	0.82***
DE	0.85***	0.67***	0.93***	0.77***	0.73***	0.92***	0.94***
FR	0.79***	0.47**	0.93***	0.39	0.52*	0.73***	0.95***
HU	0.67***	0.10	0.80***	0.17	0.07	0.34	0.88***
PL	0.22	0.14	0.66***	0.26	0.23	0.37	0.78***
PT	0.48***	0.01	0.77***	0.08	0.04	0.32	0.89***
SI	0.65***	0.03	0.91***	0.33	-0.11	0.69***	0.91***
SK	0.20	-0.21	0.56***	-0.47	-0.13	0.32	0.57**
US	0.49***	-0.01	0.70***	0.01	0.02	-0.03	0.76***

Table 37 Busienss Cycle Correlation of Selected CEE and Eurozone Countries to Eurozone (FOD)

Note: */**/*** denote significance at the 10%, 5%, 1% levels. Source: Eurostat + authors' calculations.

Countries	1996Q1 2009Q4	1996Q1 2002Q4	2003Q1 2009Q4	1996Q1 1999Q2	1999Q3 2002Q4	2003Q1 2006Q2	2006Q3 2009Q4
AT	0.59***	0.39**	0.68***	-0.12	0.44	-0.31	0.76***
cz	0.28**	-0.08	0.59***	0.00	0.33	-0.55**	0.62**
DE	0.55***	0.37*	0.61***	0.32	0.46*	0.08	0.70***
FR	0.66***	0.33*	0.79***	-0.26	0.50*	0.17	0.83***
HU	0.66***	0.20	0.78***	-0.42	0.65**	-0.20	0.76***
PL	0.16	0.09	0.53***	-0.36	0.57**	0.22	0.71***
PT	0.44***	0.17	0.55***	0.23	-0.06	-0.26	0.74***
SI	0.49***	0.10	0.64***	-0.04	0.02	-0.22	0.69***
SK	0.31**	0.18	0.49***	0.61**	-0.20	-0.32	0.61**
EA	0.49***	-0.01	0.70***	0.01	0.02	-0.03	0.76***

Table 38 Busienss Cycle Correlation of Selected CEE and Eurozone Countries to USA (FOD)

Note: */**/*** denote significance at the 10%, 5%, 1% levels.



Figure 41 Correlation Towards Eurozone and US Economy in Four Consecutive Periods (HP Filter)



Figure 42 Correlation Towards Eurozone and US Economy in Four Consecutive Periods (BP Filter)



Figure 43 Correlation Towards Eurozone and US Economy in Four Consecutive Periods (FOD)

11 Vertical Intra-Industry Trade Between the Central European Countries and the Core EU Member States

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11.1 Introduction

One of the aims of this chapter is to repeatedly reject the prediction of the standard HOV model that there is relatively little intra-industry in bilateral trade between the less developed Czech Republic, Poland and Slovenia as the Central European countries (CEC-3), and the fifteen on average more developed core European Union states (EU-15). The fact is that Central European countries are deeply integrated in trade with either horizontally or vertically differentiated products,⁵⁸ and that EU-15 members are the most important trading partners. Consequently, if trade with differentiated products exists between less developed countries and on average more developed EU-15 members, then the expected share of intra-industry trade in this trade relationships is anything but zero.

Cabral et al. (2009), who extended the standard HOV model by relaxing the assumption that countries have the same technologies, applied factor content tests to the trade of five high-income European states with 27 middle-income and developing countries for the year 1995. They show that labor skills endowments can predict with a fair degree of accuracy the factor content of both inter-industry and vertical intra-industry trade, and that the skill endowments have very little explanatory power for horizontal intra-industry trade in the observed bilateral trade flows of the selected Central European countries as the middle-income countries and the high-income EU countries. Nishioka (2009), who similarly extended the standard HOV theory, in contrast with the work cited introduces the capital to labor ratio to test the factor content of trade between OECD countries in 2000. However, Nishioka introduces a few

 $^{^{58}}$ Gullstrand (2000) tested country-specific determinants of Poland using vertical intra-industry trade between Poland and EU as dependent variable. Similarly, Cernosa and Moczulski (2010) verified horizontal and vertical intra-industry specialization of Poland and Slovenia in trade with EU-15 members.

assumptions in the extended model which are a very important deterministic factor for the Central European country's vertical intra-industry trade.

This chapter, in contrast to many earlier papers⁵⁹, uses the country's capital to labor ratio as a direct measure for factor intensity differences between two states in bilateral trade, and focuses primarily on specific determinants such as endowment differences, technological differences, human capital differences, foreign direct investment differences, and distance as a measure for transportation costs. The first testable hypothesis supposes that vertical intra-industry trade in trade between the CEC-3 and the core EU members is significantly determined by endowment differences. The second and the third testable hypotheses presuppose that technological differences are positively related to the share of vertical intra-industry trade in the same trade relationships.

These three hypotheses are borrowed from the Davis and Weinstein (2001) extended HOV model, while the fourth and the fifth suppositions are introduced according to the predictions of Nishioka's model. Accordingly the fourth and the fifth hypothesis assume that the share of vertical intra-industry trade in trade between the Central European countries and EU-15 members is positively related to human capital differences and foreign direct investment differences. The next important supposition is associated with geographical distances. For this reason the gravity model is introduced in this analysis.⁶⁰

Thus the main contributions of this chapter are as follows: for the first time it tests the suppositions of the extended HOV theorem in trade relationships between CEC-3 and EU-15 members presented elsewhere, it shows very important differences between the main deterministic factors which determine the share of vertical intra-industry trade, and it introduces the relatively large bilateral trade dataset at the five-digit level of SITC from 1999 to 2008 as a basis. This chapter is structured in the following way: Section 11.2 presents the theoretical literature. Section 11.3 presents the model and methodology, while Section 11.4 presents the dataset, sources for explanatory variables, and regression results. The final section provides concluding remarks.

 $^{^{59}\,{\}rm For}$ instance, Gabrisch (2006) includes GDP per capita as the measure for the factor intensity differences.

 $^{^{60}}$ Caporale et al. (2009) introduced the same hypothesis by using a different specification of the model to estimate Bulgarian and Romanian trade with EU-15 members.
11.2 Theoretical Background

11.2.1 Heckscher-Ohlin-Vanek Model

This analysis borrows some theoretical suppositions of the modified version of the Heckscher-Ohlin-Vanek (HOV) model as presented by Davis and Weinstein (2001). These authors began by developing the standard HOV model from the first principles. They therefore assumed that all countries have identical, constant returns to scale production function, and that markets for goods and factors are perfectly competitive. There are no barriers to trade, and transport costs are zero and the number of tradable goods is at least as large as the number of primary factors. They also supposed that the distribution of the factors across countries is consistent with the world replicating the integrated equilibrium. In these conditions the factor prices are equalized, and all producers are forced to choose the same techniques of production. The standard HOV model is extended firstly by the introduced hypothesis that Hicks-neutral technical differences exist as a parsimonious way to capture these effects.

This hypothesis allows that technologies of countries differ only in input coefficients across countries, which implies that capital to labor ratios are fixed by industry across counties in conditions of factor prices equalization (FPE). But this is an unrealistic supposition. The simple Rybczynski relation suggests that countries with a relatively large stock of capital should have an output mix shifted toward relatively capitalintensive goods. Because of this reason a correlation between country factor abundance and industry usage is expected. The HOV model is further relaxed by the introduced suppositions of the Dornbusch-Fischer-Samuelson-type model. The simple hypothesis of the standard HOV model, that FPE is approximately correct and that differences in input usage by the observed industry across countries arises almost exclusively due to aggregating goods of heterogeneous factor content within the same industry categories, is considered in this second stage.

In a two-country Dornbusch-Fischer-Samuelson-type model with approximate FPE and supposed aggregation problem it is possible to expect that the input usage is correlated with country capital abundance for tradable goods but not for nontradable goods. Since all early studies used the United States country's technology coefficients to measure the factor content of trade for all countries, the factor content of trade in this two-country framework was biased downward for both observed countries. This insight suggests a specification which explicitly supposes that (1) the factor content of production in tradable industries varies systematically with country capital abundance; and (2) the factor content of absorption must be measured bilaterally with the producer country's coefficients. The newly introduced suppositions bring interesting results of the extended HOV model, where the unit input requirements in the tradable goods sector will vary with the country's capital to labor ratio.

The next interesting stage is the case without factor price equalization (FPE), which definitely modifies the unrealistic assumption of identical techniques and which was previously suggested by Helpman (1999). If the factor price equalization theorem does not hold, the countries specialize in different zones according to their levels of capital accumulation. Thus a capital-abundant country might specialize in capital intensive subsets of industries, and conversely a labor-abundant country in labor subsets of industries. The consequence of the introduced hypothesis is that the unit factor requirement systematically differs with a country's capital abundance for industries which produce tradable goods as well as for industries which produce non-traded goods. The final result of the Davis and Weinstein extended model is that all input coefficients in a country technology matrix will systematically vary according to the country capital to labor ratio. Nevertheless, these authors introduced the gravity approach in a modified version of the Heckscher-Ohlin-Vanek (HOV) theory. In this way, one of the more incredible assumptions of the standard HOV theory, which predicts zero transport costs between two trading partner countries, is omitted.

Nishioka (2009) similarly started from the standard HOV model, which presupposes factor price equalization and that all producers from different countries are equally forced to choose identical techniques. The assumption of identical techniques is gradually relaxed by introducing the factor Hicks-neutral technical differences, the Dornbusch-Fischer-Samuelson-type model and Helpman's multiple-zones production model which excludes factor price equalization. But one of the most important differences in comparison with Davis and Weinstein work is that the latter paper examines the relative importance of specialization and technical differences. The result of this examination is that the capital accumulation alone sophisticates a country's techniques across all industries but does not shift the domestic production mix towards a more capital-intensive one.

For instance, the United States uses techniques that are ten times more intensive than China's, while the most capital-intensive manufacturing industry in the US, chemicals, is only twice as capital-intensive as the US apparel industry.⁶¹ Therefore the variation in techniques is much greater between countries than across industries. Specifically, labor-abundant countries employ predominantly labor-intensive techniques across all industries, while capital-abundant countries employ capital-intensive techniques across all industries. Nishioka pointed out that the cross country variations in capital intensity relies primarily on labor efficiency. The persistent north-south difference in labor techniques might involve many supply side issues such as educational attainment, skill composition, learning by doing and skill complementarity.

Nishioka also argues that the possibility of physical capital as an internationally mobile factor has been ignored in the empirical literature of HOV. One important exception is Helpman (1984), who previously introduced vertical foreign direct investment in the HO model when the endowment point is outside factor price equalization (FPE). According to this model the capital-abundant country produces capital-intensive products with domestic labor and capital, and allocates the remaining capital for foreign countries. This transferred capital can be combined with foreign labor to produce labor intensive or capital intensive products.

11.2.2 The Gravity Approach

This chapter introduces elsewhere mentioned gravity model as a particular type of specification which is inspired by Newton's law of gravity. The gravity approach says that attractiveness between two entities is proportional to the product of their masses and inversely proportional to the distance which separates them. In its basic form, the gravity model states that foreign trade between two countries is a positive function of their GDP as a proxy variable for their respective supply (conditions in the source country) and demand (conditions in the host country), and a negative function of the distance between two countries as a proxy variable for transportation costs. Thus the basic model has the following specification:

 $^{^{61}}$ Slovenia's state was the owner of a tobacco producer, which was four times more capital intensive than the average producer in this country. Unfortunately this tobacco producer was sold in the early 1990s to a multinational company that in 2004 closed this highly capital intensive industry in Slovenia.

 $\ln trade_{ijt} = \alpha_0 + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln Dist_{ij} + \varepsilon_{ijt} \quad (18)$

If the basic explanatory variables of the gravity equation are distance and economic size, then theory allows the inclusion of many variables that may explain trade flows between two observed countries, such as GDP per capita, foreign direct investment, exchange rate volatility as well as dummies for similar languages, common border and free trade agreements. The gravity model has gained theoretical foundations due to the development of new theories of international trade, which assume imperfect competition. Helpman and Krugman (1985) propose a formalization of the gravity equation in which intra and inter-industry trade approaches are reconsidered. The Bergstrand (1989) model represents an extension of the Helpman and Krugman model, taking into account the supply and demand functions of trade flows.

11.3 The Model and Methodology

11.3.1 Methodology

Most studies have estimated the gravity model by using cross-section data, but recently several authors have argued that standard cross-section data leads to biased results because they do not control for heterogeneous trading relationships. For this reason Rault et al. (2007) argued that the omission of specific effects per country pair could significantly bias the estimated coefficients. They suggested implementation of the panel data and introduction of a fixed effects estimator (FE), random effects estimator (RE) or the so-called fixed effects vector decomposition (FEVD) method as estimation techniques for the gravity model.

In terms of econometric terminology, this analysis primarily estimates the regressions using the fixed effects estimator as is presented by Cheng and Wall (2005). While the fixed effects estimator does not allow estimation for time-invariant variables (as for instance distance), the Cheng and Wall methodology is implemented, which also enables estimations of the coefficient for the time-invariant variables. Thus the additional regression is estimated on geographical distance as the only included time-invariant variable in this analysis:

$$\alpha_{ij} = \beta_0 + \beta_1 DIST_{ij} + \mu_{ij} \tag{19}$$

At the same time this chapter introduces Pooled Least Squares with cross section weights (GLS), and the fixed effects vector decomposition (FEVD) method proposed by Plümper and Troeger (2007), which also allows estimation of geographical distance as a time invariant variable. The testing excludes the possibility that the Generalized Method of Moments (GMM) system estimator is introduced as preferable panel techniques in this analysis. It is well known that the methodology referred to is suitable if there is serial correlation, heteroskedasticity, and endogeneity of some explanatory variables and if the estimators used do not take this into account (Faustiono and Leitao, 2005).

In this way the research carried out several preliminary estimations and tests in order to compare the results of the introduced estimation methods and to identify the most robust one. The tests show that the introduced fixed effects estimator (FE) method and fixed effects vector decomposition (FEVD) method have the most reliable results. While the estimates of time invariant variables using the FEVD method are consistent only if the number of the observations (N) is large, as was confirmed by Rault et al. (2007), the estimates of the fixed effects estimator (FE) lead to a consistent and unbiased time-invariant variable. More precisely, the revealed elasticity of the geographical distance is systematically higher for those equations that used the fixed effects estimator as an estimation method irrespective of the number of observations involved.

This chapter initially tests the shares intra-industry trade as dependent variable, which are calculated by using Greenaway, Hine and Milner (1994) methodology. While Cernosa (2009) indicated that the shares of intra-industry trade could lead to biased estimation, the values of intra-industry trade are estimated as dependent variables in the latter stage of the analysis. More precisely, the values⁶² of total IIT and vertical IIT are introduced in the regression models as a useful measure for suitable comparisons of the extent of content of intra-industry trade between CEC-3 and EU-15 states. Since the share of vertical IIT represents approximately six-sevenths of the total intra-industry trade in the case of Czech, Polish and Slovenian trade with the core EU-15 members,⁶³

 $^{^{62}}$ The values of total and vertical IIT are re-calculated using the Greenaway, Hine and Milner (1994) methodology. These values (in Euros) are in 2005 constant.

⁶³ Therefore the IIT is overwhelmingly vertical.

this analysis tested the gravity model by using the values of vertical intra-industry trade between CEC-3 and EU-15 members as a dependent variable.

11.3.2 The Model

Following the log-log space, the specification that estimates the share of vertical intra-industry trade between CEC-3 and EU-15 members as a dependent variable can be written as follows:

$$\ln IIT_{ij,t} = \alpha_{ij} + \alpha_1 \ln CPWD_{ij,t} + \alpha_2 \ln RESD_{ij,t} + \alpha_3 \ln RDED_{ij,t} + (20) + \alpha_4 \ln ENRD_{ij,t} + \alpha_5 \ln FDID_{ij,t} + \alpha_6 Dist_{ij} + \lambda_t + \varepsilon_{ij,t}.$$

Equation (20) specifies the model where $IIT_{ij,t}$ denotes the logarithm of the share of vertical intra-industry trade between the Czech Republic, Poland and Slovenia as Central European countries *i* with partner EU-15 members *j* at time *t*, $CPWD_{ij,t}$ is a proxy variable for capital intensity differences, $RESD_{ij,t}$ is the first proxy variable for technological differences, $RDED_{ij,t}$ is the second proxy variable for technological differences, $ENRD_{ij,t}$ is the proxy variable for human capital differences, $FDID_{ij,t}$ is a proxy variable for foreign direct investment differences, and $Dist_{ij}$ is a proxy variable for transportation costs between the CEC-3 countries and the EU-15 member states. The term α_{ij} is the countrypair individual effects covering all unobservable factors related to the country-pair, λ_t is time specific effects and $\varepsilon_{ij,t}$ is the error term.

The first hypothesis of this chapter is that the share of IIT is determined by capital intensity differences, where a country's capital to labor ratio differences between CEC-3 countries and the EU-15 are used as a measure for capital intensity differences. This analysis introduces the gross fixed capital formation at current prices (in Euros) per worker differences as a proxy variable for capital intensity differences. The data for fixed capital formation are taken from the same available data source as the introduced data for dependent variable (that is EUROSTAT). The prediction is that the higher the relative capital intensity differences between the more developed EU-15 members and the less developed Central European countries, the higher the share of vertical IIT. Thus a positive sign is expected for this variable ($\alpha_1 > 0$). As pointed out, this explanatory variable is suggested primarily by Davis and Weinstein's (2001) theory, similarly as the second and third hypotheses. Table 39 confirms that Slovenia in 2008 produced at least one third less capital intensive products than the average EU-15 producer, that at the same time introduces only half the capital intensity of Belgium as an advanced EU-15 member (with 15,200 USD per worker), and that it has a capital intensity per worker quite similar to that of Greece. For this reason Slovenia employs more intensively labor force in manufacturing activities in comparison with Belgium and at the same time produces approximately eightfold more capital intensive differentiated products than China.⁶⁴ In short, developing countries employ more labor and developed countries employ more capital.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
		Gross	capital f	formatio	n per w	orker (a	t consta	nt US\$	prices)	
EU-15	10809	11165	10891	10628	10804	11107	11353	11778	12047	11871
CZECH REPUBLIC	2932	3262	3497	3651	3596	3951	3875	4231	4626	4491
POLAND	2392	2442	2087	1962	2036	2342	2340	2749	3413	3493
SLOVENIA	5500	5655	5408	5529	6239	6559	6533	7312	8472	8493
					Ra	nk				
EU-15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CZECH REPUBLIC	0.27	0.29	0.32	0.34	0.33	0.36	0.34	0.36	0.38	0.38
POLAND	0.22	0.22	0.19	0.18	0.19	0.21	0.21	0.23	0.28	0.29
SLOVENIA	0.51	0.51	0.50	0.52	0.58	0.59	0.58	0.62	0.70	0.72

Table 39 Capital Intensity Differences Between EU-15 Members and CEC-3

Note: EU-15 – the core EU-15 members' average. Source: WDI – World Bank and ILO.

The second hypothesis predicts that technological differences between two countries in bilateral trade are positively correlated with the share of intra-industry trade ($\alpha_2 > 0$), where the difference in the number of researchers per thousand employed (full time equivalent) between the EU-15 and CEC-3 represents a proxy variable for technological differences. Similarly, the third hypothesis predicts that technological differences are positively related to the share of vertical IIT, where the total research and development (R&D) expenditure differences between the Central European countries and the EU-15 members is used as a proxy variable. This chapter alternatively introduces a proxy variable for technological differences, where research and development (R&D) expenditures are recalculated as a percentage of GDP at constant prices. The second and

 $^{^{64}}$ Products produced by Belgium are sixteen times more capital intensive than products produced by China (see Nishioka, 2009).

the third proxy variables, which are uncorrelated, adequately show the technological differences between unequally developed states. A positive sign is to be expected also on the third explanatory variable $(\alpha_3 > 0)$.

The fourth hypothesis supposes that human capital differences between two bilateral trade partner countries are positively correlated with the share of vertical intra-industry trade, where the enrollment in total tertiary education (public and private, full and part-time) differences between the three Central European countries and the EU-15 members is a proxy variable for human capital differences. A positive sign is expected ($\alpha_4 > 0$) on this variable. This supposition is indirectly suggested by Nishioka's (2009) model, which supposes that differences in labor techniques or in other words productivity are a very important deterministic factor for trade in factor services. Thus the cross country variations in capital intensity rely primarily on labor efficiency.

If the standard HOV theory supposes that a capital (labor) abundant country exports capital (labor) and imports labor (capita) services, then Nishioka shows this evidence depends crucially on a unique structure of techniques. Therefore a capital abundant country employs more capital and less labor to produce one unit of goods and services than a labor abundant country, and conversely a labor abundant country employs more labor and less capital to produce the same unit of goods. Nevertheless Nishioka also pointed out that the empirical literature has ignored the fact that capital is an internationally mobile factor.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
		Gross	capital	formatio	on per w	orker (at	t constar	nt US\$ p	rices)	
EU-15	4E+10	6E+10	3E+10	3E+10	2E+10	2E+10	4E+10	4E+10	7E+10	4E+10
CZECH REPUBLIC	6E+09	5E+09	6E+09	8E+09	2E+09	5E+09	1E+10	6E+09	1E+10	1E+10
POLAND	7E+09	9E+09	6E+09	4E+09	5E+09	1E+10	1E+10	2E+10	2E+10	1E+10
SLOVENIA	1E+08	1E+08	5E+08	2E+09	3E+08	8E+08	5E+08	6E+08	2E+09	2E+09
					Ra	nk				
EU-15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CZECH REPUBLIC	0.15	0.08	0.18	0.32	0.09	0.30	0.28	0.14	0.15	0.29
POLAND	0.18	0.15	0.18	0.15	0.21	0.76	0.24	0.49	0.34	0.40
SLOVENIA	0.00	0.00	0.02	0.06	0.01	0.05	0.01	0.02	0.02	0.05

Table 40 Foreign Direct Investment Differences Between EU-15Members and CEC-3

Note: EU-15 – the core EU-15 members' average. Source: WDI – World Bank. Thus the fifth supposition of this chapter predicts that foreign direct investments are positively correlated with the share of intra-industry trade. The foreign direct investment net inflow differences between CEC-3 and EU-15 members are used as a proxy variable. A positive sign is to be expected ($\alpha_5 > 0$). This proxy variable is introduced aiming to reinforce the thesis that foreign direct investments are an important deterministic factor for vertical IIT, which simultaneously reduces the development gap as measured by GDP per capita differences between the core EU members and CEC-3 countries. Table 40 shows foreign direct net inflows differences for observed CEC-3 states.

Geographical distance, which is included as the last explanatory variable, represents the essentiality of the gravity model. If we suppose that costs of transportation and other freight costs measured as geographical distance between capital cities of CEC-3 and capital cities of EU-15 members increase with distance, a negative sign for α_6 is to be expected. Since Czech Republic, Poland and Slovenia have relatively different country size and different geographical distances to Brussels as the hypothetical geographical centre of EU, the weighted distance (distw) is introduced in this analysis. Thus bilateral distance is measured in kilometres between the partner countries' capital cities and weighted by (population) share of the capital city in the overall country's population. The data sources for these explanatory variables are presented in the following section.

11.4 The Results of the Analysis

11.4.1 Data

The data on yearly bilateral trade flows, such as exports and imports by value and by weight between Central European countries and the 15 European Union member states, are provided from the EUROSTAT statistics database. Because of the nature of the unit value approach⁶⁵ these data are carefully cleansed. Thus the newly formed sample of data includes only those products (or items) which have (completed) values and weights of the exports and imports at the selected five-digit level of SITC (Rev. 3) from 1999 to 2008. The core EU-15 member states are: Austria, Belgium, Denmark, Finland, France, Germany, Greece,

 $^{^{65}}$ Unit value index (UV) is defined as a ratio of the values (in Euros) and the quantities (in kilograms).

Ireland, Italy, Luxemburg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. The data on yearly bilateral trade flows for Poland and calculated values of the share of vertical intra-industry trade for the same country are borrowed from Cernosa and Moczulski (2010).

The data for gross fixed capital formation (at current prices in Euros) and data for total employment (resident population only) are taken from the same available data source (that is EUROSTAT). The data for GDP of the EU-15 members and three Central European countries are taken from the World Development Indicator (World Bank). The data used for total employment are taken from ILO-LABORISTA databases. The differences in the number of researchers are taken from the OECD Factbook 2009. The data for total research and development (R&D) expenditures as a percentage of GDP are provided from a UNESCO dataset, similarly as data for enrolment in total education, public and private (full and part-time), which also originate from UNESCO websites. Data for foreign direct investments net-inflow differences are taken from the World Development Indicators (World Bank) websites. However, data for geographical distances (distw) are taken from the CEPII web sites (http://www.cepii.fr).

11.4.2 Dependent Variable

Thus one of the tasks of this analysis is also to measure horizontal and vertical intra-industry trade for each of the manufacturing industries at the five-digit level of SITC using the Greenaway, Hine and Milner (1994) methodology. This methodology supposes a calculation of the Grubel and Lloyd (1975) index as follows:

$$B_j = \frac{\left[(X_j + M_j) - |X_j - M_j| \right] * 100}{(X_j + M_j)}, \quad (0 \le B_j \le 100)$$
(21)

where B_j represents the Grubel and Lloyd index for a particular industry j at the five-digit level of SITC, X_j represents exports of that particular industry, while M_j represents imports of that particular industry. This index varies between 0 and 1, where 0 indicates trade to be completely of the inter-industry type, and 1 represents trade as completely of the intra-industry type. The greater the similarity between the values of exports and imports of the particular industry, the greater the matched trade or in other words the share of intra-industry trade of this industry.

The intra-industry trade at the aggregate level, which represents the dependent variable⁶⁶ in the present analysis, is measured by using the similar index $\overline{B_j}$ (Grubel and Lloyd, 1975) for the weighted average.

The introduced Greenaway, Hine and Milner methodology also supposes the separation of total IIT $(\overline{B_j})$ into the belonging shares of horizontal IIT (HB_j) and vertical IIT (VB_j) :

$$\overline{B_j} = HB_j + VB_j \tag{22}$$

Following this methodology, the unit value index (UV) is calculated for exports and imports of each of the industries at the five-digit level of SITC.⁶⁷ Horizontal IIT is defined as a ratio between the unit value of exports (UV_j^x) and the unit value of imports (UV_j^m) for a particular industry j or, to put it differently, (UV_j^x/UV_j^m) . The greater the similarity between the unit values of exports and the unit values of imports of the particular industry, the greater the share of horizontal intra-industry trade. A supposition is introduced, that transport and other freight costs alone amounted for a difference inside the range of ± 15 percent. More specifically, horizontal IIT is defined (HB_j) when the unit value index (UV) is inside the range of $\pm 15\%$:

$$0.85 \le \frac{UV_j^x}{UV_j^m} \le 1.15 \tag{23}$$

When the unit value index (UV) is outside the ±15% range, vertical IIT (VB_j) is defined for the particular industry at the six-digit level of CN. It is also possible to introduce a supposition that horizontal IIT (HB_j) is widely defined or, to be more precise, the unit value index (UV) is defined inside the range of ±25%. It is obvious that widely defined horizontal IIT simultaneously introduced narrowly defined vertical intra-industry trade. Therefore, in Table 41, the first option is included (±15%), while in the regressions the robustness of the analysis is additionally confirmed by raising the value of the coefficient c chosen to distinguish vertical from horizontal IIT (c = 15%) to one that is more favourable to horizontal IIT (c = 25%).

 $^{^{66}}$ For instance, the share of total or vertical intra-industry trade of the CEC-2 countries in trade with EU-15 members from 1999 to 2008 is measured by using GL index for weighted average.

 $^{^{67}}$ Unit value index (UV) is defined as a ratio of the values (in national currency) and the quantities (in kilograms or tons) of the particular industry *i*.

	TOTAL	HORIZ	VERT	VERT1	VERT2				
		CZECH	REPUBLIC						
1999	29.50	3.38	26.13	9.18	16.95				
2003	28.92	3.89	25.03	9.35	15.68				
2004	31.97	4.06	27.91	11.51	16.40				
2008	34.17	4.38	29.78	13.65	16.13				
POLAND									
1999	22.33	2.65	19.67	6.61	13.07				
2003	24.4	3.31	21.09	7.57	13.52				
2004	29.89	4.05	25.84	9.82	16.02				
2008	30.62	4.18	26.44	10.90	15.55				
SLOVENIA									
1999	25.38	3.34	22.03	8.90	13.13				
2003	28.49	4.09	24.41	9.63	14.78				
2004	28.14	4.52	23.62	9.30	14.31				
2008	31.55	4.66	26.89	10.18	16.71				

Table 41 The Share of Intra-industry Trade in CEC-3 Countries' Trade with EU-15 States

Note: TOTAL – The share of total intra-industry trade; HORIZ – The share of horizontal intra-industry trade. VERT1 – Represents trade in vertically differentiated products of higher quality; VERT2 – Represents trade in vertically differentiated products of lower quality.

Source: Eurostat and author's calculations at the five-digit level of SITC.

It is widely recognized that the average levels of horizontal and vertical intra-industry trade show the production structure of the observed country or intra-industry trade specialisation of that country. Therefore the shares of the horizontal and vertical intra-industry trade are measured for Czech Republics, Polish and Slovenian trade with EU-15 states from 1999 to 2008. More precisely, the weighted intra-industry trade is measured using bilateral trade data at the five-digit level of the SITC as a basis. The purpose of these measurements is to reject the elsewhere mentioned supposition that exists relatively little intra-industry in trade between the less developed Central European countries and fifteen the core European union states.

The first column in Table 41 shows the shares of total intra-industry trade of the three chosen Central European countries in bilateral trade with EU-15 members. These shares are calculated using the arithmetic mean:

$$\overline{\overline{B_i}} = \frac{1}{n} \sum_{i=1}^{n} \overline{B_i},\tag{24}$$

where, $\overline{\overline{B_i}}$ represents the arithmetic mean, and $\overline{B_i}$ represents Grubel and Lloyd's index for weighted average at the five digit level of SITC.

It is obvious that the Czech Republic's average share of intra-industry trade in 1999 represents approximately 30% and that this country in comparison with Poland and Slovenia shows the highest share of intra-industry trade in 1999. Poland and Slovenia achieve a similar share of total intra-industry trade exactly ten years later, in 2008. These results confirm that the Czech Republic is highly integrated in bilateral trade with vertically differentiated products, and that at the end of the observed period achieves the most favourable proportion between the share of vertically differentiated products of higher quality (VERT1) and the share of lower quality (VERT2).

Consequently this country largely changes the production structure or intra-industry specialization, especially in the period from 2004 to 2008. The only weak point of this state is the share of horizontal intra-industry trade: Poland and Slovenia in comparison with the Czech Republic achieve more favourable proportion between the share of horizontal and vertical intra-industry trade at the end of the observed period. Slovenia most rapidly increased trade with horizontally differentiated products.

It is worth noting that Slovenia does not change the proportion between the share of vertically differentiated products of higher quality and those of lower quality. Poland as the largest Central European country almost doubled the share of total intra-industry trade in the observed period, and at the same time significantly raised the share of high quality products (VERT1). In short, an economy of scale or large-scale production of vertically differentiated products is the most important advantage of Poland as the largest country, specialization in the production and export of higher quality products is a comparative advantage of the Czech Republic, and specialization in the production of horizontally differentiated products is an advantage of Slovenia as the smallest Central European country. Nevertheless, these results at the same time typically rejected the thesis that intra-industry trade of the CEC-3 states is insignificant in bilateral trade with EU-15 members.

11.4.3 Regression Results

As elsewhere mentioned the three different estimation methods are introduced The GLS method is alternatively introduced because it allows a faster and easier way to derive parameter estimates for geographical distance as the only included time invariant variable in regression model, while the FE method and the FEVD method require an exacting procedure of three or more steps for deriving the similar coefficients for distance as a proxy variable for transportation costs. Remember that results of the fixed effects estimator and FEVD method are more reliable in comparison with the results of the pooled GLS method, and that the fixed effects method shows the most suitable results for this analysis.

Based on the Greenaway, Hine and Milner methodology cited, two different coefficients are used to separate the share of horizontal from vertical intra-industry trade in this chapter. Therefore the first option is defined by coefficient (c = $\pm 15\%$), while the second option with more wide coefficient is defined (c = $\pm 25\%$). It is characteristic that the first option defined a relatively wider share of vertical intra-industry trade in comparison with the second one, and that the highest values of the coefficients and higher R squared is possible to expect for the first presented option. However, from an econometric point of view the both introduced options generally shows fairly similar results of the regressions.

The first tested hypothesis of the analysis, which simultaneously represents the basic thesis of the extended HOV theorem, is completely confirmed by the significant and positive values of the coefficients on the introduced proxy variables for capital intensity differences. The results of the estimations also show that the second and the third hypotheses, which predicted that technological differences between two countries in bilateral trade are an important deterministic factor for vertical intraindustry trade, are significantly confirmed. The last hypothesis is also confirmed by the highly significant values of the coefficients and negative sign as expected on geographical distance as an introduced proxy variable for transportation costs. In this way the basic suppositions of the extended HOV theorem as presented by Davis and Weinstein are completely confirmed.

11.5 Concluding Remarks

The standard HOV theory predicted that the expected share of intraindustry trade in north-south trade is to be low, and consequently the share of vertical intra-industry trade should be very low. Thus one of the aims of the present chapter was to repeatedly rejected the supposition that exists relatively little intra-industry trade between Czech Republic, Poland and Slovenia as the less developed Central European countries and on the average more developed the core European states. However the results showed, that the crucial problem in this trade relationship is not the share of intra-industry trade which represents approximately one third of total trade but that the less developed CEC are predominantly exporter of the low quality varieties and importer of the high quality products of the same good.

In this way this chapter primarily focused on specific determinants which define trade with vertically differentiated products between the developed EU-15 states and the less developed CEC-3 by testing the basic suppositions of HOV model. The results of the estimation showed that the first tested hypothesis, which simultaneously represents the basic thesis of the extended HOV model, is completely confirmed by the significant and positive values of the coefficients on capital to labor ratio as the introduced proxy variable for capital intensity differences. The results also confirmed, that two simultaneously introduced proxy variables for technological differences represent important determinant for vertical intra-industry trade.

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12 The Development of the Rate of Investments in Connection with the Rate of Savings in EEA Countries⁶⁸

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12.1 Introduction

After the fall of totalitarian regimes in countries of Central and Eastern Europe in the 90s, basic changes took place, which affected further economic development of entire Europe. Trends in the development of indices of savings and investments in new member countries of EU considerably differ from the development in its established member countries and from those of non-EU EEA members. The chapter is focussed on problems of the development and relationships of the rate of investments and the rate of savings. Its objective is to evaluate relationships of the rate of investments and the rate of savings in selected European countries using quantitative methods including testing the statistical significance. The applied analysis of investments and savings can create a basis to deal with problems of an inter-temporal approach to the balance of payments.

12.2 Methods

A starting point of the chapter is the study of domestic and foreign specialized literature. Relationships between the rate of savings and the rate of investments in selected OECD (Organization for Economic Cooperation and Development) countries were dealt with, for example, by Feldstein, Horioka (1980), Obstfeld, Rogoff (1994), Brada et al. (2008), Palát (2010). The basic source of the collection of data was represented by the Statistical Office of the European Union (EUROSTAT) or also

 $^{^{68}}$ Results given in this chapter are part of a research programme No. 6215648904 "Czech economics in the process of integration and globalization and the development of an agrarian sector and the sector of services under new conditions of the European integrated market".

by the Czech Statistical Office. After obtaining information on the character of data a decision followed concerning the use of methods suitable for the evaluation of relationships between the rate of investments and the rate of savings. In this analysis, following member countries of the European Economic Area (EEA) are included: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and UK. While Switzerland is not in the EEA, Swiss nationals have the same rights as EEA nationals and so this country has also been included in it. Malta and Luxembourg are members of EU and EEA but they don't publish data on gross savings as % of GDP at EUROSTAT which is essential for further analysis. Liechtenstein doesn't publish both data on gross capital formation as %of GDP and gross savings as % of GDP and is therefore also excluded from it.

The evaluation of relationships between the rate of investments and the rate of savings in EEA-countries, which is the objective of this chapter, can be carried out using methods of regression and correlation analysis including testing the statistical significance. A model presented by Feldstein and Horioka (1980) can be used for needs of this chapter. Moreover, it can be completed by means of other variables on the basis of knowledge obtained from the study of literature. A reference period for the given analysis was selected (with respect to the availability of data) for the period 1995–2010. Feldstein and Horioka (1980) used a reference period of the same duration.

The use of statistical methods was described by Aczel (1989) or Mason, Lind (1990). The factual data processing comes from the methodology published by Hindls et al. (2003), Dirschedl, Osteermann (2001). Minařík (1996, p. 97) states, that the statistical dependence of two characteristics (numeric figures) can be expressed as their functional relation by a formula, table or graph. We recognize these types of statistical dependence: fix, functional alias deterministic dependence and free, statistic alias stochastic dependence. The stochastic dependence makes itself felt like more or less significant repeatable tendency, which realizes in different form on different place and in different time. It is characteristic for its variability of individual causes and makes itself felt under a row of noteless, variously reacting factors. The stochastic dependence is referred to as a correlation dependency. For this dependency, we distinguish from dependent and independent variable. The correlation analysis of two variables is called pair or simple analysis.

The main graphical data presentation tool for examining the dependence between two variables is a point diagram, where we mark particular cases as points in a reference frame with coordinates, which are the values of particular dependent and independent variables.

The equation for a linear model is: $y' = b_0 + b_1 x$

The equation for a quadratic model is: $y' = b_0 + b_1 x + b_2 x^2$

The equation for a cubic model is: $y' = b_0 + b_1 x + b_2 x^2 + b_3 x^3$

The equations for a bisector or second-degree parabola are the same as trend determination in temporal series.

In this chapter, particular characteristics of tightness of the dependency of variables are calculated. Conjugate regression lines show the same values of the tightness dependency characteristics, the correlation coefficient $r_{yx} = r_{xy}$, determination coefficient $r_{yx}^2 = r_{xy}^2$ (at the first place in this index is stated variable thought to be dependent). The correlation index I_{yx} is a dependency tightness characteristics for any type of regression function (for simple as well as multiple dependencies of variables). Its second power is determination index I_{yx}^2 . Determination index multiplied by 100 presents the explanation percentage of the calculated regression function – how the changes of dependent variable Y are explained by the changes of independent variable(s).

Statistical software Unistat 5.11 for Windows has been used for the calculation of following results.

12.3 Results

The rate of savings is expressed by means of the indicator of gross savings as the percentage of GDP. For the rate of investments an indicator of the gross creation of capital is used as the percentage of GDP. Values of indicators of the rate of investments and the rate of savings result from the data of EUROSTAT. A reference period has been determined for 1995–2010. First, it is possible to meet the development of an indicator, which was calculated as a difference between the rate of investments and the rate of savings in selected countries. This development is illustrated in Fig. 44.

While the EU-15 average fluctuates around zero, in new member countries, the rate of investments permanently exceeded the rate of savings



Figure 44 A Difference Indicator of the Rate of Investments and the Rate of Savings in EEA Countries in 1995–2010 (%)



Source: Own calculations.

Figure 45 A Difference Indicator of the Rate of Investments and the Rate of Savings in Iceland, Norway, Greece, Estonia, Latvia and Switzerland in 1995–2010 (%)

Source: Own calculations.

within the monitored period. Out of 171 calculated differences of the rate of investments and the rate of savings in new member countries only 12 data reached negative values, namely in Bulgaria, Poland and Slovakia at the very beginning of the monitored period and in Baltic countries in the last two monitored years. Within the rest of a reference period, distance values of the rate of investments and savings fluctuated in positive values. One of the highest imbalances between investments and savings were observed also in Iceland and Greece. But while in Latvia or Estonia these imbalances were only temporary, Greece has been achieving these figures steadily. Due to lack of data at EUROSTAT Greek time series starts only from 2000. Calculated figures of the difference indicator of the rate of investments and the rate of savings in above mentioned countries are in Tab. 42.

Year	Iceland	Norway	Greece	Estonia	Latvia	Switzerland
1995	-0.8	-3.6	:	6.8	0.4	-6.2
1996	1.8	-6.9	:	7.4	4.9	-6.2
1997	1.8	-6.2	:	10.6	5.5	-8.6
1998	6.7	0.4	:	9.3	9.5	-8.4
1999	6.8	-5.6	:	4.6	8.9	-10.3
2000	10.1	-15.0	12.0	5.3	4.8	-11.5
2001	4.3	-16.1	11.4	5.0	7.5	-8.3
2002	-1.5	-12.6	12.7	10.4	6.7	-7.7
2003	4.8	-12.3	12.3	11.3	8.2	-12.4
2004	9.8	-12.7	10.3	11.4	12.8	-11.9
2005	16.0	-16.2	11.0	10.1	12.5	-14.4
2006	23.8	-17.2	12.8	16.2	22.5	-13.4
2007	16.4	-14.1	14.6	18.9	22.3	-9.0
2008	22.2	-17.8	13.8	10.2	13.1	-2.5
2009	2.2	-13.1	13.1	-3.9	-9.6	-8.0
2010	-1.7	-13.7	10.3	-4.3	-9.1	-7.4

Table 42 A Difference Indicator of the Rate of Investments and the Rate of Savings in Iceland, Norway, Greece, Estonia, Latvia and Switzerland in 1995–2010 (%)

Source: Own calculations.

Tab. 42 also includes countries with entirely different development from above mentioned countries, namely Norway and Switzerland. These two non-EU members have been steadily achieving negative values of examined indicator which is graphically illustrated on Fig. 45 where we can find both extremes: countries with high rates of investments and low rates of savings and countries with high rates of savings and low rates of investments. Fig. 46 presents developmental tendencies of the difference indicator of the rate of investments and the rate of savings in EEA countries compared to the EU-15 and Czech Republic. I fitted developmental series in EEA countries by a polynomial of the third degree to indicate and compare trends at this indicator. A difference indicator of the rate of investments and the rate of savings and its polynomial trends in EEA and the EU-15 in the monitored period are evident in Fig. 47.

As for some other EEA member countries, Malta and Luxembourg are members of the EU and EEA but they don't publish data on gross savings as % of GDP at EUROSTAT which is essential for further analysis. Liechtenstein doesn't publish both data on gross capital formation as %of GDP and gross savings as % of GDP and was therefore also excluded from it. Therefore, the number of EEA countries is limited to 27 plus Switzerland. Trends of a difference indicator of the rate of investments and the rate of savings in Central European countries refer to similar developmental tendencies characterized by a relatively stable state or even decreasing the imbalance of the rate of investments and the rate of savings, esp. in the Czech Republic. Difference indicator trends in Baltic countries (together with Romania and Bulgaria) refer to other developmental tendencies characterized in the midst of the reference period by increasing the imbalance of the rate of investments and the rate of savings significantly and then follow-up dramatic decline towards the balance as a result of ongoing global financial and real economy crises. And entirely different development from above mentioned countries has been observed in Norway and Switzerland. These two non-EU members have been steadily achieving negative values of this indicator.

For the purpose of a more profound analysis, rates of investments and rates of savings calculated on the basis of data available from EU-ROSTAT in monitored countries are repeatedly used. A time period 1995–2010⁶⁹ is a reference period for the following analysis. I shall try to prove statistically the existence of correlation between the rate of investments and the rate of savings. Perhaps even other variables can be added to the model. Brada et al. included into the analysis of relationships between the rate of investments and the rate of savings also a variable gross domestic product per capita, which appeared to be, however, statistically insignificant. Therefore, I decided not to include this variable into the model. To determine parameters of a regression function were used methods of regression and correlation analysis (including

 $^{^{69}\,\}mathrm{At}$ data for 2010, it refers to the EUROSTAT prediction.



Figure 46 A Difference Indicator of the Rate of Investments and the Rate of Savings and Its Polynomial Trends in EEA and the Czech Republic in the Period 1995–2010 (%)

Source: Own calculations.



Figure 47 A Difference Indicator of the Rate of Investments and the Rate of Savings and Its Polynomial Trends in EEA and the Czech Republic in the Period 1995–2010 (%)

Source: Own calculations.

testing the statistical significance) described in the part Methods. Parameters of linear, quadratic and cubic regression functions in the given reference period are presented in Tab. 42 (page 237) and Tab. 43.

Countral	Madal		Model pa	rameters		
Country	model	bo	b1	b ₂	b ₃	⊥yt
	1	26.5148	0.0061	-	-	0.0038
Latvia	2	-63.9501	8.9159	-0.2068	-	0.6936+
	3	-245.0330	36.7622	-1.5798	0.0216	0.7254++
	1	20.1402	0.1141	-	-	0.0347
Lithuania	2	-52.0317	10.3201	-0.3569	-	0.1876
	3	1086.8450	-232.234	16.7092	-0.3969	0.3608
	1	30.0062	-0.5593	-	-	0.4028
Iceland	2	23.6954	0.8097	-0.0603	-	0.4831
	3	12.8096	6.3841	-0.6507	0.0175	0.5363+
	1	14.2646	0.7775	-	-	0.8396++
Greece	2	9.7396	1.8602	-0.0601	-	0.8506++
	3	12.4183	0.8420	0.0623	-0.0047	0.8508++
	1	2.5795	1.0510	-	-	0.7622++
Czech	2	5.7958	0.7850	0.0055	-	0.7622++
Керивне	3	45.7869	-4.1459	0.2067	-0.0027	0.7623++
	1	34.4254	-0.4602	-	-	0.5105+
Austria	2	226.5268	-16.1430	0.3188	-	0.7656++
	3	-326.2200	51.6235	-2.4432	0.0374	0.7697++
	1	24.7366	-0.1044	-	-	0.2119
Norway	2	112.4243	-5.5352	0.0826	-	0.7088++
	3	213.5867	-14.9875	0.3738	-0.0030	0.7139++

Table 43 Parameters of a Regression Function for the Rate of In-
vestments with Respect to the Rate of Savings in Latvia,
Iceland, Greece, Czech Republic, Austria and Norway in
the Period 1995–2010

Note: Correlation index: $I_{yt};$ Significance level: $^+\alpha$ = 0.05; $^{++}\alpha$ = 0.01 Source: Own calculations.

Based on the results, the existence of correlation is evident between the rate of investments and the rate of savings in most monitored countries. Indices of correlation were calculated for particular countries and types of a regression function. For Czech Republic and Austria, these results are statistically significant using all three types of a regression function. Also Greece achieves highly significant results for correlation indices. In other examined countries they can be indicated as statistically significant using the polynomial of the second and third degrees. The situation is similar also in Latvia, where the use of a polynomial of a higher degree significantly improves correlation index results. And the use of a polynomial of the second and the use of a polynomial of the second and the use of a polynomial of the second second second and the use of a polynomial of the second second

mial of the third degree means achieving highly significant results in the last mentioned country. In Iceland, only the use of a polynomial of the third degree gives significant results. On the other hand, in countries as Lithuania the calculated correlation indices were very low and the use of a polynomial of a higher degree brought no significant change.

12.4 Conclusions

As first, it is possible to get acquainted with the development of an indicator, which was calculated as a difference between the rate of investments and the rate of savings in examined countries. Based on values of this indicator, it is evident that in the majority of EEA countries the rate of investments permanently exceeded the rate of savings within the monitored period. Out of more than 170 calculated differences between the rate of investments and the rate of savings in ten new member countries of EU, only twelve data reached negative values, namely in Bulgaria, Poland and Slovakia at the very beginning of the monitored period and in Baltic countries in the last two years as a result of global financial and real economy crises. For the rest of the reference period, difference values between the rate of investments and the rate of savings in new member countries fluctuated in positive values. Through fitting the developmental series of an indicator calculated as a difference between the rate of investments and the rate of savings in monitored countries as a whole using a polynomial of the third degree it is possible to follow trends of this indicator. Trends of a difference indicator of the rate of investments and the rate of savings in EEA countries show increasing the imbalance of the rate of investments and the rate of savings until 2008, especially Baltic countries, Bulgaria or Iceland refer to these developmental tendencies characterized in the midst of the reference period by increasing the imbalance of the rate of investments and the rate of savings significantly and then follow-up dramatic decline towards the balance.

For the purpose of a more profound analysis, rates of investments and rates of savings, calculated on the basis of data available from EURO-STAT in monitored countries, are used again. A reference period for an analysis trying to prove statistically the existence of a correlation between the rate of investments and the rate of savings was the period 1995–2010. If necessary, other variables can be than added to the model. For example, Brada et al. included also the variable of a gross domestic product per capita into the analysis of relationships between investments and savings. However, this variable appeared to be statistically insignificant. Therefore, I decided not to include this variable into this analysis. To determine parameters of a regression function, methods of regression and correlation analysis (including testing the statistical significance) described in detail in Methods were used. Parameters of linear, quadratic and cubic regression functions in the given reference period mentioned in the chapter point to the existence of correlation between the rate of investments and the rate of savings. Indices of correlation were calculated for particular countries and types of regression. For Czech Republic and Austria, these results are statistically significant using all three types of a regression function. Also Greece achieves highly significant results for correlation indices. In other examined countries they can be indicated as statistically significant using the polynomial of the second and third degrees. The situation is similar also in Latvia, where the use of a polynomial of a higher degree significantly improves correlation index results. And the use of a polynomial of the third degree means achieving highly significant results in the last mentioned country. In Iceland, only the use of a polynomial of the third degree gives significant results. On the other hand, in countries as Lithuania the calculated correlation indices were very low and the use of a polynomial of a higher degree brought no significant change. The analysis of investments and savings presented in this chapter can be further used and developed as part of problems of the inter-temporal approach to the balance of payments.

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13 Capital Markets in the Baltic States in Years 2000–2010. Preliminary Investigation⁷⁰

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13.1 Introduction

European Union has been widening and becoming more heterogeneous. Therefore many studies are dedicated to comparisons of new member states to the developed European countries. Chaudhury (2010) examines the extent to which the transition economies of Central and Eastern Europe as well as Southeast Asian "tiger" economies have converged to industrialized country levels of per capita income growth, using the convergence criteria defined in Sala-i-Martin (1996), for the 1992–2007 period. His findings suggest that both regions exhibit fairly rapid convergence, which is likely to continue in the future due to favorable export demand elasticities, technological diffusion and total factor productivity.

The Central and Eastern European countries have been undergoing transformation from a centrally planned economy to a market-orientated economic system, since the collapse of the communist regimes in the year 1989. Privatization and activation of stock exchanges is one of the symptoms of transformation. According to the level of capital markets development, countries in transition can be classified into four groups (see Table 44):

- early reformers i.e. countries that activated stock exchanges in years 1989–1992;
- 2. laggards i.e. countries that activated stock exchanges in years 1993–1996;
- 3. late reformers i.e. countries that activated stock exchanges in years 1998–2002;
- 4. countries with no stock exchange.

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Estonia, Lithuania and Latvia have been introducing economic and political reforms since 90s of the previous century and they are the only former Soviet Union republics that became members of the European Union in the year 2004. Lithuania and Latvia activated capital markets in the year 1993, Estonia – two years later. Now all these security exchanges are members of NASDAQ OMX Group that was founded at the beginning of the year 2008.

Early reformers	Laggards	Late reformers	Countries with no stock exchange
Slovenia (1989) Serbia (1989) Hungary (1990) Bulgaria (1991) Croatia (1991) Poland (1991) Slovakia (1991) Czech Republic (1992)	Kazakhstan (1993) Latvia (1993) Lithuania (1993) Kyrgyzstan (1994) Estonia (1995) FYR of Macedonia (1995) Moldova (1995) Romania (1995) Russia (1995)	Belarus (1998) Georgia (1999) Azerbaijan (2000) Armenia (2001) Ukraine (2002)	Albania Bosnia & Herzegovina Tajikistan Turkmenistan

Table 44 Stock Exchanges Inception Dates

Source: Shostya et al., 2008.

The aim of the research, presented in the chapter, is basic comparative analysis of Baltic Security Exchanges in the period from the $3^{\rm rd}$ of January 2000 to the $9^{\rm th}$ of March 2010. In our investigation we employ daily rates of return and risk measures since they are the most important characteristics that describe financial instruments, and analysis of these features is always provided when investing is considered.⁷¹ In the chapter we apply measures of:

- central tendency,
- $\bullet\,$ dispersion,
- asymmetry and flatness,
- correlation.

It is worth mentioning that reported research is the first stage of the wider investigation concerning capital market development in Eastern and Central European Countries. In that part we try to learn about domestic markets and to recognize their role in the region.

 $^{^{71}}$ See Jajuga, 2000, Tarczyński, 2001, Witkowska et al., 2008.

13.2 Baltic Countries

Baltic states are small countries with similar historical, political and cultural factors that influence their development (Melnikas, 2008). After the collapse of the centrally planned system Baltic states show a rapid economic growth (despite some economic downturns). Lapinskiene and Peleckis (2009) notice that during the last decade the rate of GDP growth in these countries has been much higher than in the developed countries. However they show that still a large gap in the level per capita income has been remaining between Baltic states and the developed European countries (Austria, Belgium, Denmark, Netherlands, France, Germany). Similar conclusion is drawn by Batog and Batog (2006) who deal with the phenomena of income convergence among Baltic Sea Region countries (i.e. Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden). They find out that the real income convergence process within the Baltic Sea Region states exists. They also conclude that, despite the quite high speed of convergence, transition countries - Estonia, Latvia, Lithuania and Poland have to wait about 30 years to obtain the level of development reached by Denmark, Finland, Germany and Sweden.

Data presented in Table 45 describe general economic situation in Baltic countries during analyzed period. For the first seven years of the present century there was very strong real GDP growth. In 2007, though, the boom period turned to bust as country-specific factors such as the slow-down in credit growth dampened domestic demand growth. This was followed by the international financial crisis, which further limited the availability of foreign capital and pushed the Baltic countries into severe recession. However at the end of the year 2009 the first symptoms of economic recovery became visible in all Baltic states, and in the year 2010 Estonia and Lithuania GDP growth rate became positive (although one should remember that these rates were estimated for low levels of GDP observed in 2009).

The highest inflation rates were observed in years 2007 and 2008 while it decreased quite rapidly in 2009. During the boom period, the Baltic states experienced not only internal imbalances in the form of increasing inflation but also considerable external imbalances in form of large current and capital account deficits that peaked up in the year 2007. In 2009 external imbalances was reversed, mainly as a result of collapsing imports (Reiner, 2010). The main focus of the (Paas and Poltimäe, 2010) study is on analyzing the innovation performance of the Baltic states. They conclude that Estonian innovation performance seems to be ahead of the other two Baltic countries that is mainly caused by the successful attraction of foreign investment, favorable tax policy and possible positive spillover effects from the Nordic neighborhood, particularly Finland and Sweden.

				Years						
	2000-2002	2003–2005	2006	2007	2008	2009	2010* est.			
		A	nnual GI	OP growth	[in %]					
Estonia	8.5	8.1	10.4	6.3	-3.6	-14.1	1.9			
Latvia	7.1	8.8	12.2	10.0	-4.6	-18.0	-1.8			
Lithuania	5.6	8.5	7.8	8.9	3.0	-15.0	0.4			
Annual growth in bank lending [in %] end of period data										
Estonia	23.4	36.4	41.6	33.0	7.2	-5.0				
Latvia	41.4	47.5	58.3	34.0	11.8	-6.6				
Lithuania	16.2	52.4	40.5	42.8	18.1	-8.2				
HICP inflation [in %]										
Estonia	4.4	2.8	4.4	6.7	10.6	0.2				
Latvia	2.4	5.3	6.6	10.1	15.3	3.3				
Lithuania	1.0	0.9	3.8	5.8	11.1	4.2				
	Currer	it and capital a	account l	balance [i	n % of GE	PP]	_			
Estonia	-6.6	-10.1	-17.0	-17.9	-9.1	3.9				
Latvia	-5.9	-10.2	-22.5	-22.5	-13.0	6.8				
Lithuania	-5.1	-6.2	-10.4	-15.0	-12.4	0.1				

Table 45 Important Factors About Baltic States Economic Development

Note: * http://www.cia.gov/library/publications/the-world-factbook/ rankorder/2003rank.html Source: Reiner, 2010.

13.3 Structure of the Baltic Capital Market

It is worth mentioning that aggregated Baltic market is very small in comparison to other security markets in Europe. For instance in the year 2009, The Warsaw Stock Exchange (Poland) was 17 times bigger than aggregated Baltic market in terms of market capitalization and turnover, as well as there were 391 companies listed (in comparison to 94 ones at Baltic market)⁷².

Development of the aggregated Baltic market in the years 2002–2010 is presented in Table 46. The highest level of development seems to be observed in the years 2005–2006. It is visible that financial crisis influenced Baltic capital markets in the years 2008 and 2009, causing dramatic decrease of market capitalization and turnovers. Looking at the dynamic measures it can be noticed that the highest increase of capitalization was observed in the years 2003 and 2004 while the biggest market turnover increase was visible in the year 2005. The deepest decrease of market capitalization and turnover appeared in the year 2008.

Although we are used to treat Baltic states as very similar ones, it is worth mentioning that there are essential differences among them⁷³. We notice (in Table 47) that in the years 2009 and 2010 the total turnover at Tallinn market was the biggest one although Estonia is the smallest country but with the highest GDP per capita (among three Baltic states). While Latvian capital market seems to be completely insignificant since total turnover is less than 5% in both years. This tendency is also observed during daily quotations (see Tab. 54 in the Appendix, page 266) on November 8 and 9, 2010. During both days majority of securities at the Latvian market were not trading (i.e. turnover equals zero).

The capital markets in Baltic states have been developing in different rates, that can be noticed at Fig. 48. Comparison of the annual turnover value (in the year 2009 to the year 2000 – see Table 55 in the Appendix, page 266) shows that it increased only in Lithuania (by 84% in comparison to the year 2000). Other markets had smaller turnover values in the year 2009 than in the year 2000. The biggest decreased is observed for the Riga market. Therefore it is the reason why the structure of turnovers has been changing at the Baltic capital market (Fig. 49). The most stable situation is observed for the Tallinn Stock Exchange since the share of Estonian market in aggregated Baltic market increased from 47% in the year 2000 to 54% in 2009, although the biggest share was observed in the year 2005 (75%), while the smallest – in 2006 (31%). Share of Latvian market decreased from 36% in the year 2000 to 3% in

 $^{^{72}}$ In November 2009 at The Warsaw Stock Exchange there were 391 listed companies; domestic market capitalization was about 110,160.79 mil. EUR and share turnover value – 92,036.93 mil. EUR (see http://www.gpw.pl/, 9.11.2010; data in PLN were recalculated for EUR using the exchange rate 1 PLN = 0.261554 EUR).

⁷³ Interesting discussion is presented in (Melnikas, 2008).

						Year				
Characte	ristics	2002	2003	2004	2005	2006	2007	2008	2009	2010*
Market	MEUR	4417.0	6671.8	10587.2	12081.3	14340.8	13095.7	5177.5	6386.1	5428.0
capitalization	% changes	×	+51%	+59%	+14%	+19%	%6	~09~	+23%	×
Model to the second	MEUR	567.0	783.0	1065.0	2603.1	2460.1	2385.7	978.4	495.0	253.4
	% changes	x	+38%	+36%	+144%	-5%	-3%	59%	-49%	x
Average monthly turnover	MEUR	47.3	65.3	88.8	216.9	205.0	198.8	81.5	41.3	42.2
Number of companies	count	128	114	95	104	86	66	94	06	88
Number of IPOs	count	0	0	1	3	3	3	1	0	2
Average	MEUR	34.5	58.5	111.4	116.2	146.3	132.3	55.1	71.0	61.7
company capitalization	% changes	×	+70%	%06+	+4%	+26%	-10%	-58%	+29%	×
Market capitalization	% of GDP	13.5%	19.0%	27.1%	26.8%	26.9%	20.1%	7.3%	10.8%	9.3%
Market turnover	% of market capitalization	12.8%	11.7%	10.1%	21.5%	17.2%	18.2%	18.9%	7.8%	10.9%

Table 46 Aggregate Baltic Market Development in the Years 2002-2010

Note: The symbol * denotes the first half of the year. Changes are calculated as percentage increase (+) in the current year in comparison to the previous year. Symbol MEUR denotes $10^6 \in$ = one million Euro.

Source: Own elaboration based on Guide to NASDAQ OMX Baltic Securities Market, 2010, p. 21.

	Year	Number of companies	D	eals	Number tra	of shares Ided	Total t	urnover
	2000		count	329276	×10 ⁶	966.36	MEUR	495.05
Baltic	2009		%	100.00	%	100.00	%	100.00
market	2010*	04	count	288404	×10 ⁶	580.08	MEUR	423.58
	2010	94	%	100.00	%	100.00	%	100.00
	2000		count	84757	×10 ⁶	333.47	MEUR	266.62
Tallinn	2009		%	25.74	%	34.51	%	53.86
market	2010*	21	count	89987	×10 ⁶	186.25	MEUR	215.26
	2010	21	%	31.20	%	32.11	%	50.82
	2000		count	21676	×10 ⁶	13.00	MEUR	13.96
Riga domestic	2009		%	6.58	%	1.34	%	2.82
market	2010*	24	count	15943	×10 ⁶	12.8	MEUR	17.82
	2010	Ъ	%	5.53	%	2.22	%	4.21
	2000		count	222843	×10 ⁶	619.89	MEUR	214.46
Vilnius	2009		%	67.68	%	64.15	%	43.32
market	2010*	22	count	182474	×10 ⁶	380.95	MEUR	190.49
	2010	22	%	63.27	%	65.67	%	44.97

Table 47 Structure of Baltic Market in Years 2009 and 2010

Note: symbol * denotes the period from January 1 to November 15 (2010); $10^6 \in \Rightarrow$ MEUR

Source: Own elaboration on the basis of http://www.nasdaqomxbaltic.com/market.



Figure 48 Comparison of Turnovers of Domestic Markets in Years 2000–2010, in MEUR $(10^6 \in)$

Note: For the year 2010 turnovers cover the period from January 1 to November 15.

Source: Own elaboration on basis of data from nasdaqomxbaltic.com.





Note: For the year 2010 turnovers cover the period from January 1 to November 15.

Source: Own elaboration on basis of data from nasdaqomxbaltic.com.

the year 2009. While the share of Lithuanian market increased from 17% in the year 2000 to 43% in the year 2009, but the biggest share of this domestic market (in aggregated Baltic market) is observed in the year 2006 (65%).

The paper (Dubinskas and Stungurienė, 2010) analyses the alternations in the causality in the financial markets during the 2008–2009 financial crisis with a clear focus on the changes and developments in the financial markets of the Baltic States and Russia in the period starting from 2008. Applying Dickey-Fuller and Johansen testing methodology it is demonstrated a strong cointegration between the changes in the indexes of all equity markets (i.e. OMX Vilnius, OMX Riga, OMX Tallinn and RTS⁷⁴) irrespective of the period analyzed (i.e., precrisis 1.2.2008-31.8.2008, during the crisis 1.9.2008-30.5.2009, post-crisis 1.6.2009–31.12.2009). The strongest cointegration was observable in the crisis period, and the weakest – after the crisis. The results showed that in view of the financial crisis the Latvian market showed the greatest degree of slow-down despite it being most active in the pre-crisis times, likewise, Estonian market also showed a somewhat higher degree of passiveness. Thus, it was the Latvian and Estonian markets that the financial downturn had the most painful impacts upon. While the

 $^{^{74}}$ RTS (Russian Trading System) – Russian stock index first calculated on September 1, 1995, has since become the main benchmark for the Russian securities industry and is based on the Exchange's 50 most liquid and capitalized shares (www.rts.ru).

Lithuanian and the Russian markets were, on the contrary, much more active and therefore outlived the equity crash period with least painful after-effects, thus producing confirmation that in the face of a crisis the interests and expectations of most investors are largely related to major markets normally viewed as more reliable and showing a higher degree of resilience.

Investigation provided by Paskevicius, Dubinskas (2009) shows that the main reasons of the fall in the Lithuanian equity market were:

- an increase in interest rates;
- the current account deficit and
- financial crises in the foreign countries, with which Lithuania maintains close trade contacts.

High interest rates slowed down the investment in the stock market. Investors preferred to save money and/or put it into the less risky money market. Moreover, Lithuanian equity market reacted to the financial crises in other countries. This reaction might occur due to various reasons, for instance, due to close ties in import and export (Russia), psychological factors (the U.S. "IT bubble" in 2000, the U.S. real estate crisis in 2007–2008) or unfavorable decisions made by the governing financial institutions (e.g. decisions of the Federal Reserve (FED) and/or European Central Bank to increase interest rates). They also conclude that local currency (litas) has no impact on the equity market decline because it is pegged to Euro. Research into the relationship between inflation and the equity market movements in Lithuania showed that this correlation is irrelevant.

Baltic stock markets (including stock markets of Estonia, Latvia and Lithuania) are investigated by Maneschiöld (2006). The results indicate that the integration between Baltic stock markets and international capital markets represented by the stock markets of the U.S., the U.K., Germany, France and Japan are low. Masood, Bellalah, Chaudhary, Mansour and Teulon (2010) investigate the co-integration and causal relationship between the various stock exchanges of the Baltic countries. They prove the existence of a long-run bidirectional causal relationship between Baltic bench, Riga and Tallinn. This relationship has made the exchanges more stable. The analysis employs Augmented Dickey Fuller (ADF) test, Johansson co-integration approach, Vector error Correction model, Granger Causality test.

The objective of the paper (Birg and Lucey, 2006) is to study capital market integration in eight CEE countries and its implications for an
international portfolio investment allocation. Results of investigation vary from country to country and sample countries can be broken down into distinctive groups according to their recent integration score performance:

- Countries which are becoming increasingly integrated with both regional European and international equity markets (Estonia, Hungary, Czech Republic, Lithuania, Poland).
- Countries which have becoming increasingly integrated with the regional market, while growing segmented with the world market (Latvia, Slovakia, Slovenia).

13.4 Baltic Stock Exchange Indexes

Stock indexes describe general situation of the whole market, its sectors or segments. NASDAQ OMX uses a common classification of indexes for the Nordic and Baltic markets. A uniform index standard enhances understanding of the Nordic and Baltic indexes and facilitates comparisons between the different markets. The NASDAQ OMX Baltic index family includes four types of indicators.⁷⁵

- Benchmark index (OMX Baltic Benchmark) is available on the Baltic level. The index consists of a portfolio of the largest and most traded shares, representing all sectors available on the NAS-DAQ OMX Baltic Market. The index serves as an indicator of the overall trend in the market and is intended to offer a cost effective index that an investor can fully replicate. The composition of the index is revised on a semi-annual basis to ensure that it offers high investability and low transaction costs. The weight of the constituent stocks is based on the market value adjusted by the free float, which means that only the part of the share capital that is considered available for trading is included in the index.
- Tradable (OMX Baltic 10) index is available on the Baltic level and consists of the 10 most actively traded stocks on the NASDAQ OMX Baltic Market. A limited number of constituents guarantees that all the underlying shares of the index have excellent liquidity, which results in an index that is suitable as underlying for derivatives. The weight of the constituent stocks is based on the market value adjusted by the free float. The composition of the index is revised on a semi-annual basis.

⁷⁵ http://www.nasdaqomxbaltic.com

- All Share (OMX Baltic, OMX Tallinn, OMX Riga, OMX Vilnius) indexes are available on both local and Baltic level and include the shares listed on the Main and Secondary lists of the Baltic exchanges. The indexes reflect the current status and changes in each market or on the Baltic Market as a whole.
- Sector indexes are available on the Baltic level and they are based on the Global Industry Classification Standard (GICS) developed by Morgan Stanley Capital International Inc. (MSCI) and Standard & Poor's (S&P). GICS is an international classification created to meet investors' demand for more precise, exhaustive and standardized classification. Sector indexes show the trend of a specific sector and enable peer comparison between companies engaged in the same sector. The indexes cover shares listed in the Main and Secondary Lists of the NASDAQ OMX Baltic Market and are calculated for each GICS sector.

All indexes are chain-linked, meaning that they are always calculated based on the price level of the previous trading day. The indexes are market weighted, calculated based on the change in the total market value from one point in time to another of all the shares included in the index.

13.5 Data, Methodology and Research Organization

In our investigation we employ daily close quotation of the Baltic States capital markets (BSCM) stock indexes: OMX Baltic Benchmark (OMXB), OMX Tallinn (OMXT), OMX Riga (OMXR) & OMX Vilnius (OMXV).⁷⁶ Analysis is provided for the whole period (denoted as P0) as well as for the distinguished six sub-periods that are characterized by different market trends i.e. (see Fig. 50):⁷⁷

P0. whole period of analysis from 3.01.2000 to 9.03.2010 (2593 observations),

⁷⁶ Data for indexes OMX Vilnius and OMX Benchmark are collected from http://www.nasdaqomxbaltic.com/market/ while data for indexes OMX Riga and OMX Tallinn come from http://www.stooq.pl.

⁷⁷ It is worth mentioning that our analysis is conducted for the periods distinguished on the basis the market trends and these periods are different from the ones distinguished by Dubinskas and Stunguriene, 2010, as: pre-crisis, crisis and post-crises periods.

P1. stagnation, covering the period from 3.01.2000 to 30.11. 2001 (500 observations),

P2. bull market 1, covering the period from 1.12.2001 to 30.09.2005 (990 observations),

P3. bear market 1, covering the period from 1.10.2005 to 31.07.2006 (208 observations),

P4. bull market 2, covering the period from 1.08.2006 to 31.07.2007 (250 observations),

P5. bear market 2, covering the period from 1.08.2007 to 30.04.2009 (434 observations),

P6. bull market 3, covering the period from 1.05.2009 to 9.03.2010 (212 observations).

In order to check mutual relations between Estonian, Latvian and Lithuanian markets we evaluate Pearson coefficients for domestic All Share and Benchmark OMX indexes (Table 48). As one can notice correlation among all indexes is very strong for the whole period of analysis and sub-periods P2, P4–P6. Only in "stagnation" and "bear market 1" periods we observe small values of the Pearson coefficients. Also for the horizontal trend period Latvian market seems to have opposite trends than other markets and aggregate OMXB.

In analysis we apply statistical measures to describe the situation that has been observed at investigated domestic markets alone and at the



Figure 50 Baltic States Capital Market Stock Indexes Quotations; Quotation at the End of Month

Source: Own elaboration on basis of data from nasdaqomxbaltic.com.

PO	Benchmark	Tallinn	Riga
Tallinn	0.986704		
Riga	0.983309	0.961947	
Vilnius	0.981056	0.965415	0.966468
P1	Benchmark	Tallinn	Riga
Tallinn	0.506078		
Riga	0.191532	-0.489470	
Vilnius	0.155793	0.704504	-0.777970
P2	Benchmark	Tallinn	Riga
Tallinn	0.993539		
Riga	0.988240	0.980277	
Vilnius	0.992800	0.984690	0.991721
P3	Benchmark	Tallinn	Riga
Tallinn	0.597794		
Riga	0.649279	0.187526	
Vilnius	0.842547	0.659151	0.308352

P4	Benchmark	Tallinn	Riga
Tallinn	0.871764		
Riga	0.940662	0.76608	
Vilnius	0.978198	0.878954	0.933848
P5	Benchmark	Tallinn	Riga
Tallinn	0.982614		
Riga	0.98782	0.964402	
Vilnius	0.985171	0.954403	0.979007
P6	Benchmark	Tallinn	Riga
Tallinn	0.836368		
Riga	0.904973	0.798885	
Vilnius	0.952319	0.806444	0.952946

Table 48 Pearson Coefficients

Source: Own calculation.

aggregate described by the OMX Baltic Benchmark. All statistics are calculated for the daily returns although we also consider so called "periodic" rates of return from the stock indexes. In the first step we transform close indexes quotations into:

• daily rates of return from the t^{th} day $(t = 1, 2, ..., T) - y_t$:

$$y_t = \frac{Y_t - Y_{t-1}}{Y_{t-1}} \cdot 100 \tag{25}$$

• periodic rates of return from the p^{th} period ($p = P0, P1, P2, \dots, P6$) – y_p :

$$y_p = \frac{Y_{pe} - Y_{pb}}{Y_{pb}} \cdot 100$$
 (26)

where: Y_t – close index quotations from the t^{th} day, t – count of daily observations,⁷⁸ Y_{pe} , Y_{pb} – close index quotations respectively from the last and the first day of the p^{th} period.

To describe situation at the investigated markets, we employ such measures as: 79

 $^{^{78}}$ We assume that there is no missing observations in our sample. If this assumption is not fulfilled than either there are less observations in the series or the missing observations are somehow generated.

⁷⁹ Tarczyński, 2001, Witkowska et al., 2008.

- maximal (y_{max}) and minimal (y_{min}) values of y_t ,
- mean of rates of return (\overline{y}) i.e. the first moment of the distribution of the random variable, being a central tendency measure,
- median (M) of rates of returns because time series are usually asymmetric,
- standard deviation (S) of rates of return that measure variability i.e. risk, that is evaluated as the positive root square of variance being the second central moment about the mean of a real-valued random variable probability distribution,
- coefficient of variation variability coefficient (CV) that can be used for comparison of different series variability,
- range: $R = y_{\text{max}} y_{\text{min}}$, where y_{max} , y_{min} denote the biggest and the smallest value of variable respectively,
- skewness that measures the asymmetry of the data set histogram, being the third central moment of a real-valued random variable probability distribution:

$$A = \frac{T}{(T-1)\cdot(T-2)} \cdot \frac{\sum_{t=1}^{T} (y_t - \overline{y})^3}{S^3}$$
(27)

• kurtosis, a measure of the flatness of the distribution, being the fourth central moment of a real-valued random variable probability distribution:

$$K = \left\{ \frac{T \cdot (T+1)}{(T-1) \cdot (T-2) \cdot (T-3)} \cdot \sum_{t=1}^{T} \frac{(y_t - \overline{y})^4}{S^4} \right\} - \frac{3 \cdot (T-1)^2}{(T-2) \cdot (T-3)}$$
(28)

that are evaluated for the calculated rates of return.

The next step of the research is the hypothesis verification in order to find out if the expected value of the analyzed rates of return significantly differs from zero. Thus the null hypothesis is:

$$H_0: E(y) = 0$$
 (29)

and the test statistics is:

$$u = \frac{\overline{y}}{S}\sqrt{T} \tag{30}$$

where u is normally distributed statistics, other symbols are described above.

We also compare count of positive and negative returns in order to find out if in certain periods and markets probability of obtaining certain investment result (i.e. profit or loss) is the same.

13.6 Empirical Results

Investors apply different strategies to maximize profit (or rate of return) or to minimize risk of loss (or probability of loss). These strategies are constructed using a great variety of quantitative methods.⁸⁰ In this section we discuss results obtained applying descriptive statistics and hypothesis verification.

We start our analysis from the general description of the rates of return evaluated for considered indexes (Tables 49–52).⁸¹ It is visible that for all but one (i.e. OMXT) indexes the highest expected returns are observed in the last period i.e. from 1.05.2009 to 26.02.2010. While the lowest average returns appear in the "bear market 2" i.e. from 1.08.2007 to 30.04.2009 i.e. the period that covers world financial crisis and deep economic depression in the Baltic states. Usually the highest returns are accompanied by the highest risk, measured by standard deviation, that is observed also in the period denoted as "bull market 3" for all indexes but the one i.e. for Riga.

Taking into account different periods of analysis we notice that for the whole sample average rates of return, obtained from different indexes, are alike. However maximal and minimal returns essentially differ. The smallest range is observed for OMXB while the biggest one for OMXT. In "stagnation" period (P1) and "the bear market 1" (P3) we notice different values of average returns for domestic and aggregated stock indexes while for "bull markets" (i.e. P2, P4 and P6) all expected returns are positive while in "bear market 2" (P5) – negative.

 $^{^{80}}$ See Brigham, Gapensky, 1991, Jajuga, 2000, Witkowska et al., 2008.

 $^{^{81}\,\}mathrm{Some}$ results are presented in Bak, 2010.

	P0	P1	P2	P3	P4	P5	P6
	whole period	stagna- tion	bull market 1	bear market 1	bull market 2	bear market 2	bull market 3
τ	2593	499	989	207	249	433	211
y min	-8.44	-4.69	-3.31	-2.07	-5.07	-8.44	-4.54
y _{max}	9.38	8.75	6.25	2.21	2.37	8.27	9.38
ÿ	0.06	0.04	0.16	-0.05	0.17	-0.31	0.33
м	0.07	0.06	0.12	-0.07	0.24	-0.20	0.15
R	17.82	13.44	9.56	4.28	7.44	16.71	13.92
s	1.09	1.04	0.78	0.52	0.93	1.55	1.60
V	18.17	26.00	4.88	-10.40	5.47	-5.00	4.85
Α	-0.07	0.72	0.576	-0.26	-2.09	-0.50	0.97
К	10.45	11.62	6.403	2.94	8.93	5.72	4.90

Table 49 Description of Percentage Daily Rates of Returns from Indexes: OMXB

	P0	P1	P2	P3	P4	P5	P6
	whole period	stagna- tion	bull market 1	bear market 1	bull market 2	bear market 2	bull market 3
Т	2593	499	989	207	249	433	211
y min	-31.28	-5.70	-3.86	-2.55	-5.70	-6.80	-31.28
y _{max}	12.86	7.62	7.44	2.58	2.53	5.86	12.86
ÿ	0.05	0.00	0.17	-0.01	0.13	-0.23	0.16
м	0.07	0.03	0.13	0.02	0.18	-0.16	0.08
R	44.14	13.32	11.30	5.13	8.23	12.67	44.14
5	1.36	1.24	0.92	0.58	1.11	1.54	2.83
V	27.20	×	5.41	-58.00	8.54	-6.70	17.69
Α	-4.48	0.16	0.674	-0.41	-1.68	-0.34	-5.97
K	115.26	4.73	6.829	4.67	7.01	2.78	73.50

Source: Own calculation.

Table 50 Description of Percentage Daily Rates of Returns from Indexes: OMXT

Source: Own calculation.

Using variability coefficients we may compare risk at different markets. The smallest variability is observed at the aggregated and Vilnius markets (with exception of OMXB in the period P1). The biggest values for this coefficient are observed in the "bear market 1" (P3) for OMXT -58% and OMXR 37%.

It also visible (in Tables 49–52) that all time series are characterized by asymmetric distribution and they are leptokurtic. Asymmetry measure is negative for the majority of periods and indexes.

	P0 whole period	P1 stagna- tion	P2 bull market 1	P3 bear market 1	P4 bull market 2	P5 bear market 2	P6 bull market 3
τ	2593	499	989	207	249	433	211
y _{min}	-13.68	-9.71	-6.74	-6.54	-3.02	-7.56	-7.53
y _{max}	10.72	4.69	5.05	4.44	3.02	9.59	10.72
ÿ	0.06	-0.05	0.11	0.03	0.08	-0.26	0.19
м	0.02	-0.01	0.04	-0.05	0.05	-0.21	0.19
R	24.39	14.40	11.79	10.98	6.03	17.15	18.24
s	1.62	0.92	0.97	1.11	0.81	1.79	2.11
V	27.00	-18.40	8.82	37.00	10.13	-6.88	11.11
Α	-0.32	-1.98	-0.177	-0.43	-0.16	0.20	0.68
к	13.31	26.28	7.937	6.63	2.11	3.71	3.64

Table 51 Description of Percentage Daily Rates of Returns from Indexes: OMXR

	P0	P1	P2	P3	P4	P5	P6
	whole period	stagna- tion	bull market 1	bear market 1	bull market 2	bear market 2	bull market 3
т	2593	499	989	207	249	433	211
y min	-9.71	-13.68	-4.35	-3.56	-3.72	-8.71	-5.49
y _{max}	11.63	9.92	4.64	3.53	2.68	11.63	11.55
ÿ	0.05	0.17	0.20	-0.14	0.15	-0.27	0.32
м	0.03	0.09	0.14	0.00	0.19	-0.09	0.05
R	21.34	23.60	8.99	7.09	6.40	20.34	17.04
s	1.17	2.46	0.84	1.02	0.88	1.70	1.81
V	23.40	14.47	4.20	-7.29	5.87	-6.30	5.66
Α	0.07	-0.70	0.49	-0.15	-0.95	-0.14	1.45
K	15.73	8.99	3.719	1.77	2.97	10.30	8.04

Source: Own calculation.

Table 52 Description of Percentage Daily Rates of Returns from Indexes: OMXT

Source: Own calculation.

The comparison of expected daily rates of return is presented at Figure 51. As one can notice returns are similar for all indexes only when the whole period (i.e. P0) of investigation is taken into account. The highest differences between indexes are visible for periods of "stagnation" P1 and "bear market 1" i.e. P3. The highest average daily loses appear during financial crisis i.e. in the period P5 while the highest daily returns are visible in the last period of analysis.

One can also analyze returns evaluated for the whole considered periods (due to Formula (26)) i.e. hypothetical situation described by the invest-



Figure 51 Comparison of Daily Average Rates of Returns for Investigated Periods; Daily Expected Rates of Return Source: Own calculation.



Figure 52 Comparison of Periodic Rates of Return in Considered Periods

Source: Own calculation.

ment strategy: buy at the beginning of the period and sell at the end of the period (Figure 52). As one can notice the highest returns from all indexes investors could gain in the period P2 (i.e. "bull market 1") while negative returns are observed for all indexes in the period P5 i.e. during financial crisis.

Taking into account expected returns, we verify the null hypothesis, Eq. (29), and we found out (Table 53) that statistically significant positive returns are observed at all markets in the periods P0 (i.e. for the whole sample) and P2 (– "bull market 1") while negative rates of re-

	P0	P1	P2	P3	P4	P5	P6
ОМХВ	2.80**	0.86	6.45**	-1.38*	2.88**	-4.16**	3.00**
ОМХТ	1.87**	0.00	5.81**	-0.25	1.85**	-3.11**	0.82
OMXR	1.89**	-1.21	3.57**	0.39	1.56*	-3.02**	1.31*
ΟΜΧΥ	2.18**	1.54*	7.49**	-1.97**	2.69**	-3.30**	2.57*

Table 53 Value of u-statistic (Eq. (30))

Note: We denote by ** rejection of the null hypothesis at the significance level 0.05, and by * - rejection at the significance level 0.1. Source: Own calculation.



Figure 53 Comparison of Relative Frequencies of the Number of Positive Returns



Source: Own calculation.

Figure 54 Comparison of Relative Frequencies of the Number of Negative Returns

Source: Own calculation.

turn appear in the period P5 (– "bear market 1"). In the period P1 (stagnation) returns are not significantly different from zero.

We also compare relative frequencies of positive, negative and zero returns that are observed in each period (Figures 53, 54 and 55).⁸² As we expected count of negative returns is bigger than the positive ones during the "bear market 2" (P5) for all markets, in the period P3 for all but one (i.e. OMXT) indexes and in stagnation period (P1) only for the Riga market.

Comparing domestic and aggregated Baltic markets in the whole analyzed period, we notice (Figure 55) great similarities of the return tendencies at all markets. Although the index of the largest and the most traded shares OMXB seems to perform more positive returns than other indexes that are all share domestic ones.



Figure 55 Comparison of Relative Frequencies of the Number of Positive, Negative and Zero Returns in the Whole Period (3.1.2000–9.3.2010) of Analysis Obtained for each Investigated Stock Index

Source: Own calculation.

 $^{^{82}}$ Detailed information for each market and sub-period is presented on Figures 56–61 in the Appendix, pages 267–269.

13.7 Conclusions

On the basis of empirical analysis we conclude as following:

- 1. Capital markets in the Baltic states has been developing in different rates.
- 2. The most dynamic development is visible for Lithuania.
- 3. Estonian security exchange seems to play the most important role among Baltic domestic capital markets.
- 4. Share of Riga market has been decreasing and at present it seems to be insignificant at the aggregated Baltic market.
- 5. Mutual relation among all analyzed indexes is strong for the whole period of investigation, all three "bull market" periods and the "bear market 2" periods (i.e. for all distinguished period except the period P3).
- 6. Investing at the Vilnius Stock Exchange during bull periods (i.e. in the periods P2 and P6) generated the highest average daily and periodic rates of return.

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13.9 Appendix

	Tallinn	Riga	Vilnius	Baltic total
Baltic Main List				
Number of companies	14	5	17	36
Turnover (EUR)	1312534.34	9434.74	642531.34	1964500.42
Baltic Secondary List				
Number of companies	7	29	22	58
Turnover (EUR)	304	25504.01	286483.33	312291.34
Grand total				
Number of companies	21	34	39	94
Turnover (EUR) 8.11.2010	1312838.34	34938.75	929014.67	2276791.76
Turnover (% of total)	57.66%	1.53%	40.80%	
Turnover (EUR) 9.11.2010	1457631.83	177214.74	1494649.78	3129496.35
Turnover (% of total)	46.58%	5.66%	47.76%	

Table 54 Structure of Baltic Market: Daily Quotationson November 8 and 9, 2010

Source: http://www.nasdaqomxbaltic.com/date=08.11.2010.

Turnovers	Tallinn market	Riga market	Vilnius market	Baltic total
Maximal	2005	2000	2006	2005
Minimal	2001	2009	2000	2009
Rate 200/2000	-18.20	-94.38	84.00	-28.34

Table 55 Comparison of Turnovers at Baltic Markets: Years of Maximal and Minimal Turnovers and Percentage Rate Turnovers in the Years 2000–2009

Source: Own elaboration on basis of data from nasdaqomxbaltic.com.

13.9.1 Comparison of Relative Frequencies of the Number of Positive, Negative and Zero Returns in Sub-periods



■ positive ■ negative ■ zero

Figure 56 Period 3.1.2000-30.11.2011

Source: Own elaboration.



■ positive ■ negative ■ zero

Figure 57 Period 30.11.2001-30.9.2005

Source: Own elaboration.





Source: Own elaboration.





Figure 59 Period 31.7.2006–31.7.2007

Source: Own elaboration.





Source: Own elaboration.





Figure 61 Period 30.4.2009-9.3.2010

Source: Own elaboration.

IV Epilogue

Epilogue

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Some readers may find the contributions in this volume pessimistic, stressing problems and complications at the expense of opportunities. However, recent developments indicate that the world economy in general and that of the Eurozone in particular are still mired in the deteriorating cycle.

Indeed, the nature of problems differs around the world. USA are still in the process of deleveraging and facing dilemmas related to it. In simple terms: Baring the acceleration of the rate of technological change, the restoration of the US economic growth requires consumers to restore the growth of spending. Rising demand would then restore investments. Together rising consumption and investments would restore the full employment and hence the long-term economic growth.

Precondition for that is to bring the household debt (or, to be precise, the net asset position) in relationship to the expected permanent income to the levels households and individuals are comfortable with. At present it appears that a majority of households still deems their debt to be too high (i.e. the net asset position is too low). This results in a relatively higher asset accumulation (i.e. higher savings) and hence lower consumption. Combined with an increased risk aversion due to the recent recession shock dynamics and the persistently high unemployment, this behavior constitutes the main barrier to the restoration of a long-term, self-sustaining growth.

Indeed, economic policies of the Obama administration contributed to the prolongation of this barrier by reducing – but not eliminating – the decline in financial asset positions. This prevented the recession turning into a depression, but by prolonging the deleveraging process it prolonged the economic underperformance.

The good news is that this process is indeed gradually coming to the conclusion. The end of deleveraging combined with a pent up demand for both investment goods and consumer durables should restore the employment and the long-term growth starting in 2013 (or perhaps even late 2012).

The Chinese economy is clearly slowing down, which is reflected in the stagnant world demand for shipping and commodities. In some sense this is expected – the frantic pace of the Chinese expansion was clearly unsustainable. At some point the need to slow down and consolidate is not only necessary, but even desirable.

But Chinese problems run deeper. Enormous fiscal stimulus (25% of GDP) designed to copy with the impact of 2008–2009 recession on Chinese economy resulted in the growing overcapacity and a housing bubble. Perhaps more importantly, financial disequilibria financed by monetary expansion lead to a creeping inflation. To restore the equilibrium Chinese will have to engage in a deleveraging of their own. That may lead to an increased export drive – a complicated prospect in a clearly stagnant world economy.

And, indeed, one should mention the Chinese demographics. It is estimated that the Chinese labor force will decline by about 45 million people by 2020. That will lead to an increase in wages, but probably to a decline in the domestic consumption as well.

One surmises that Chinese will manage a "soft landing", but it would be naïve to expect China to take over the role of the world economic locomotive – certainly not in the current decade. (But, indeed, this analysis ignores perhaps the most vexing – and threatening – of Chinese problems, namely the rising surplus of men in marrying age. But that is the issue which goes beyond the scope of this book.)

The Chinese slowdown will affect other Asian economies – and perhaps some non-Asian, like Germany (via German exports) as well.

European situation is more complicated than either US or China. The key to the understanding of the European conundrum lies in the fact that in contrast to the US or even China (and associated Asian economies), Europe remains a geographical term and the cultural and social phenomenon (in broadest possible sense of those terms), but it is hardly a coherent and integrated economic area, the pretentions of the European elites notwithstanding.

Differing structural characteristics, traditions and the history of an economic and political behavior were by and large ignored when the common currency Euro was launched in January 1999. The common financial and monetary space was quickly established. Nominal interest rates rapidly converged in the newly created Eurospace. However, the above mentioned differences in structural characteristics, traditions and the behavioral stereotypes resulted in persistent inflation differentials. Those appeared to be small and basically unimportant as inflation goes. However, in the environment of the converging nominal interest rates they led to a persistent and significant differences in real interest rates.

Diverging real interest rates made the borrowing in higher inflation countries cheaper, leading to the economic expansion – i.e. the faster growth relative to the rest of the Eurozone. This then not only perpetuated the inflation differentials, but rising domestic demand resulted in the faster growth of domestic wages. And as long as the rising domestic demand was concentrated mostly on non-tradeables – predominantly housing and services, with a limited productivity growth potential – the rising wages resulted in unit labor costs growing faster in the affected countries. REER's (real effective exchange rates) appreciated.

The results are the rising private indebtness of domestic agents, reflected consequently in rising and persistent current account deficits of affected countries. The risk then arises that any shock to the income generating (and hence the debt servicing) abilities of domestic agents will trigger financial instability affecting both private and public sectors (the latter via a tax revenue effect).

As far as such a result affects only some Eurozone member countries, it is a classical example of an asymmetric shock. And it is necessary to point out that such a shock is the consequence of the functioning of the common currency area (the Eurozone) in the real world of different "national" economic structures (especially the differences in tradeables and non-tradeables shares) which results in persisting inflation differentials.

Obviously, the Eurozone in its present form and structure is unsustainable – the fact which is increasingly recognized even in the "europeanist" circles. The question indeed arises of how to solve the "problem".

Three possible alternatives offer themselves. First is the restoration of the worldwide economic growth. The logic here is that the growth improves simultaneously the balance sheets of financial institutions and public finance positions via rising tax revenues. This is the dream solution of European integrationists – after all, it does not require any hard thinking or unpopular decisions. But as the discussion above indicates, the likelihood of the restoration of the economic growth worldwide is extremely low – at any case before 2014. A dream remains what it is – a dream.

Second alternative is the fiscal union (transferunion in german). In essence it entails a centralization of the decision making regarding the collection and distribution of tax revenues union-wide and (as a consequence) a centralized control of public expenditures. Recent EU actions are clearly steps in this direction, albeit rather tentative and veiled in the "save the Euro and EU" rhetoric. But this "solution", albeit favored by integrationist circles and Europeanist elites, has almost no chance for success beyond the immediate short-term time horizon.

Europe is the "Europe of Nations". Even if the advent of the EU resulted in more than an economic integration (unrestricted flow of goods, capital and people), each member state preserves a significant autonomy in its tax structure, public expenditures (which include pensions and healthcare), labor market structures etc. These are given by history and were (and are) very resistant to any "harmonization". The result indeed is that some nations are more "successful" in maintaining a long-term fiscal stability than others – hence the fiscal union would necessarily entail either long-term fiscal transfers or the significant restrictions on the fiscal (and in this context it means political and social as well) autonomy of at least some member states.

At the current stage of European integration such an outcome is not politically feasible. Moreover, the ageing process is bound to exert more pressures on fiscal positions of even "successful" countries, making any "structural" fiscal transfers politically virtually impossible (at least in democracy).

The third alternative is a restructuring of the Eurozone. Several possible versions of this alternative were discussed by some economists recently. However, no matter how analysts envisage this possibility, the end result seems to be a "new" common currency zone centered in Northern and Eastern Europe around Germany and Holland and the restoration of the currency sovereignty for Portugal, Italy, Greece, Spain and Portugal. France and Belgium remain on the edge, with a probable bias toward the German led currency group.

Historically, the disintegrations of currency zones or even monetary unions were manageable affairs, with a very limited negative impact. However, the current Eurozone's situation is different. In contrast to historical experiences the Eurozone is a financially integrated area, but the one where agents in the southern countries (i.e. the Mediterranean plus Portugal and Ireland), both public and private, issued a significant amount of liabilities to buyers in the North – especially to northern financial

institutions. Independently on this, many of those institutions are in a rather precarious financial state.

Reintroducing a currency which would separate disciplined North from the fragile South would create a very risky and unpredictable situation. If Southern liabilities would be kept on books of Northern financial institutions in Southern currency denomination, an impairment of balance sheets of those institutions would be probably enough to require recapitalization. Northern credit would be reduced (temporarily, but nevertheless) and South would be cut off from capital inflow, reducing the domestic investments and public spending (again, temporarily but nevertheless) to a depression level. Keeping the Southern liabilities in Northern institutions in terms of Northern currency would imply for Southern countries a foreign debt of a magnitude which would probably lead to the immediate bankruptcy – with the impact on Northern financial institutions more or less the same as mentioned above.

Damned if you do and damned if you do not. Unfeasibility (or better: political impossibility) of EU's fiscal union (transferunion) and economic risks of the European's restructuring are behind a somewhat "sluggish" response of the European policymakers to the ongoing crisis. Given the discussed alternatives they simply hope the by muddling through – the policy sometime described as "kicking the can down the road" they gain enough time for the world growth to return. The first alternative described above would then apply and European problems and dilemmas would be (hopefully) solved.

But that is unlikely to happen – at least not till 2014 or even 2015. Hence a new approach is needed. That is where the concept of the dual (sometimes called parallel) currency regime may enter the play. In essence it means a re-introduction of a second (domestic) currency alongside the Euro in some countries for all domestic money functions.

Introduction of the "dual" currency would facilitate a restoration of competitiveness (Euro denominated costs – i.e. the internal devaluation) while simultaneously mitigating the devastating impact of current "austerity" arrangements on employment, standards of living and the political stability. Moreover, it could mitigate fiscal stresses by generating some inflation tax revenue.

Indeed, for this to work a managed bankruptcy (i.e. the debt restructuring) in the countries introducing the dual currency regime would be necessary, reducing the present value of the Euro denominated liabilities to a serviceable level. That would indeed affect the creditors (Northern financial institution) but to a lesser and more manageable degree (if done properly, in a cooperative manner) compared to the case of outright leaving the Euro.

Some may argue that the introduction of a dual currency regime is illegal under European treaties. It may well be so, but so are policies introduced today to help to "kick the can down the road".

At any case, whereas US and Chinese economies will present rather grey and essentially boring picture of a sluggish performance in the next 2-3 years, Europe promises to provide exciting, intellectually stimulating and dramatic scene. Let us look forward to it.

> Antonin Rusek, Selinsgrove, PA, August 14th, 2011

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