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The effect of asymmetries in fiscal policy conducts on business cycle correlation in the EU

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The effect of asymmetries in fiscal policy conducts on business cycle correlation in the EU

Working Paper no 62

Authors: Petr Rozmahel, Ladislava Issever Grochová, Marek Litzman (MUAF)

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The effect of asymmetries in fiscal policy conducts on business cycle correlation in the EU

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The effect of asymmetries in fiscal policy conducts on business cycle correlation in the EU

Petr Rozmahel, Ladislava Issever Grochová, Marek Litzman (MUAF)

Contribution to the Project

The paper deals with the issues of fiscal policy harmonisation in the EU with a special attention given to the countries staying out of the Euro area including the CEE countries. The paper identifies the fiscal indiscipline and dissimilarity together with the non-Euro area membership to have negative effects on correlation of business cycles in the EU. The paper intends to contribute to the discussion on the implications of current insider-outsider constellations for European governance.

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Abstract

The paper examines the effects of asymmetries in fiscal policy conduct upon the correlation of business cycles in the European Union. In particular the paper estimates the effects of fiscal indiscipline and dissimilarity on business cycle correlation in the period 1996-2012 using a panel of 27 EU countries. The paper pays special attention to Central and Eastern European countries and examines the effects of interactions between fiscal policy measures and the fact that the country has not yet adopted the Euro. The results show a significant and robust negative effect of fiscal indiscipline and dissimilarity upon business cycle correlation in the EU. The paper also provides some evidence for the significance of intra-industry trade as well as of the interactions between fiscal measures and non-Euro area membership. The study provides arguments for fiscal policy harmonisation and fiscal discipline of the Euro area member as well as acceding countries, as undisciplined and dissimilar fiscal policies are shown as sources of business cycle deviations from the average European cycle.

Key words: European integration, Euro area, business cycle correlation, fiscal divergence, fiscal irresponsibility, optimum currency area

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1. Introduction

Monetary and economic integration in Europe is continuing. The European Union, as well as the Euro area, has been enlarging gradually. Also the progress in macroeconomic policy harmonisation has been obvious over the past decade. However, the progresses in the harmonisation of monetary and fiscal policies are remarkably different. Whereas the European Central Bank conducts common monetary policy for the Euro area member countries and acceding countries are also expected to adjust their policies in line with the Maastricht convergence criteria, fiscal policy is still under the control of national authorities. Apart from the augmentation of the Stability and Growth Pact (SGP) by the Fiscal Compact rules introduced in the Treaty on Stability, Coordination and Governance (2011), there has been hardly any progress in the process of government spending and tax policy harmonisation so far in Europe.

The asymmetry in fiscal and monetary policy harmonisation implies problems for Euro area member as well as non-member countries as the autonomous fiscal policy influences public debts and leads to substantially increasing debt-to-GDP ratios in some states. As stated by Feldstein (2005), the current institutional structure of Europe, with centralized monetary policy and decentralized fiscal policy, creates a strong bias towards irresponsible behaviour of governments leading to large chronic fiscal deficits and rising ratios of debt-to-GDP. Apart from a lack of fiscal discipline in general, Kočenda et al. (2008) observe the extent in the heterogeneity in the fiscal convergence. They also find higher fiscal discipline of the CEE countries acceding to the Euro area than the EU 15. They conclude that current fiscal practices may destabilize economic activity in the European Union, and delay the adoption of the Euro in the acceding countries.

The literature also provides some evidence of the negative impact of undisciplined and divergent fiscal policies on business cycle correlation in the European Union, especially in the Euro area. Reduced business cycle correlation increases the costs of common monetary policy from the perspective of the Optimum Currency Areas theory (OCA). The OCA endogeneity hypothesis suggests factors that influence the OCA criteria such as business cycle similarity. Among these the impact of fiscal policy harmonisation upon cyclical similarity is also discussed in this framework. Despite there being no existing theoretical formal model describing the link between fiscal convergence and business cycle correlation, Darvasz et al. (2005) explain the link intuitively and test it empirically. They find statistically significant and robust evidence of a negative impact of fiscal indiscipline and divergence on business cycle synchronization. They explain that countries running persistently high budget deficits are also countries that create idiosyncratic shocks. Accordingly, reducing the scope for idiosyncratic shocks by reducing the budget deficits raises the coherence of the business cycle with other countries. This argument is also supported by Crespo et al. (2011). In their study fiscal deficits are shown to be an important potential source of idiosyncratic macroeconomic shocks, especially in the Euro area. Given the fact that fiscal objectives are driven by national priorities, they could later turn into another source of asymmetric shocks. Such effects might affect the CEE countries and the dynamics of their integration into the Euro area since low correlation of business cycles is a strong argument of the CEE national authorities for postponing Euro adoption in their countries.

To demonstrate current fiscal heterogeneity and indiscipline in Europe one might compare the fiscal behaviour of countries and country groups before and after the major impact of the global

financial crisis. The debt-to-GDP ratio increased by 0.4 percentage points (p.p.) from 2000 to 2006 in the EU27 as well as in the Euro area (17 countries). In 2007-2012, the debt-to-GDP ratio increased by 26.3 % in the EU and by 24.3 p.p. in the Euro area. Using another division of the country-groups comprising the EU core, periphery and CEE countries[1], there is a different development of fiscal measures in that period. In 2007-2012, the core countries increased the debt-to-GDP ratio on average by 19.2 p.p. and CEE countries by 18.5 p.p. By contrast, in the periphery countries this ratio increased by more than 54 p.p. in the same period. The majority of CEE countries, including Czech Republic, Poland, Slovakia, Slovenia and also Bulgaria and Romania, still keep their indebtedness at up to 60% of GDP[2]. The average indebtedness of the Euro area countries amounted to a level of 90% in average in the same period.

Regarding the effect of fiscal policy upon business cycle correlation suggested in the literature and when looking at the current situation in Europe, one might argue about the direction of causality. The idiosyncratic fiscal policy, which is usually related to fiscal irresponsibility, can be considered as being a source of macroeconomic shocks reducing business cycle correlation. In contrast, in the case of asymmetric macroeconomic shock, the idiosyncratic fiscal policy of a country might be the result of a country's attempt to cope with the shock. Thus, such a divergent fiscal policy can lead to a higher cyclical correlation as a consequence in this case. This ambiguity makes the question of the link ultimately empirical (Darvasz et al., 2005).

Regarding the current discussion on the need of moving closer towards a fiscal union arrangement in Europe, which is a highly sensitive issue in the CEE countries acceding to the Euro area, the effect of fiscal policy upon cyclical macroeconomic performance is examined in the paper. Hence, the paper asks what the effects of dissimilar and undisciplined fiscal policies are upon business cycle correlations in Europe.

In particular, the paper examines whether the countries keeping a fiscal discipline measured by the Fiscal Compact criterion of a structural deficit have more synchronized business cycles with the EU 15 and EU 27 average. In addition, the paper tests whether closing the fiscal gaps, e.g. lowering the differences between the national government debts per head and the EU15 and EU27 average leads to higher business cycle correlations. Giving special attention to CEE countries, the paper also examines the interaction between the fiscal policy measures and the fact that the country has not yet adopted the Euro. From this point of view, the paper intends to contribute to the discussion on the implications of current insider-outsider constellations for European governance.

[1] The following division is used. Core: BE, DK, DE, FR, LU, NL, AT, FI, SE; CEE countries: BG, CZ, EE, CY, LT, LV, HU, PL, RO, SK, SI; periphery: IE, GR, ES, IT, PT.

[2] Updated to 2012.

2. Literature review

2.1 OCA theory endogeneity: business cycle similarity drivers

The EU membership brings for all new EU members including the CEE countries the commitment to adopt the Euro when reaching appropriate level of convergence. Apart from the Maastricht criteria, the ECB and the authorities of acceding countries regularly evaluate other relevant criteria to assess the preparedness for joining the Euro area. Low business cycle correlation belongs among the most frequent arguments for postponing the process of the Euro adoption in the CEE countries. Business cycle correlation measuring has become a popular subject of academic research over the past two decades, especially with regards to the European economic and monetary integration.

The examination of business cycle correlation in the European integration processes has its underpinnings in the literature of Optimum Currency Areas (OCA) theory. In its exogenous approach, the theory defines business cycle similarity as an important criterion to be reached before joining the common monetary union. High business cycle similarity minimizes the risk of the occurrence of asymmetric shocks, which would be difficult for a common central bank in the union to deal with. From this point of view the acceding countries are supposed to reach the appropriate level of convergence and similarity including the business cycle correlation before entering the Euro area.

In a later development of the theory, the OCA endogeneity hypothesis became a subject of the research interest. According to the hypothesis, the OCA criteria cannot be considered purely exogenous as they can be affected by the integration factors. In particular, as the countries become more integrated in terms of economic and trade relations, their cycles become more correlated.

Apart from rising trade intensity, the OCA endogeneity hypothesis introduces other factors of which drive the business cycle correlation. The hypothesis has the implications for the acceding countries with relatively less correlated business cycles to the Euro area members. The cyclical correlation of the new Euro area countries to the rest of the monetary union might increase after adoption of the Euro. The purpose of the paper is to contribute to discussion on the OCA criteria endogeneity by shedding some light on the link between the fiscal policy discipline and harmonisation and similarity of business cycles. In particular, the paper examines the effect of fiscal indiscipline and dissimilarity on business cycle correlation in Europe with a special attention to the CEE countries acceding the Euro area.

Regarding the brief historical development of OCA theory, Mundell originally proposed it in a pioneering article (1961) and it then extensively developed. A traditional list of the OCA criterions defined in the early phase of the OCA theory's development, e.g., by Ingram (1962), McKinnon (1963), Kenen (1969), Mintz (1970), Corden (1972), comprises of similarity in the inflation rates, similarity in industrial and production structures, diversification of output, labour and factor mobility, and flexible wages or fiscal integration. After a period of an *intellectual limbo* (Tavlas, 1993), meaning the lack of research interest, OCA theory revived due to the intensive integration processes in Europe starting during the 1990s. Business cycle similarity and also shock asymmetry are the criterions becoming frequently applied under the approach of the "New" optimum OCA theory (Mongelli, 2002, 2008). The original Mundellian OCA approach considered

business cycle similarity to be exogenous to monetary policy. From this point of view, the cyclical similarity is a necessary precondition or a desired condition for countries forming a common monetary union. The recent developments in the OCA literature has emphasised the empirical applicability of OCA criteria so that further EU and EMU enlargement intensions could be tested and examined. Highly influential works by Bayoumi and Eichengreen (1993, 1996, and 1997) introducing the OCA index, shock asymmetry testing and other OCA empirical applications come from these times.

Rather than an exogenous approach, the endogenous character of business cycle similarity and convergence in integrating Europe has become the subject of many theoretical and empirical papers in the past two decades. The OCA endogeneity hypothesis has been stimulated by a well-known disputation between Paul Krugman's (1993) negative view on regional specialization[3] and the opposing European Commission's view (1990) advocating the beneficial effects of production diversification and business cycle convergence resulting from continuing economic and monetary integration. Frankel and Rose (1997, 1998) contributed to the OCA endogeneity discussion significantly when finding evidence of the positive influence of trade intensity upon business cycle correlation. More precisely, intra-industry trade was identified as a business cycle similarity (Fidrmuc, 2001, 2004). Other studies confirmed the influence of bilateral trade upon output correlation (e.g. Fontagne and Freudenberg (1999), Gruben et al. (2002) or Calderón et al. (2007), Baxter and Kouparitsas (2005)), although the size of the effect differs substantially. In other words, the OCA endogeneity hypothesis suggests rising business cycle correlation due to increasing trade intensity among the Euro area member countries. The evidence of positive effect of monetary integration upon bilateral trade of integrating countries was given in Rose (2000), Rose and Wincoop (2001), Persson (2001) Frankel-Rose (2002). Regarding the following OCA literature development, other business cycle correlation factors such as fiscal policy harmonisation (Darvas et al., 2005; Kocenda et al., 2008, Crespo-Cuaresma et al., 2011), financial market integration, specialization in production (Kalemli-Oczan et al., 2001, 2003; Inklaar et al., 2008; Imbs, 2004) exchange rate volatility (Otto et al. 2001, Enders, Z. et al., 2013), capital flows (Jansen and Stockman, 2004), institutional changes (Canova et al. 2012), etc. have been identified.

Considering the later development of the OCA endogeneity hypothesis there are also arguments dampening the estimated endogenous effects of integration process. Willet et al. (2010) stress that there is a lack of theoretical analysis in the OCA literature explaining the expected time horizons for various types of endogenous effects. The time frame of the endogenous responses in labour market flexibility and macro policy coordination was inadequately analysed and discussed in recent literature. The authors also expect different patterns of the endogenous spillovers and responses across the Euro area countries. Similarly, Matthes (2009) states that although the endogenous effects of EMU are theoretically relevant, in practice their ability to foster the convergence among the Euro area countries is limited and the real impact is of low importance so far. Other empirical studies such as Vieira and Vieira (2012) or Buscher and

[3]Krugman's specialization hypothesis is in line with conclusions by Kenen (1969) defined during the early phase of OCA theory development. Kenen also forecasted a higher sensitivity of monetary union members to idiosyncratic sectoral shocks due to their lower diversification of production.

Gabrisch (2012) provide evidence that OCA endogeneity does not hold for some EMU countries or has a little impact under current economic conditions in Europe.

Most of the critical studies mention a lack of theoretical as well as empirical literature on the endogenous effects of the monetary integration in Europe. Particularly, there is a need for theoretical models explaining the estimated effects. To some extent this applies also for the effects of fiscal policy harmonisation.

2.2 The role of fiscal policy in business cycle correlation and convergence processes

Authors focussing on this topic often mention the lack of literature on the issue of the effect of fiscal policy asymmetries on business cycle similarity and convergence. Darvas et al. (2005) state, that no one to their knowledge, had explored the link between differences of national fiscal policies and the synchronisation of their business cycles. They also point out that there is theoretical model formally linking fiscal convergence to business cycle synchronisation. They use the average differences between fiscal positions as well as differences in the level of total government budget deficits as measures o fiscal policy differences.

Using a panel of 21 OECD countries over the time period 1964-2003, Darvas et al. (2005) find an empirically robust and significant relation between fiscal convergence and more synchronised business cycles. They also find evidence that reduced primary deficits (or higher surpluses) increase business cycle synchronisation across countries. Regarding the gap in related literature, Kočenda et al. (2008) intend to provide a comprehensive empirical study on fiscal convergence in the new EU states. Although their study does not focus on business cycle similarity directly, it provides an interesting suggestion of fiscal convergence evaluation. The authors modify the methodology proposed by Vogelsang (1998, 1999) and apply alternative measures of fiscal convergence. They use flexible convergence tests allowing for structural breaks. Their study observes a poor progress in fiscal convergence and a lack of fiscal discipline in general across the EU countries. The fiscal discipline is measured in terms of satisfying the convergence criterion of the Maastricht Treaty. The deficit-to-GDP and debt-to-GDP ratio is compared to the two related Maastricht benchmarks. The new EU countries reveal themselves to be relatively more fiscally disciplined than the old EU15. As a conclusion Kočenda et al. call for new fiscal reforms to achieve a credible and strong fiscal union. Not surprisingly, the lack of attention to fiscal policy influence on business cycle similarity in the EU is mentioned in another influential paper on that issue by Crespo-Cuaresma (2011). They analyse the effect of fiscal policy applying the fiscal budget surplus and other factors on cyclical synchronisation in the EU in the period 1995-2008. They suggest original business cycle synchronisation indicator, measuring the relative differences in business cycle dispersion in the reference country groups. According to authors, this measure allows for more detailed analysis of the dynamics of business cycle coherence than the bilateral correlation coefficients. Examining the endogeneity problems, they employ instruments for fiscal policy measures capturing mainly the information on political determinants of fiscal stances. Their results show that fiscal policy and trade integration are important drivers of business cycle synchronisation. They conclude that the fiscal deficits are identified as sources of idiosyncratic macroeconomic fluctuations in the Euro area. Their findings are in line with those of Artis et al. (2008). They identify divergent fiscal policies and

heterogeneous labour market rigidities as factors lowering business cycle synchronicity, regardless of the definition of other determinants such as trade and financial integration.

Inklaar et al. (2008) re-examine the impact of various factors, including monetary and fiscal policies, financial integration and specialization and also trade intensity, upon business cycle synchronisation. They find that the effect of trade intensity on business cycle similarity is smaller than previously reported in literature. They find the effects of fiscal and monetary policies to be at least as strong as the trade effect. Using a panel of OECD countries, Furceri (2009) finds some evidence that countries with similar government budget positions tend to have smoother business cycles, meaning that fiscal policy convergence might lead to smoother cycles. In addition to that, such reduced cyclical volatility due to fiscal convergence stimulates growth. Regarding the lack of literature focused primarily on the link between fiscal policy and business cycle similarity, there are a number of papers dealing with fiscal policy characters. Some useful implications might be drawn from those papers for business cycle similarity analysis. Apart from the already mentioned paper by Kočenda et al. (2008), Holm-Hadulla et al. (2012) provide some evidence of the effect of unexpected output gap changes and numerical expenditure rules upon fiscal discipline. They find a procyclical fiscal behaviour of those governments that have no strict numerical expenditure rules. Accordingly countries with strict numerical expenditure rules do not have a pro-cyclical bias of their spending policies, which provides an argument for the need for rule-based restrictions to expenditure policy. Finally, Fatas and Mihov (2010) provide a comprehensive comparative study on the link between fiscal policy and the business cycle in the Euro area and United States. They find the Euro-wide fiscal policy more procyclical than in the United States, where it is strongly countercyclical. On the contrary, the automatic stabilizers are larger and fiscal policy is less volatile in the Euro area.

2.3 Business cycle similarity measuring: The lack of consensus in OCA methodology

Although OCA theory provides a strong theoretical framework for all OCA criteria selections, including business cycle similarity, it does not suggest a unified methodological approach to be applied for empirical testing. Therefore the studies usually differ in the way in which the business cycles are identified and similarity is measured. Considering the business cycle identification problem, the approaches differ depending on whether classical business cycles or deviation cycles are supposed to be the subject of the analysis. Whereas the classical cycles are considered as fluctuations in absolute levels (in terms of absolute expansions and recessions) of the aggregate economic activity (Burns and Mitchel, 1946), the growth (deviation) cycles are defined as deviations of the aggregate economic activity around its trend (Lucas, 1977).

Thus, the latter approach assumes some type of detrending technique to be applied to dissect the cyclical component of the analysed economic time series. According to studies by De Haan et al. (2008) or Fidrmuc and Korhonen (2006), growth cycle analysis predominates in economic literature. King and Rebelo (1993) consider using a stationary time series in the case of growth cycle analysis as being the most important advantage of this approach. In addition, Artis et al. (2004) point out that Central and Eastern European countries are characterised with high growth trends. Therefore they consider it appropriate to use growth cycle analysis for those countries. On the contrary, there are still studies, such as Bordo and Helbling (2010), Giannone et al.

(2008), or Ozyildirim et al. (2010) which analyse classical cycles using a sufficiently long time series of data.

Considering the dominance of growth cycle analysis, the problem of selecting an appropriate detrending technique occurs. A discussion comprising influential works by Canova (1998, 1999), Baxter and King (1999), Stock and Watson (1999), Schenk-Hopé (2001), Watson (2007), Estrela (2007), Kauermann et al. (2011) points out the weaknesses and threats of existing detrending approaches and particular filters and tests the characters and statistical properties of "ideal" filters. The critique applies to time as well as frequency domain filters. As an outcome of this discussion, a set of different filters is typically applied together in business cycle studies to prevent the problem of individual filter imperfections and to support the robustness of results.

In addition to the problem of a subjective choice of a detrending technique, the studies also differ in the measure of similarity. The simple Pearson's correlation coefficient is the most often used measure of business cycle similarity in literature, as stated by De Haan et al. (2008), Flood and Rose (2010) or Mink et al. (2012). A comparison of correlation coefficients in few consecutive time periods or rolling window correlation is used for examining convergence tendencies. Since this approach seems to be strongly logical and simple, it also includes methodological problems and caveats when treating and interpreting the results in an inappropriate way, as described in a critical paper by Inclaar andde Haan (2001) reacting to papers by Artis-Zhang (1997, 1999) who examine business cycle co-movement patterns in European countries before and after joining the European Exchange Rate Mechanism (ERM) of the European Monetary System (EMS) in 1979. Another critique of correlation deals with the statistical nature of this method. In fact correlation does not need the cycles to be identified; it examines "only" the statistical association between the analysed macroeconomic time series. As a reaction to that, Harding and Pagan (2002, 2006) suggest that the concordance index measuring the fraction of time the countries share an identical phase (expansion or recession) of the business cycle. The concordance measure needs the turning points and also the phases of the cycles to be identified. The measure is used very rarely in literature, since there is no reliable methodology to identify the turning points[4]. In addition, the application of a concordance index demands the availability of a long macroeconomic time series so that the complete cycles can be identified. It especially counts for the classical cycles, which are characteristic with a longer expansion phase when the potential output is growing (Artis, 2004)[5]. Due to the lack of a sufficiently long time series, particularly in the case of Central and Eastern European countries, the method could hardly be used to examine business cycle convergence in the EU. Regarding the recent evolution in business cycle similarity analysis, the alternative approaches to business cycle similarity measuring such as Wälti (2012) or Mink et al. (2012) have to be mentioned. Mink et al. (2012) distinguish between the output gap synchronicity and similarity to evaluate business cycle coherence in the Euro area for the period 1970-2006 using the US as a benchmark. The measure of synchronicity examines the fraction of time the countries appear jointly above or under the trend. The similarity index

[4] The naive rules of turning point identification proposed by Canova (1998, 1999), Bry-Boshan Algorithm (Bry and Boschan, 1971) or the rules used by the NBER belong to standard methods of business cycle turning point identification in literature.

[5] Artis (2004) assumes that some of the CEE countries had not completed a full classical cycle since the transformation period.

compares the extent of deviation from the trend. According to Mink et al. (2012), the resultant composite measure consisting of the synchronicity as well as similarity indicator takes the differences in the signs and amplitudes of the output gaps more adequately into account than correlation. Thus it is a more relevant measure for a monetary policy decision making process than correlation.

Crespo-Cuaresma et al. (2011) apply the structural unobserved component model and other filters to identify cycles in EU countries to analyse the role of fiscal policy and intra-EU trade in business cycle synchronisation. Analysing the degree of synchronisation, they estimate a rate of change in the cyclical components' dispersion[6]. In particular, the synchronisation indicator is based on measuring the relative difference in business cycle dispersion in the group reference with and without the inclusion of a particular country. A negative value of the measure means that the country induces cyclical divergence in the group and a positive one implies cyclical convergence.

Recalling the limitation of using correlation and similar measures in panel data based techniques, there are few attempts in literature to prevent the aggregation problem. For instance Cerqueira and Martins (2009) points out that the majority of recent papers dealing with business cycle similarity in the EU or elsewhere use the cross-correlation of outputs and averaging of other variables over certain time spans. Hence, the estimations are either cross sectional or panels with few observations based on cross correlation coefficients and averages of other variables in subsequent time spans. Such an aggregation reduces the importance of time variability in original data. To prevent the undesirable effects of aggregation, they develop a synchronisation index that enables them to make a panel of disaggregated data over time. Their alternative cross-correlation index, which is mostly based on a comparative analysis of the individual countries'growth rates, has several advantages: there is no loss of observations; there is no need to set time spans; it distinguishes temporary correlations due to some negative shocks in a particular year. Artis and Okubo (2011) augment the cross-correlation index by employing the extended Fisher transformation to overcome a kind of asymmetry of an original index proposed by Cerqueira and Martins (2009). Due to this transformation, the index is bound in symmetric ranges.

Taking into consideration the limitations of the methodology of business cycle identification and measuring their similarity, we employ various techniques to identify the cyclical components including band-pass filters and an unobserved component model. We also use alternative measures of business cycle correlations. Apart from a simple Pearson's correlation coefficient, we apply alternative cross correlation measures as suggested by Cerqueira and Martins (2009) and Artis and Okubo (2011) to increase the robustness of results.

[6] This synchronicity measure was originally proposed in Crespo-Cuaresma and Amador (2010).

2.4 Our contribution

As pointed out by Darvas et al. (2005), Kočenda et al. (2008) and Crespo-Cuaresma et al. (2011), there is still a gap in literature dealing with the link between fiscal policy and the similarity of business cycles. This study intends to contribute by shedding some light on the effect of fiscal discipline and similarity on business cycle correlation. In addition to that, it focuses on the CEE countries and the EU countries still staying out of the Euro area. Apart from examining the role of the Euro, the paper also focuses on the interaction effects of not having the Euro and being fiscally undisciplined and divergent from the EU average. Regarding the general implicit idea of the traditional approach to OCA theory, which has also been reflected in the Maastricht treaty, countries are assumed to be similar or close to a potential European average before joining the Euro area. The reason is to avoid later asymmetries on a national or regional level, which could hardly be stabilized using common monetary policy. Hence, the paper uses the EU15 and EU27 average cycles as a reference benchmark to measure correlations for both models.

As was already mentioned above from the perspective of Maastricht treaty, the similarity in fiscal behaviour should be guaranteed by keeping fiscal discipline, in terms of the Stability and Growth Pact defining the rules of the total national debt, at less than 60% of GDP and fiscal deficit not higher than 3% of GDP. This paper introduces two measures of fiscal discipline and similarity. The fiscal similarity measure is based on the revisited SGP introduced as the Fiscal Compact, which suggests keeping the structural deficit at up to 0.5%. The paper's fiscal responsibility measure is estimated as the difference of current structural deficit of a country and the Fiscal Compact rule. The structural deficit is based on the estimation of potential products of analysed countries as a long term trend component of the GDP and GVA time series using three alternative filtering techniques. The fiscal similarity measure is calculated as the difference between the country's gross public debt per capita and the EU15/EU27 average (excluding the particular analysed country). Using the debt per capita measure, the paper follows the current political trend of evaluating the indebtedness of countries using measures which are clearly understood by the public. Compared to the traditional approach based on measuring the debt-to-GDP ratio, the per capita approach also excludes the possibility of creative accounting, which underestimates the debts as one could see in the past process of the EMU enlargement and its following development. The paper also considers using new alternative measures of business cycle correlation published in recent literature as a contribution to its approach. The Cerqueira-Martins cross correlation index (Cerqueira-Martins, 2009) and the augmented Artis-Okubo index (Artis-Okubo, 2011), providing the measures of correlations for each particular year (quarter) in analysed time series, allow the use of a longer time series as well as larger panels for business cycle analysis.

3. Empirical strategy

The paper examines the link between fiscal policy conduct and business cycle correlation in the EU. In particular, the study estimates the effects of fiscal indiscipline and dissimilarity upon business cycle correlation.

The fiscal indiscipline is measured as the difference of the structural deficit-to-GDP ratio to the limit set by the Fiscal Compact. The fiscal dissimilarity is calculated as the difference of the government debt per head from EU15 and EU27 averages. Hence, the paper tests whether the

countries keeping fiscal discipline measured by the Fiscal Compact criterion of a structural deficit have more synchronized business cycles with EU15 and EU27 averages. It also examines whether closing the fiscal gaps, e.g. lowering the differences between the national government debt per head levels and the EU15 and EU27 averages, leads to higher business cycle correlation.

The panel multivariate regression model for the dataset of 27 EU countries using the generalized least squares estimator is applied in the analysis. In order to estimate the effects of undisciplined and dissimilar fiscal policies on business cycle correlation, the following independent variables are included in the model: fiscal indiscipline and dissimilarity measures, trade intensity, and a spatial dummy for Euro area membership. Interactions between fiscal measures and a spatial dummy capturing the effect of Euro area membership, as well as time specific effects to identify a possible influence of the global crisis, are also included in the model and its extended version. Both models use annual data in the time period of 1996-2012. The 5-year overlapping windows of quarterly GDP and IP are used to calculate the correlation coefficients in annual frequency. To be specific, each correlation coefficient in the resultant time series of business cycle correlation in annual frequency refers to the preceding 5-year time span.

The regression model examining the link between fiscal policy conduct and business cycle correlation (1) and its extension by interaction effects (2) can take the following forms:

$$BC_simil_{ij,t} = \propto + \beta_1 FISC_{i,t} + \beta_2 NONEUR_{i,t} + \gamma GLI_{ij,t} + \nu_t + \varepsilon_{ij,t} \quad (1)$$

$$BC_simil_{ij,t} = \propto + \beta_1 FISC_{i,t} + \beta_2 NONEUR_{i,t} + \beta_3 (FISC_{i,t} * NONEUR_{i,t}) + \gamma GLI_{ij,t} + \nu_t + \varepsilon_{ij,t} \quad (2)$$

$$\varepsilon_{ij,t} = \mu_{ij} + u_{ij,t} \quad (3)$$

where $BC_simil_{ij,t}$ denotes the measure of business cycle similarity between the country *i* and reference benchmark *j*, which is the average cycle of EU15 and EU27 without the respective country i. The similarity is measured as a rolling correlation over a five-year rolling window of quarterly GDP and GVA in 1996-2012. The final time series of business cycle correlation at annual frequency consists of the coefficients measuring the correlation of cycles in the preceding five years. The cyclical component was dissected applying the Hodrick-Prescott filter (HP), Christiano-Fitzgerald filter (CF) and the Unobserved Component Model (UCM). The Cerqueira-Martins cross-correlation index (Cerqueira-Martins, 2009) and its extended form by Artis-Okubo (2011) were used as alternative measures of correlation using the annual GDP and GVA in 2000-2013. The Cerqueira-Martins index (CM) takes the form:

$$r_{ij,t} \equiv 1 - \frac{1}{2}\left[\frac{d_{j,t} - \bar{d}_j}{\sqrt{\frac{1}{T}\sum_{t=1}^{T}\left(d_{j,t} - \bar{d}_j\right)^2}} - \frac{d_{i,t} - \bar{d}_i}{\sqrt{\frac{1}{T}\sum_{t=1}^{T}\left(d_{i,t} - \bar{d}_i\right)^2}}\right]^2 ; \quad (4)$$

where $r_{ij,t}$ denotes the cross-correlation index of country *i* with the reference benchmark *j* (EU15/27) in time t, $d_{j,t}$ and $d_{i,t}$ represent the GDP and GVA growth rates in time t, $\bar{d}_i$ and $\bar{d}_j$ are the average growth rates of country i and reference benchmark j in the time period T. The resultant index is bound by ranges <-∞; 1>.

Artis-Okubo (2011) augmented the index using Fisher transformation, which binds the resulting similarity measure $\rho_{ij,t}$ by symmetrics range <-∞; ∞>.

$$\rho_{ij,t} \equiv \frac{1}{2} log\left(\frac{1}{1 - r_{ij,t}}\right); \tag{5}$$

Considering the contemporary developments of EU legislation, the paper uses a fiscal indiscipline measure based on the Fiscal Compact criterion, as defined in the revised Stability and Growth Pact, with a lower limit of the structural deficit of 0.5% introduced in the Treaty on Stability, Coordination and Governance (2011). The Fiscal Compact criterion compares the value of the actual structural deficit of country *i* and the official fiscal compact limit. Hence the fiscal indiscipline measure might take the form:

$$FISC_{i,t} = \left|\frac{general\ government\ deficit_{i,t}}{pot.GDP_{i,t}} - fiscal\ criterium\right| \tag{6}$$

The increasing value of the measure indicates a larger difference between the fiscal position and the criterion, which, in fact, in the majority of European countries, implies rising indiscipline or irresponsibility.

The Fiscal dissimilarity measure is estimated as:

$$FISC_{ij,t} = \left|\frac{Government\ consolidated\ gross\ debt_{i,t}}{Population\ on\ 1\ January\ _{i,t}} - \frac{Government\ consolidated\ gross\ debt_{(j-i),t}}{Population\ on\ 1\ January_{(j-i),t}}\right| \tag{7}$$

The potential output is estimated as a trend component of the GDP time series of country *i* applying the Hodrick-Prescott and Christiano-Fitzgerald filters and the unobserved component model when measuring their correlation for each model specification.

Intra-industry trade is also expected as a driver of business cycle similarity, as suggested in the literature (e.g. Fidrmuc 2001, 2004). The paper estimates it using the Grubel-Lloyd index, which measures the share of intra-industry trade within the overall trade volume between countries *i* and *j*. The increasing value of the GLI index indicates a higher bilateral trade intensity and deeper integration. The index takes the form:

$$GLI_{ij,t} = \left(1 - \frac{\sum_k |X_{k,ij,t} - M_{k,ij,t}|}{\sum_k |X_{k,ij,t} + M_{k,ij,t}|}\right) * 100 \quad (8)$$

where $X_{k,ij,t}$ and $M_{k,ij,t}$ denote the export and import of commodity *k* (SITC classification) between country *i* and the reference benchmark *j* (EU 15/27).

NONEUR is the dummy variable capturing whether the EU country has adopted the Euro *(NONEUR=0)* or still belongs among the candidate countries *(NONEUR=1)*. Regarding the positive influence of monetary integration on business cycle correlation described in OCA endogeneity hypothesis literature, the paper expects a negative sign suggesting that countries out of the Euro area have less correlated cycles.

$(FISC_{i,t} * NONEUR_{i,t})$ in the extended model describe the interaction of fiscal indiscipline (dissimilarity) and the effect of staying out of the Euro area.

The term ν_t captures the time specific effects. In examining the time specific effects, the paper intends to shed some light on the influence of the financial crisis that hit the European Economy in 2007/2008 and might act as a kind of symmetric shock. Such a shock is expected to be symmetric in terms of putting the economies in the same business cycle phase of recession and stagnation despite having a dissimilar intensity.

$\varepsilon_{ij,t}$ is the error term comprising country specific effects and i.i.d.

The Eurostat database was the source of data for the empirical analysis.

4. Empirical findings

Table 1 summarizes the parameters describing the estimated effect of the fiscal indiscipline measure and its impact on business cycle correlation of the EU countries to the Euro area average. The table includes estimated parameters of the panel regression model (eq. 1) as well as its extended version (eq. 2) with the interaction terms *(_int)* The influence of the fiscal indiscipline of the EU countries (including the Euro area member as well as non-member countries) in presented in the column of parameters β_1 in the model without interactions. In the extended model with interaction terms the parameter *β1* shows the effect on the Euro area countries. The column of parameters $\beta_1+\beta_3$ describes the interaction effects of fiscal indiscipline and not being the member of the Euro area. The variety of examined models capture the correlation of business cycles dissected with the Hodrick-Prescott (HP), Christiano-Fitzgerald (CF) filters and Unobserved Component Model (UOC). Also Cerqueira-Martins (CM) and augmented Artis-Okubo (AO) indices were used as alternative measures of cyclical similarity. The average Euro area (EU15) as well EU27 business cycles were used as benchmarks. The complete results of the model, including the estimated effects of the intra-industry trade measured with the GLI index and time-specific effects, are presented in the appendix. Moreover, estimated effects of all regressors upon the business cycles using the GVA as a proxy of aggregate economic activity are attached there.

Table 1: The effect of fiscal indiscipline and its interaction with non-membership in the Euro area on business cycle correlation (GDP)

model	β_1		$\beta_1+\beta_3$		N	R^2
corr_hp	-3.179	(0.128)***			286	0.410
corr_hp_int	-2.748	(0.247)***	-3.494	(0.208)***	286	0.409
corr_cf	-4.132	(0.096)***			286	0.357
corr_cf_int	-1.671	(0.231)***	-5.942	(0.080)***	286	0.365
corr_uoc	-1.020	(0.163)***			252	0.236
corr_uoc_int	-0.496	(0.183)***	-2.019	(0.203)***	252	0.253
cm_hp	-1.684	(0.484)***			286	0.182
cm_hp_int	-0.324	(0.602)	-2.945	(0.695)***	286	0.182
cm_cf	-1.662	(0.486)***			286	0.182
cm_cf_int	-0.319	(-0.604)	-2.907	(0.699)***	286	0.182
ao_hp	-2.730	(1.011)***			286	0.103
ao_hp_int	-1.798	(1.615)	-3.227	(1.351)**	286	0.098
ao_cf	-2.711	(1.013)***			286	0.103
ao_cf_int	-1.789	(1.616)	-3.494	(1.355)**	286	0.098

Source: Authors' calculations

Note: *Corr_hp* denotes correlation of cyclical components using Hodrick-Prescott filter; *int* denotes the model where interaction effects are also tested; *cf* - Christiano Fitzgerald filter; *uoc* – Unobserved Component Model; *cm* – Cerqueira-Martins cross correlation index; *ao* – Artis-Okubo augmented coos correlation index

Negative signs of β_1 across examined models suggest the inverse relation between fiscal indiscipline and business cycle similarity. Thus, the larger the gap between structural deficit and Fiscal Compact criterion, the lower the business cycle correlation of the EU countries with the EU15/27 average. The estimations of models using alternative CM and AO correlation indices are insignificant for the Euro-area members.

A strong negative effect of fiscal indiscipline upon business cycle correlation in the non-Euro area is estimated as shown in column ($\beta_1+\beta_3$). Considering the impacts of other control variables presented in table 3 included in the appendix, non-membership in the Euro area as such seems to be a factor lowering the business cycle correlation of the EU countries with the EU15 average. Also almost all model specifications provide significant evidence that the intra-industry trade is a positive driver of cyclical similarity, including the ones identified with alternative CM and AO measures. Assessing the time specific effects, one might notice a rise in parameters since 2007, especially in the case of standard HP and CF filters[7]. The paper attributes this increase to the influence of the global crisis pushing the national cycles into a downswing phase, which is obvious mainly in the case of the band-pass filters providing rather smoother cycles contrary to UOC models and alternative CM and AO measure

Using the EU27 as a benchmark, the fiscal indiscipline is estimated to have a strongly negative effect on business cycle correlation. The results are robust and significant, as shown in table 5 in

[7] The results for business cycles identified with the Unobserved Component Model (UOC) were not included in the tables in the appendix since they are widely insignificant

the appendix. There is also the negative effect of non-Euro membership, significant for most of the models including the alternative CM cross-correlation measure. Intra-industry trade is estimated as a significant driver of business cycle correlation across all model specifications. Similarly to the previous set of models with the EU 15 benchmark, the crisis influence in the EU27 identified through the time specific effects testing seems to have an impact when both band-pass filters are used.

As far as GVA is used for business cycle analysis, the main results are similar to those of GDP cycles. Fiscal irresponsibility has strong and significant negative effects on business cycle similarity towards the EU 15, as presented in table 4. The effects of the fiscal indiscipline in non-Euro membership are also negative but with less statistical significance. The intra-industry trade positively influences the similarity of GVA cycles towards the EU 15 average in line with the OCA endogeneity hypothesis. The time specific effects are stronger in 2007 compared to previous periods across all model specifications implying a potential crisis influence in that year. Such effects remained high or even increasing in the following years mainly in the case of both band-pass filters

Table 2: The effect of fiscal indiscipline and its interaction with non-membership in the Euro area on business cycle correlation

model	β_1		$\beta_1+\beta_3$		N	R^2
corr_hp	-11.900	(0.880)***			312	0.433
corr_hp_int	-5.289	(1.992)***	-12.609	(1.871)***	312	0.436
corr_cf	-11.640	(1.527)***			312	0.403
corr_cf_int	-8.259	(1.836)***	-13.509	(1.764)***	312	0.406
corr_uoc	0.647	(0.795)			252	0.209
corr_uoc_int	-3.950	(0.234)*	6.250	(6.477)	252	0.223
cm_hp	-6.830	(1.53)***			338	0.114
cm_hp_int	-3.980	(1.43)***	-10.330	(4.143)**	338	0.116
ao_hp	-4.030	(5.920)			338	0.068
ao_hp_int	4.360	(8.320)	-9.140	(6.090)*	338	0.072

Source: Authors' calculations

Table 2 presents the estimated effects of the fiscal dissimilarity on business cycle correlation in the EU. Apart from the model using the Unobserved Component Model (UOC) when dissecting and measuring GDP cyclical component correlations, the results show significant negative signs in the Euro area member as well as non-member countries. The rising gap between the country's gross public debt per capita and the EU average[8], denoting the fiscal dissimilarity measure and also its interaction with non-Euro membership, leads to lower business cycle correlations. An overall negative but less significant effect of non-Euro area membership is also estimated across most of the model specifications. On the contrary, the intra-industry trade intensity has significant positive effects on business cycle similarity. There were significantly positive time specific effects in 2006 for all estimated model specifications. These effects remained positive and significant for 2007 and 2008 when applying the band-pass Hodrick-Prescott and Christiano-Fitzgerald filters. The research attributes this to a change in the overall economic performance in Europe, where

[8] EU 27 average excluding the analysed country.

2006 was a year of remarkably positive GDP growth for many European economies followed by a downswing of the business cycle in the next years due to the global crisis hit.

The estimations when the EU27 average is used as a benchmark are widely similar to those of EU15. Significantly negative effects of fiscal dissimilarity in the Euro area and overall positive effects of intra-industry trade upon business cycle correlations were estimated as shown in table 9. The effects of non-Euro membership are also negative and significant. There was a significant rise of time-specific effects in 2007 when applying the band-pass filters.

The results estimated for GDP are widely confirmed when using the GVA as a proxy for the business cycle for the EU15 as well as EU27 benchmarks. In the Euro area the negative effect of fiscal dissimilarity is significant and robust. The effect of fiscal divergence in the non-Euro area members shows rather ambiguous results. These are negative in the case of HP and BP filters, positive for the alternative CM measure and insignificant when applying the AO correlation measure. Intra-industry trade measured with the GLI index has significantly positive effects. There was also a strong positive time specific effect in 2007 that remained positive and significant in the following years in the case of band-pass filters and the traditional correlation measure.

5. Conclusions

This paper examined the effects of fiscal indiscipline and dissimilarity on business cycle correlation in the EU. Using the difference between countries' structural deficits and the Fiscal Compact limit, this research provides evidence for the negative effect of fiscal indiscipline upon business cycle similarity. It also provides evidence for the negative link between fiscal dissimilarity measured by differences in national debts per head and business cycle correlation. Using alternative filtering techniques to isolate business cycles and alternative correlation measures, the paper considers the evidence found to be robust and significant. Similarly, it emphasizes the strongly positive effects of intra-industry trade intensity upon business cycle correlation in the EU. The analysis also shows the evidence of a negative effect of fiscal indiscipline and dissimilarity in the countries staying out of the Euro area. Testing for time specific effects, an increased effect upon business cycle correlation has been observed since 2007, which the paper attributes to the influence of the global crisis pushing EU countries into a cyclical downswing from that time.

From a policy perspective, fiscal indiscipline and dissimilarity might be considered as sources of business cycle deviations of individual EU countries from the average European cycle. Thus the call for keeping fiscal rules, as defined by the Fiscal Compact or national numerical expenditure rules as reported in Holm-Hadulla (2010), seems to be a timely issue. However, regarding the efforts to stimulate economic recovery potentially by expansionary fiscal policy, because the monetary policy seems to be caught in a Keynesian liquidity trap and thus ineffective nowadays in Europe, the risk of softening and neglecting the extended fiscal rules appears to be relatively high. The paper also draws some implications for the monetary unification process in the CEE countries. The results of interaction effect estimations indicate that the fiscally undisciplined and dissimilar behaviour of the acceding countries reduce significantly business cycle correlation to the European cycle. This, in fact, might lead to postponing euro adoption in countries acceding to the Euro area

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Annex

Table 3: The effect of fiscal indiscipline and its interaction with non-membership in the Euro area on business cycle correlation (GDP, EU15 as a benchmark)

	cr_hp	cr_hp_int	cr_cf	cr_cf_int	cm_hp	cm_hp_int	cm_cf	cm_cf_int	ao_hp	ao_hp_int	ao_cf	ao_cf_int
β_1	-3.179	-2.748	-4.132	-1.671	-1.684	-0.324	-1.662	-0.319	-2.730	-1.798	-2.711	-1.789
	(0.128)***	(0.247)***	(0.096)***	(0.231)***	(0.484)***	0.602	(0.486)***	0.604	(1.011)***	1.615	(1.013)***	1.616
β_3		-0.746		-4.271		-2.621		-2.588		-1.429		-1.421
		(0.379)**		(0.219)***		(0.883)***		(0.888)***		(2.129)		(2.133)
β_2	-0.189	-0.171	-0.161	-0.055	-0.064	0.034	-0.064	0.033	-0.074	-0.037	-0.074	-0.037
	(0.014)***	(0.017)***	(0.005)***	(0.008)***	(0.016)***	(0.032)	(0.016)***	(0.032)	(0.054)	(0.084)	(0.054)	(0.084)
γ	-0.031	-0.035	0.139	0.131	0.386	0.382	0.386	0.383	0.831	0.849	0.832	0.849
	(0.013)**	(0.014)**	(0.013)***	(0.013)***	(0.041)***	(0.041)***	(0.041)***	(0.041)***	(0.252)***	(0.257)***	(0.252)***	(0.257)***
y2001	-0.018	-0.017	-0.002	0.000	0.077	0.073	0.077	0.074	-0.007	-0.005	-0.007	-0.004
	(0.008)**	(0.008)**	0.004	0.009	(0.023)***	(0.017)***	(0.023)***	(0.017)***	(0.059)	(0.059)	(0.058)	(0.059)
y2002	0.047	0.048	0.016	0.021	0.067	0.069	0.067	0.069	0.141	0.168	0.142	0.168
	(0.008)***	(0.008)**	(0.004)***	(0.010)**	(0.023)***	(0.017)***	(0.023)***	(0.017)***	(0.059)**	(0.062)***	(0.059)**	(0.062)***
y2003	0.175	0.177	0.126	0.130	0.059	0.059	0.060	0.059	-0.020	0.001	-0.020	0.001
	(0.008)***	(0.009)***	(0.004)***	(0.010)***	(0.023)**	(0.017)***	(0.023)***	(0.017)***	(0.058)	(0.060)	(0.058	(0.060)
y2004	0.216	0.218	0.167	0.170	0.155	0.147	0.155	0.147	0.187	0.192	0.187	0.191
	(0.008)***	(0.009)***	(0.004)***	(0.010)***	(0.023)***	(0.018)***	(0.023)***	(0.018)***	(0.059)***	(0.060)***	(0.059)***	(0.059)***
y2005	0.105	0.106	0.140	0.146	0.110	0.095	0.110	0.095	0.000	0.000	0.000	-0.001
	(0.009)***	(0.009)***	(0.004)***	(0.010)***	(0.024)***	(0.018)***	(0.024)***	(0.018)***	(0.058)	(0.059)	(0.058)	(0.059)
y2006	0.309	0.310	0.131	0.130	0.107	0.103	0.107	0.103	0.185	0.191	0.185	0.191
	(0.009)***	(0.009)***	(0.004)***	(0.010)***	(0.024)***	(0.018)***	(0.024)***	(0.018)***	(0.058)***	(0.059)***	(0.058)***	(0.059)***
y2007	0.457	0.458	0.311	0.315	0.052	0.062	0.052	0.062	-0.028	-0.036	-0.028	-0.036
	(0.009)***	(0.009)***	(0.004)***	(0.010)***	(0.025)**	(0.020)***	(0.025)**	(0.020)***	(0.059)	(0.060)	(0.059)	(0.060)
y2008	0.425	0.427	0.314	0.318	-0.057	-0.049	-0.057	-0.049	-0.207	-0.210	-0.208	-0.211
	(0.009)***	(0.009)***	(0.004)***	(0.010)***	(0.024)**	(0.018)***	(0.024)**	(0.018)***	(0.059)***	(0.060)***	(0.059)***	(0.060)***
y2009	0.436	0.437	0.368	0.387	0.008	-0.008	0.008	-0.008	0.114	0.099	0.113	0.098
	(0.009)***	(0.009)***	(0.005)***	(0.010)***	(0.025)	(0.025)	(0.025)	(0.025)	(0.065)*	(0.068)	(0.065)*	(0.068)
y2010	0.437	0.439	0.365	0.358	0.000	-0.010	0.000	-0.010	-0.033	-0.051	-0.034	-0.052
	(0.009)***	(0.009)***	(0.005)***	(0.010)***	(0.025)	(0.023)	(0.025)	(0.023)	(0.063)	(0.066)	(0.063)	(0.065)
y2011	0.469	0.468	0.373	0.367	0.068	0.051	0.068	0.051	-0.061	-0.062	-0.061	-0.062
	(0.009)***	(0.009)***	(0.005)***	(0.010)***	(0.024)***	(0.022)**	(0.023)***	(0.022)**	(0.061)	(0.062)	(0.060)	(0.061)
y2012	0.434	0.433	0.384	0.375	0.009	-0.002	0.009	-0.002	-0.115	-0.135	-0.114	-0.135
	(0.009)***	(0.009)***	(0.006)***	(0.010)***	(0.024)	(0.020)	(0.024)	(0.020)	(0.060)*	(0.064)**	(0.060)*	(0.064)**
_cons	0.661	0.653	0.691	0.641	0.663	0.623	0.662	0.623	0.405	0.372	0.405	0.372
	(0.016)***	(0.016)***	(0.009)***	(0.014)***	(0.029)***	(0.033)***	(0.029)***	(0.033)***	(0.165)**	(0.173)**	(0.165)**	(0.173)**
N	286	286	286	286	286	286	286	286	286	286	286	286
R^2	0.410	0.409	0.357	0.365	0.182	0.182	0.182	0.182	0.103	0.098	0.103	0.098

Source: Authors' calculations

Table 4: The effect of fiscal indiscipline and its interaction with non-membership in the Euro area on business cycle correlation (GVA, EU15 as a benchmark)

	cr_hp	cr_hp_int	cr_cf	cr_cf_int	cm_hp	cm_hp_int	cm_cf	cm_cf_int	ao_hp	ao_hp_int	ao_cf	ao_cf_int
β_1	-0.621	-4.054	-0.793	-0.404	-2.690	-2.595	-2.690	-2.597	-1.092	-2.574	-1.081	-2.574
	(0.086)***	(0.336)***	(0.073)***	(0.126)***	(0.182)***	(0.272)***	(0.181)***	(0.271)***	0.676	(1.188)**	0.675	(1.190)**
β_3		5.652		-0.682		-0.186		-0.180		2.968		2.977
		(0.369)***		(0.196)***		(0.427)		(0.426)		(1.209)**		(1.216)**
β_2	-0.151	-0.285	-0.071	-0.051	0.044	0.049	0.044	0.049	0.005	-0.092	0.005	-0.093
	(0.006)***	(0.017)***	(0.001)***	(0.006)***	(0.012)***	(0.018)***	(0.012)***	(0.018)***	0.027	(0.042)**	0.027	(0.042)**
γ	0.053	0.099	0.232	0.234	1.082	1.091	1.084	1.093	0.686	0.684	0.686	0.684
	(0.011)***	(0.016)***	(0.007)***	(0.006)***	(0.081)***	(0.079)***	(0.080)***	(0.079)***	(0.052)***	(0.060)***	(0.052)***	(0.059)***
y2001	-0.011	-0.026	-0.448	-0.447	0.854	0.855	0.854	0.854	0.136	0.121	0.136	0.121
	(0.005)**	(0.008)***	(0.001)***	(0.002)***	(0.012)***	(0.012)***	(0.012)***	(0.012)***	(0.021)***	(0.025)***	(0.021)***	(0.025)***
y2002	0.207	0.192	-0.330	-0.329	1.223	1.226	1.223	1.226	0.537	0.522	0.537	0.521
	(0.005)***	(0.008)***	(0.001)***	(0.002)***	(0.012)***	(0.012)***	(0.013)***	(0.013)***	(0.021)***	(0.024)***	(0.021)***	(0.024)***
y2003	0.315	0.302	-0.096	-0.095	1.236	1.237	1.235	1.236	0.616	0.606	0.616	0.606
	(0.005)***	(0.008)***	(0.001)***	(0.002)***	(0.012)***	(0.012)***	(0.012)***	(0.012)***	(0.020)***	(0.022)***	(0.020)***	(0.022)***
y2004	0.320	0.309	-0.045	-0.045	1.144	1.145	1.144	1.144	0.535	0.530	0.535	0.530
	(0.005)***	(0.008)***	(0.001)***	(0.002)***	(0.012)***	(0.011)***	(0.011)***	(0.011)***	(0.020)***	(0.023)***	(0.021)***	(0.023)***
y2005	0.298	0.287	0.002	0.003	1.223	1.224	1.222	1.223	0.809	0.803	0.809	0.803
	(0.005)***	(0.007)***	0.002	(0.002)***	(0.011)***	(0.010)***	(0.010)***	(0.010)***	(0.021)***	(0.024)***	(0.021)***	(0.024)***
y2006	0.435	0.427	-0.049	-0.048	1.225	1.224	1.224	1.223	0.679	0.672	0.678	0.672
	(0.005)***	(0.007)***	(0.002)***	(0.002)***	(0.011)***	(0.011)***	(0.010)***	(0.011)***	(0.023)***	(0.026)***	(0.023)***	(0.026)***
y2007	0.622	0.608	0.172	0.172	1.247	1.248	1.246	1.247	0.962	0.951	0.961	0.951
	(0.006)***	(0.007)***	(0.001)***	(0.002)***	(0.011)***	(0.011)***	(0.011)***	(0.011)***	(0.023)***	(0.028)***	(0.023)***	(0.028)***
y2008	0.600	0.574	0.199	0.200	0.194	0.195	0.193	0.194	-0.012	-0.021	-0.012	-0.022
	(0.006)***	(0.008)***	(0.001)***	(0.002)***	(0.010)***	(0.010)***	(0.010)***	(0.010)***	(0.020)	(0.025)	(0.020)	(0.025)
y2009	0.593	0.580	0.227	0.230	-3.557	-3.557	-3.559	-3.558	-0.201	-0.200	-0.201	-0.201
	(0.006)***	(0.007)***	(0.002)***	(0.002)***	(0.011)***	(0.010)***	(0.011)***	(0.010)***	(0.024)***	(0.028)***	(0.023)***	(0.028)***
y2010	0.600	0.594	0.222	0.225	1.205	1.206	1.205	1.205	0.423	0.421	0.422	0.421
	(0.006)***	(0.007)***	(0.002)***	(0.002)***	(0.011)***	(0.010)***	(0.011)***	(0.010)***	(0.021)***	(0.025)***	(0.021)***	(0.025)***
y2011	0.611	0.605	0.214	0.217	0.958	0.957	0.958	0.957	0.269	0.265	0.269	0.265
	(0.006)***	(0.008)***	(0.002)***	(0.003)***	(0.010)***	(0.010)***	(0.010)***	(0.010)***	(0.017)***	(0.020)***	(0.017)***	(0.020)***
y2012	0.578	0.577	0.203	0.205.	.	.	.	.	.	.	.	
	(0.006)***	(0.008)***	(0.002)***	(0.003)***	.	.	.	.	.	.	.	
_cons	0.373	0.429	0.654	0.642	-0.851	-0.859	-0.852	-0.860	-0.258	-0.203	-0.259	-0.203
	(0.007)***	(0.018)***	(0.004)***	(0.006)***	(0.050)***	(0.050)***	(0.050)***	(0.050)***	(0.048)***	(0.056)***	(0.048)***	(0.056)***
N	260	260	260	260	240	240	240	240	240	240	240	240
R^2	0.448	0.468	0.407	0.407	0.725	0.726	0.725	0.725	0.506	0.510	0.506	0.510

Source: Authors' calculations

Table 5: The effect of fiscal indiscipline and its interaction with non-membership in the Euro area on business cycle correlation (GDP, EU27 as a benchmark)

	cr_hp	cr_hp_int	cr_cf	cr_cf_int	cm_hp	cm_hp_int	cm_cf	cm_cf_int	ao_hp	ao_hp_int	ao_cf	ao_cf_int
β_1	-2.592	-2.686	-3.607	-1.389	-1.408	-0.481	-1.383	-0.48	-2.246	-1.871	-2.228	-1.884
	(0.117)***	(0.175)***	(0.140)***	(0.230)***	(0.526)***	(0.556)	(0.526)***	(0.558)	(0.890)**	(1.307)	(0.893)**	(1.308)
β_3		0.227		-3.809		-1.906		-1.86		-0.884		-0.833
		(0.347)		(0.220)***		(0.766)**		(0.767)**		(2.006)		(2.010)
β_2	-0.212	-0.216	-0.165	-0.071	-0.045	0.000	-0.045	-0.000	-0.049	-0.025	-0.049	-0.026
	(0.008)***	(0.009)***	(0.004)***	(0.007)***	(0.021)**	(0.029)	(0.021)**	(0.029)	(0.040)	(0.072)	(0.041)	(0.072)
γ	0.017	0.020	0.204	0.189	0.361	0.309	0.362	0.309	0.826	0.809	0.828	0.811
	(0.010)*	(0.011)*	(0.010)***	(0.011)***	(0.048)***	(0.096)***	(0.048)***	(0.096)***	(0.202)***	(0.202)***	(0.202)***	(0.203)***
y2001	-0.015	-0.016	-0.011	-0.002	0.055	0.049	0.055	0.049	0.002	0.008	0.002	0.009
	(0.006)**	(0.006)**	(0.004)***	0.005	(0.009)***	(0.016)***	(0.009)***	(0.016)***	(0.094)	(0.093)	(0.094)	(0.093)
y2002	0.063	0.063	0.020	0.019	0.089	0.113	0.089	0.113	0.057	0.070	0.057	0.070
	(0.006)***	(0.006)***	(0.004)***	(0.005)***	(0.009)***	(0.017)***	(0.009)***	(0.016)***	(0.095)	(0.096)	(0.095)	(0.096)
y2003	0.194	0.195	0.127	0.133	0.048	0.049	0.048	0.049	-0.19	-0.176	-0.191	-0.176
	(0.006)***	(0.006)***	(0.004)***	(0.005)***	(0.009)***	(0.017)***	(0.009)***	(0.017)***	(0.097)*	(0.097)*	(0.097)*	(0.097)*
y2004	0.231	0.231	0.171	0.175	0.155	0.164	0.155	0.164	0.090	0.099	0.089	0.098
	(0.006)***	(0.006)***	(0.004)***	(0.005)***	(0.010)***	(0.016)***	(0.010)***	(0.016)***	(0.097)	(0.096)	(0.097)	(0.096)
y2005	0.123	0.123	0.154	0.152	0.087	0.093	0.087	0.093	0.035	0.039	0.035	0.038
	(0.006)***	(0.006)***	(0.004)***	(0.005)***	(0.010)***	(0.017)***	(0.010)***	(0.017)***	(0.096)	(0.095)	(0.096)	(0.094)
y2006	0.329	0.329	0.129	0.134	0.141	0.133	0.141	0.133	0.114	0.119	0.114	0.119
	(0.006)***	(0.006)***	(0.004)***	(0.006)***	(0.010)***	(0.017)***	(0.010)***	(0.017)***	(0.095)	(0.094)	(0.095)	(0.094)
y2007	0.498	0.499	0.32	0.328	0.046	0.040	0.046	0.040	-0.21	-0.207	-0.211	-0.207
	(0.009)***	(0.009)***	(0.004)***	(0.006)***	(0.010)***	(0.017)**	(0.010)***	(0.017)**	(0.094)**	(0.093)**	(0.094)**	(0.093)**
y2008	0.469	0.469	0.335	0.341	-0.017	-0.011	-0.017	-0.012	-0.253	-0.252	-0.254	-0.252
	(0.008)***	(0.008)***	(0.005)***	(0.006)***	(0.011)	(0.018)	(0.011)	(0.018)	(0.095)***	(0.094)***	(0.095)***	(0.094)***
y2009	0.474	0.475	0.389	0.399	-0.011	-0.010	-0.012	-0.011	-0.128	-0.132	-0.129	-0.133
	(0.008)***	(0.008)***	(0.005)***	(0.007)***	(0.011)	(0.018)	(0.011)	(0.018)	(0.104)	(0.105)	(0.104)	(0.104)
y2010	0.476	0.477	0.388	0.38	0.021	0.024	0.020	0.024	-0.098	-0.103	-0.099	-0.104
	(0.008)***	(0.008)***	(0.004)***	(0.007)***	(0.010)*	(0.019)	(0.010)*	(0.019)	(0.102)	(0.102)	(0.102)	(0.102)
y2011	0.501	0.503	0.379	0.382	0.050	0.069	0.050	0.069	-0.139	-0.138	-0.139	-0.137
	(0.009)***	(0.009)***	(0.004)***	(0.007)***	(0.011)***	(0.019)***	(0.011)***	(0.019)***	(0.100)	(0.099)	(0.100)	(0.099)
y2012	0.468	0.47	0.384	0.389	0.007	0.001	0.007	0.001	-0.16	-0.161	-0.16	-0.161
	(0.009)***	(0.009)***	(0.004)***	(0.007)***	(0.011)	(0.019)	(0.011)	(0.019)	0.097)	(0.097)*	(0.098)	(0.097)*
_cons	0.592	0.591	0.623	0.581	0.672	0.68	0.671	0.68	0.494	0.493	0.492	0.492
	(0.013)***	(0.014)***	(0.009)***	(0.011)***	(0.036)***	(0.064)***	(0.036)***	(0.063)***	(0.132)***	(0.132)***	(0.132)***	(0.132)***
N	260	260	260	260	286	286	286	286	286	286	286	286
R^2	0.410	0.410	0.360	0.367	0.173	0.177	0.173	0.177	0.173	0.177	0.173	0.177

Source: Authors' calculations

Table 6: The effect of fiscal indiscipline and its interaction with non-membership in the Euro area on business cycle correlation (GVA, EU27 as a benchmark)

	cr_hp	cr_hp_int	cr_cf	cr_cf_int	cm_hp	cm_hp_int	cm_cf	cm_cf_int	ao_hp	ao_hp_int	ao_cf	ao_cf_int
β_1	-0.85	-4.249	-0.812	-0.586	-2.647	-2.512	-2.648	-2.514	-1.072	-2.887	-1.06	-2.88
	(0.094)***	(0.354)***	(0.055)***	(0.086)***	(0.196)***	(0.274)***	(0.195)***	(0.273)***	0.657	(0.637)***	0.654	(0.639)***
β_3		5.485		-0.434		-0.265		-0.26		3.414		3.398
		(0.390)***		(0.196)**		(0.441)		(0.440)		(0.998)***		(1.002)***
β_2	-0.154	-0.286	-0.056	-0.047	0.042	0.050	0.042	0.050	-0.002	-0.113	-0.002	-0.113
	(0.006)***	(0.016)***	(0.004)***	(0.006)***	(0.012)***	(0.019)***	(0.012)***	(0.019)***	(0.023)	(0.035)***	(0.023)	(0.035)***
γ	0.042	0.076	0.237	0.234	1.058	1.072	1.06	1.074	0.728	0.739	0.729	0.738
	(0.011)***	(0.016)***	(0.010)***	(0.009)***	(0.085)***	(0.083)***	(0.085)***	(0.082)***	(0.069)***	(0.075)***	(0.069)***	(0.075)***
y2001	0.021	0.012	-0.453	-0.453	0.907	0.908	0.907	0.908	0.174	0.141	0.174	0.141
	(0.001)***	(0.006)**	(0.002)***	(0.002)***	(0.013)***	(0.013)***	(0.013)***	(0.013)***	(0.037)***	(0.038)***	(0.037)***	(0.038)***
y2002	0.237	0.226	-0.338	-0.338	1.242	1.246	1.242	1.246	0.544	0.508	0.544	0.508
	(0.001)***	(0.007)***	(0.002)***	(0.002)***	(0.013)***	(0.013)***	(0.013)***	(0.013)***	(0.036)***	(0.037)***	(0.036)***	(0.037)***
y2003	0.331	0.32	-0.103	-0.103	1.247	1.249	1.247	1.249	0.56	0.529	0.56	0.529
	(0.001)***	(0.007)***	(0.002)***	(0.002)***	(0.013)***	(0.012)***	(0.013)***	(0.012)***	(0.033)***	(0.035)***	(0.033)***	(0.035)***
y2004	0.335	0.328	-0.048	-0.047	1.158	1.158	1.157	1.158	0.533	0.506	0.533	0.506
	(0.001)***	(0.006)***	(0.002)***	(0.002)***	(0.012)***	(0.011)***	(0.012)***	(0.011)***	(0.034)***	(0.036)***	(0.034)***	(0.036)***
y2005	0.304	0.296	-0.003	-0.003	1.237	1.238	1.236	1.238	0.777	0.753	0.777	0.753
	(0.001)***	(0.005)***	(0.002)*	0.002	(0.011)***	(0.011)***	(0.011)***	(0.011)***	(0.033)***	(0.034)***	(0.033)***	(0.035)***
y2006	0.441	0.436	-0.057	-0.057	1.234	1.234	1.234	1.233	0.706	0.682	0.706	0.682
	(0.001)***	(0.005)***	(0.002)***	(0.002)***	(0.011)***	(0.011)***	(0.012)***	(0.011)***	(0.030)***	(0.029)***	(0.030)***	(0.030)***
y2007	0.623	0.615	0.167	0.167	1.264	1.265	1.263	1.264	0.937	0.91	0.937	0.91
	(0.002)***	(0.005)***	(0.002)***	(0.002)***	(0.012)***	(0.011)***	(0.012)***	(0.012)***	(0.030)***	(0.029)***	(0.030)***	(0.030)***
y2008	0.605	0.589	0.202	0.203	0.317	0.318	0.315	0.317	-0.003	-0.035	-0.004	-0.036
	(0.002)***	(0.006)***	(0.002)***	(0.002)***	(0.011)***	(0.011)***	(0.011)***	(0.011)***	(0.026)	(0.026)	(0.026)	(0.027)
y2009	0.602	0.593	0.235	0.236	-3.552	-3.552	-3.553	-3.553	-0.253	-0.252	-0.254	-0.254
	(0.002)***	(0.005)***	(0.002)***	(0.002)***	(0.011)***	(0.011)***	(0.011)***	(0.011)***	(0.017)***	(0.017)***	(0.017)***	(0.017)***
y2010	0.606	0.605	0.221	0.221	1.204	1.205	1.203	1.204	0.409	0.402	0.408	0.401
	(0.002)***	(0.005)***	(0.002)***	(0.002)***	(0.011)***	(0.011)***	(0.011)***	(0.011)***	(0.016)***	(0.016)***	(0.016)***	(0.017)***
y2011	0.613	0.615	0.213	0.213	0.969	0.967	0.968	0.967	0.284	0.277	0.283	0.277
	(0.002)***	(0.005)***	(0.002)***	(0.002)***	(0.011)***	(0.010)***	(0.011)***	(0.010)***	(0.016)***	(0.015)***	(0.016)***	(0.015)***
y2012	0.593	0.593	0.209	0.209	.	.	.	.	.	.	.	.
	(0.002)***	(0.006)***	(0.002)***	(0.002)***	.	.	.	.	.	.	.	.
_cons	0.383	0.441	0.643	0.64	-0.854	-0.866	-0.854	-0.866	-0.265	-0.192	-0.265	-0.191
	(0.008)***	(0.017)***	(0.006)***	(0.006)***	(0.053)***	(0.053)***	(0.053)***	(0.052)***	(0.063)***	(0.057)***	(0.063)***	(0.057)***
N	260	260	260	260	240	240	240	240	240	240	240	240
R^2	0.434	0.453	0.409	0.410	0.725	0.726	0.725	0.726	0.725	0.726	0.725	0.726

Source: Authors' calculations

Table 7: The effect of fiscal dissimilarity and its interaction with non-membership in the Euro area on business cycle correlation (GDP, EU15 as a benchmark)

	cr_hp	cr_hp_int	cr_cf	cr_cf_int	cm_hp	cm_hp_int	ao_hp	ao_hp_int
β_1	-11.9	-5.289	-11.64	-8.259	-6.83	-3.98	-4.03	4.36
	(0.880)***	(1.992)***	(1.527)***	(1.836)***	(1.53)***	(1.43)***	5.92	8.32
β_3		-7.32		-5.25		-6.35		-13.5
		(1.937)***		(1.297)***		(3.980)		(9.470)
β_2	-0.195	-0.119	-0.139	-0.096	-0.026	0.001	-0.092	0.017
	(0.010)***	(0.026)***	(0.011)***	(0.018)***	(0.031)	(0.039)	(0.063)	(0.111)
γ	-0.031	0.025	0.153	0.135	0.149	0.109	0.478	0.449
	(0.025)	(0.033)	(0.015)***	(0.014)***	(0.073)**	(0.065)*	(0.142)***	(0.144)***
y2001	-0.023	-0.026	-0.011	-0.011	0.076	0.070	-0.023	-0.030
	(0.005)***	(0.005)***	(0.007)	(0.007)	(0.025)***	(0.024)***	(0.091)	(0.095)
y2002	0.03	0.030	0.008	0.008	0.124	0.123	0.018	0.015
	(0.005)***	(0.005)***	(0.007)	(0.007)	(0.025)***	(0.024)***	(0.091)	(0.095)
y2003	0.171	0.169	0.134	0.135	0.033	0.018	-0.032	-0.027
	(0.005)***	(0.005)***	(0.007)***	(0.007)***	(0.025)	(0.024)	(0.091)	(0.096)
y2004	0.228	0.226	0.184	0.184	0.144	0.159	0.108	0.116
	(0.005)***	(0.005)***	(0.007)***	(0.007)***	(0.025)***	(0.024)***	(0.091)	(0.096)
y2005	0.112	0.107	0.17	0.169	0.124	0.127	0.057	0.059
	(0.005)***	(0.006)***	(0.007)***	(0.007)***	(0.025)***	(0.024)***	(0.091)	(0.096)
y2006	0.313	0.312	0.138	0.137	0.191	0.179	0.248	0.252
	(0.005)***	(0.006)***	(0.007)***	(0.007)***	(0.025)***	(0.024)***	(0.091)***	(0.096)***
y2007	0.47	0.471	0.333	0.333	0.089	0.083	0.018	0.024
	(0.005)***	(0.006)***	(0.007)***	(0.008)***	(0.025)***	(0.024)***	(0.091)	(0.096)
y2008	0.443	0.443	0.353	0.355	-0.086	-0.101	-0.276	-0.269
	(0.005)***	(0.006)***	(0.008)***	(0.008)***	(0.025)***	(0.025)***	(0.092)***	(0.097)***
y2009	0.443	0.445	0.39	0.39	-0.091	-0.098	-0.039	-0.034
	(0.006)***	(0.006)***	(0.008)***	(0.008)***	(0.026)***	(0.026)***	(0.094)	(0.098)
y2010	0.461	0.449	0.397	0.397	-0.067	-0.072	-0.118	-0.115
	(0.007)***	(0.008)***	(0.008)***	(0.009)***	(0.026)***	(0.026)***	(0.095)	(0.099)
y2011	0.469	0.464	0.399	0.398	0.065	0.053	-0.032	-0.036
	(0.007)***	(0.008)***	(0.008)***	(0.009)***	(0.026)**	(0.027)*	(0.098)	(0.101)
y2012	0.437	0.427	0.379	0.377	0.056	0.058	-0.184	-0.188
	(0.007)***	(0.008)***	(0.008)***	(0.008)***	(0.026)**	(0.028)**	(0.097)*	(0.101)*
_cons	0.671	0.586	0.64	0.626	0.754	0.78	0.515	0.466
	(0.014)***	(0.033)***	(0.019)***	(0.022)***	(0.061)***	(0.053)***	(0.146)***	(0.162)***
N	312	312	312	312	338	338	338	338
R^2	0.433	0.435	0.403	0.406	0.114	0.115	0.068	0.072

Source: Authors' calculations

Table 8: The effect of fiscal dissimilarity and its interaction with non-membership in the Euro area on business cycle correlation (GVA, EU15 as a benchmark)

	cr_hp	cr_hp_int	cr_cf	cr_cf_int	cm_hp	cm_hp_int	ao_hp	ao_hp_int
β_1	-2.67	-3.165	-1.314	-7.46	-11.3	-10.7	-12	-16.3
	(1.159)**	(1.205)***	(0.192)***	(0.288)***	(0.604)***	(1.110)***	(2.310)***	(8.870)*
β_3		-3.64		10.4		-0.776		5.29
		(1.141)***		(0.882)***		(1.860)		(11.100)
β_2	-0.144	-0.124	-0.069	-0.165	0.054	0.058	-0.055	-0.086
	(0.012)***	(0.014)***	(0.006)***	(0.012)***	(0.008)***	(0.026)**	(0.040)	(0.081)
γ	0.093	0.055	0.233	0.276	0.937	0.933	0.599	0.625
	(0.023)***	(0.019)***	(0.009)***	(0.013)***	(0.052)***	(0.053)***	(0.081)***	(0.094)***
y2001	-0.043	-0.042	-0.433	-0.433	.	.	.	.
	(0.004)***	(0.003)***	(0.002)***	(0.002)***	.	.	.	.
y2002	0.153	0.153	-0.362	-0.362	0.366	0.367	0.354	0.354
	(0.004)***	(0.003)***	(0.002)***	(0.002)***	(0.021)***	(0.021)***	(0.032)***	(0.032)***
y2003	0.278	0.275	-0.124	-0.126	0.454	0.454	0.402	0.401
	(0.004)***	(0.003)***	(0.002)***	(0.002)***	(0.021)***	(0.021)***	(0.032)***	(0.032)***
y2004	0.278	0.279	-0.064	-0.067	0.342	0.342	0.361	0.362
	(0.005)***	(0.003)***	(0.002)***	(0.002)***	(0.022)***	(0.022)***	(0.032)***	(0.032)***
y2005	0.268	0.266	-0.013	-0.013	0.422	0.423	0.556	0.558
	(0.004)***	(0.003)***	(0.002)***	(0.003)***	(0.022)***	(0.022)***	(0.032)***	(0.032)***
y2006	0.413	0.412	-0.059	-0.062	0.431	0.430	0.552	0.553
	(0.005)***	(0.003)***	(0.002)***	(0.003)***	(0.022)***	(0.022)***	(0.032)***	(0.032)***
y2007	0.608	0.603	0.159	0.158	0.430	0.430	0.771	0.772
	(0.005)***	(0.003)***	(0.002)***	(0.003)***	(0.022)***	(0.022)***	(0.033)***	(0.032)***
y2008	0.580	0.586	0.182	0.175	-0.684	-0.684	-0.239	-0.234
	(0.005)***	(0.003)***	(0.002)***	(0.004)***	(0.022)***	(0.022)***	(0.035)***	(0.035)***
y2009	0.575	0.577	0.204	0.205	-4.424	-4.424	-0.447	-0.443
	(0.005)***	(0.003)***	(0.002)***	(0.004)***	(0.022)***	(0.022)***	(0.034)***	(0.035)***
y2010	0.574	0.580	0.200	0.191	0.329	0.329	0.277	0.282
	(0.005)***	(0.004)***	(0.002)***	(0.005)***	(0.022)***	(0.022)***	(0.035)***	(0.036)***
y2011	0.575	0.584	0.191	0.187	0.185	0.185	0.11	0.116
	(0.005)***	(0.004)***	(0.003)***	(0.005)***	(0.022)***	(0.022)***	(0.036)***	(0.037)***
y2012	0.568	0.575	0.179	0.167	-0.732	-0.731	-0.208	-0.207
	(0.005)***	(0.004)***	(0.003)***	(0.005)***	(0.022)***	(0.022)***	(0.035)***	(0.035)***
_cons	0.361	0.405	0.657	0.683	0.031	0.030	0.066	0.074
	(0.033)***	(0.018)***	(0.003)***	(0.005)***	(0.031)	(0.033)	(0.052)	(0.056)
N	273	273	273	273	300	300	288	288
R^2	0.295	0.288	0.397	0.403	0.694	0.694	0.469	0.468

Source: Authors' calculations

Table 9: The effect of fiscal dissimilarity and its interaction with non-membership in the Euro area on business cycle correlation (GDP, EU27 as a benchmark)

	cr_hp	cr_hp_int	cr_cf	cr_cf_int	cm_hp	cm_hp_int	ao_hp	ao_hp_int
β_1	-11.6	-2.02	-11.3	-8.19	-5.76	-3.23	-10.6	-10.8
	(0.888)***	(2.480)	(1.490)***	(1.770)***	(1.510)***	(1.370)**	(6.460)*	(7.060)
β_3		-9.86		-5		-6.29		5.76
		(2.04)***		(1.29)***		(0.382)*		(8.180)
β_2	-0.194	-0.055	-0.139	-0.099	-0.022	0.006	-0.103	-0.109
	(0.010)***	(0.033)*	(0.010)***	(0.018)***	(0.030)	(0.039)	(0.050)**	(0.098)
γ	-0.037	0.026	0.145	0.127	0.143	0.101	0.484	0.481
	(0.024)	(0.032)	(0.014)***	(0.013)***	(0.073)*	(0.063)	(0.181)***	(0.183)***
y2001	-0.021	-0.021	-0.012	-0.012	0.062	0.057	0.261	0.26
	(0.004)***	(0.005)***	(0.008)	(0.008)	(0.024)**	(0.022)**	(0.073)***	(0.073)***
y2002	0.037	0.039	0.008	0.009	0.104	0.102	0.065	0.064
	(0.004)***	(0.005)***	(0.008)	(0.008)	(0.024)***	(0.022)***	(0.073)	(0.073)
y2003	0.172	0.173	0.133	0.133	0.021	0.007	0.007	0.007
	(0.004)***	(0.005)***	(0.008)***	(0.008)***	(0.024)	(0.022)	(0.073)	(0.073)
y2004	0.228	0.228	0.183	0.183	0.13	0.146	0.049	0.048
	(0.004)***	(0.005)***	(0.008)***	(0.008)***	(0.024)***	(0.022)***	(0.073)	(0.073)
y2005	0.111	0.104	0.169	0.169	0.111	0.113	0.165	0.165
	(0.004)***	(0.006)***	(0.008)***	(0.008)***	(0.024)***	(0.022)***	(0.073)**	(0.074)**
y2006	0.314	0.312	0.138	0.137	0.172	0.162	0.152	0.152
	(0.004)***	(0.006)***	(0.008)***	(0.008)***	(0.024)***	(0.022)***	(0.074)**	(0.074)**
y2007	0.47	0.486	0.332	0.332	0.072	0.067	0.017	0.017
	(0.005)***	(0.006)***	(0.008)***	(0.009)***	(0.024)***	(0.022)***	(0.074)	(0.075)
y2008	0.447	0.456	0.358	0.36	-0.073	-0.086	-0.163	-0.164
	(0.005)***	(0.007)***	(0.008)***	(0.009)***	(0.025)***	(0.024)***	(0.076)**	(0.076)**
y2009	0.447	0.456	0.392	0.393	-0.128	-0.134	-0.105	-0.106
	(0.005)***	(0.008)***	(0.008)***	(0.009)***	(0.025)***	(0.025)***	(0.078)	(0.079)
y2010	0.463	0.458	0.399	0.399	-0.070	-0.073	-0.114	-0.115
	(0.006)***	(0.009)***	(0.009)***	(0.009)***	(0.025)***	(0.026)***	(0.081)	(0.082)
y2011	0.472	0.478	0.402	0.4	0.041	0.030	-0.017	-0.018
	(0.007)***	(0.010)***	(0.009)***	(0.009)***	(0.025)	(0.027)	(0.084)	(0.084)
y2012	0.442	0.442	0.38	0.378	0.037	0.040	-0.172	-0.173
	(0.007)***	(0.010)***	(0.008)***	(0.009)***	(0.025)	(0.027)	(0.083)**	(0.083)**
_cons	0.671	0.523	0.642	0.631	0.766	0.792	0.587	0.59
	(0.014)***	(0.044)***	(0.018)***	(0.021)***	(0.060)***	(0.051)***	(0.128)***	(0.134)***
N	312	312	312	312	338	338	338	338
R^2	0.432	0.424	0.285	0.279	0.107	0.108	0.080	0.079

Source: Authors' calculations

Table 10: The effect of fiscal dissimilarity and its interaction with non-membership in the Euro area on business cycle correlation (GVA, EU27 as a benchmark)

	cr_hp	cr_hp_int	cr_cf	cr_cf_int	cm_hp	cm_hp_int	ao_hp	ao_hp_int
β_1	-4.97	-2.36	-0.926	-7.38	-11.1	-9.42	-12.7	-9.24
	(0.505)***	(1.26)*	(0.185)***	(2.85)***	(0.660)***	(1.29)***	(2.80)***	(6.75)
β_3		-4.53		11		-2.85		-4.85
		(1.90)**		(0.864)***		(0.206)		(8.76)
β_2	-0.15	-0.109	-0.066	-0.168	0.040	0.065	-0.028	0.003
	(0.011)***	(0.024)***	(0.006)***	(0.012)***	(0.008)***	(0.027)**	(0.047)	(0.063)
γ	0.059	0.046	0.228	0.276	0.932	0.918	0.681	0.67
	(0.015)***	(0.019)**	(0.009)***	(0.012)***	(0.060)***	(0.062)***	(0.082)***	(0.089)***
y2001	-0.011	-0.011	-0.438	-0.438	.	.	.	.
	(0.002)***	(0.002)***	(0.002)***	(0.002)***	.	.	.	.
y2002	0.179	0.179	-0.369	-0.369	0.341	0.341	0.342	0.346
	(0.002)***	(0.002)***	(0.002)***	(0.002)***	(0.016)***	(0.016)***	(0.079)***	(0.080)***
y2003	0.287	0.288	-0.13	-0.131	0.41	0.411	0.421	0.427
	(0.002)***	(0.003)***	(0.002)***	(0.002)***	(0.016)***	(0.016)***	(0.079)***	(0.080)***
y2004	0.293	0.293	-0.068	-0.071	0.306	0.306	0.256	0.26
	(0.002)***	(0.003)***	(0.002)***	(0.002)***	(0.017)***	(0.017)***	(0.079)***	(0.080)***
y2005	0.269	0.27	-0.017	-0.018	0.393	0.394	0.622	0.624
	(0.002)***	(0.003)***	(0.002)***	(0.002)***	(0.017)***	(0.017)***	(0.079)***	(0.080)***
y2006	0.417	0.418	-0.066	-0.070	0.383	0.383	0.517	0.521
	(0.002)***	(0.003)***	(0.002)***	(0.003)***	(0.017)***	(0.017)***	(0.079)***	(0.080)***
y2007	0.608	0.608	0.157	0.155	0.392	0.393	0.738	0.738
	(0.002)***	(0.003)***	(0.002)***	(0.003)***	(0.017)***	(0.017)***	(0.079)***	(0.080)***
y2008	0.595	0.596	0.184	0.177	-0.602	-0.602	-0.228	-0.23
	(0.002)***	(0.003)***	(0.002)***	(0.004)***	(0.017)***	(0.017)***	(0.079)***	(0.080)***
y2009	0.585	0.587	0.205	0.204	-4.393	-4.392	-0.439	-0.425
	(0.003)***	(0.004)***	(0.002)***	(0.004)***	(0.017)***	(0.017)***	(0.079)***	(0.080)***
y2010	0.589	0.591	0.202	0.193	0.279	0.28	0.24	0.24
	(0.003)***	(0.004)***	(0.002)***	(0.004)***	(0.017)***	(0.017)***	(0.080)***	(0.080)***
y2011	0.592	0.594	0.194	0.189	0.15	0.152	0.103	0.101
	(0.003)***	(0.004)***	(0.003)***	(0.005)***	(0.017)***	(0.018)***	(0.08)	(0.080)
y2012	0.584	0.587	0.182	0.17	-0.768	-0.766	-0.158	-0.169
	(0.003)***	(0.004)***	(0.003)***	(0.005)***	(0.017)***	(0.018)***	(0.079)**	(0.080)**
_cons	0.406	0.393	0.655	0.682	0.080	0.075	0.065	0.050
	(0.016)***	(0.021)***	(0.003)***	(0.005)***	(0.031)**	(0.032)**	(0.084)	(0.085)
N	273	273	273	273	288	288	288	288
R^2	0.918	0.913	0.700	0.682	0.695	0.695	0.451	0.451

Source: Authors' calculations

Project Information

Welfare, Wealth and Work for Europe

A European research consortium is working on the analytical foundations for a socio-ecological transition

Abstract

Europe needs change. The financial crisis has exposed long-neglected deficiencies in the present growth path, most visibly in the areas of unemployment and public debt. At the same time, Europe has to cope with new challenges, ranging from globalisation and demographic shifts to new technologies and ecological challenges. Under the title of Welfare, Wealth and Work for Europe – WWWforEurope – a European research consortium is laying the analytical foundation for a new development strategy that will enable a socio-ecological transition to high levels of employment, social inclusion, gender equity and environmental sustainability. The four-year research project within the 7th Framework Programme funded by the European Commission was launched in April 2012. The consortium brings together researchers from 34 scientific institutions in 12 European countries and is coordinated by the Austrian Institute of Economic Research (WIFO). The project coordinator is Karl Aiginger, director of WIFO.

For details on WWWforEurope see: www.foreurope.eu

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WWWFOR EUROPE
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