



# Trade intensity and output synchronisation: On the endogeneity properties of EMU<sup>☆</sup>



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## ABSTRACT

Using annual bilateral data over the period 1988–2011 for a panel of 26 industrialised and emerging economies, we analyse in a time-varying framework the determinants of output synchronisation in EMU (European Monetary Union) distinguishing between core and peripheral member states. The results support the specialisation paradigm rather than the endogeneity hypothesis. Evidence is found in the euro period of diverging patterns between the core and the peripheral EMU countries raising questions about the financial stability of EMU.

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## 1. Introduction

The recent economic and financial crisis has shown weaknesses in the EMU governance framework. In particular, the euro zone sovereign debt crisis has raised again the question of the financial sustainability of EMU and whether in its current form it can be considered an optimal currency area (OCA). A number of recent studies (Chen et al., 2012; Schmitz and von Hagen, 2009; Sinn et al., 2011) indeed concluded that during its first decade imbalances between member states and differences in business cycle patterns in the core and in the periphery increased.

As is well known, OCA theories (Mundell, 1961; McKinnon, 1963; Kenen, 1969) argue that the degree of synchronisation of national business cycles is an indicator of the cost of adopting

a common currency and relinquishing monetary policy independence: the more synchronised they are, the more effective a common monetary policy is. Therefore, from a financial stability perspective, output synchronisation has crucial implications in the context of EMU, reducing the likelihood of asymmetric responses to shocks and thus increasing the effectiveness of “one fits all” ECB policies.

OCAs theories, however, do not provide formal criteria to evaluate whether the timing of the various steps necessary to create a currency area can be considered optimal, neither do they specify unique measures of the potential gains and losses. Individual OCA properties (e.g. labour and capital markets integration, price flexibility) as well as meta-properties aggregating several criteria have been considered. In the case of EMU, the positive impact of trade flows on output synchronisation predicted by Frankel and Rose (1998) has been analysed mainly in its very early stages (see the survey by Barbosa and Alves, 2011) – surprisingly, despite their availability, longer runs of data have not been used to test for long-run effects.

The present study aims to fill this gap. The issue it analyses is of particular relevance because if EMU does not converge endogenously towards an OCA more efforts to reform European

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governance and more strict policy coordination among member states are needed to ensure financial stability and to limit the risk of a break-up.

Specifically, this paper draws on three different, though related, strands of empirical research. The first has examined the so-called “nominal convergence” criterion (Haug et al., 2000; von Hagen and Neumann, 1994; Antonucci and Girardi, 2006), highlighting some heterogeneity among countries in Stage III of the process of European integration. In particular, Haug et al. (2000) predicted potential problems in the long run for some peripheral countries (Italy, Portugal, and Spain) with the need for “potentially painful long-run policy adjustments and reforms” (Haug et al., 2000, p. 431).

A second strand of research has analysed the real aspects of monetary integration and the degree of synchronisation of national business cycles. Fatás (1997), using annual employment growth rates for various regions of France, Germany, Italy and the United Kingdom, found that the average correlation with aggregate EU-12 employment growth was higher in the period 1979–1992 than in previous one, 1966–1979. Similarly, Angeloni and Dedola (1999) reported that the output correlation between Germany and other European countries increased during the period 1993–1997, while Furceri and Karras (2006) estimated a higher business-cycle synchronisation for many countries in 1992–2003 compared to 1980–1991. Despite this evidence, the general overall conclusion emerging from more recent studies is that the “euro effect” on euro zone business cycles has been weak (Enders et al., 2010) or even null (Canova et al., 2009; Del Negro and Otrok, 2008; Giannone et al., 2009).

A third strand has stemmed from the heated debate between advocates of trade “specialisation” (Krugman, 1993; Krugman and Venables, 1995) theories and of the “endogeneity” hypothesis (Frankel and Rose, 1998) respectively. Economic theory does not provide unique predictions: stronger linkages could result either in a higher or a lower degree of business cycle co-movement depending on whether or not demand- and supply-side effects dominate over increased specialisation of production (Baxter and Kouparitsas, 2005; Imbs, 2006). In particular, the “specialisation” paradigm postulates that as countries become more integrated, their industrial structure develops according to their comparative advantages (Bayoumi and Eichengreen, 1996), and thus the economy of each member country of an OCA becomes more vulnerable to supply shocks. By contrast, according to the endogenous view of OCA the positive link between income correlation and trade integration is magnified for countries joining a currency union, and therefore the conditions for an OCA might be satisfied ex post even if they were not met ex ante.

This paper, using annual bilateral data over the period 1988–2011 for a panel of 26 industrialised and emerging economies, contributes to the existing literature in three ways. First, unlike the existing studies covering a short time period after the launch of EMU, it analyses how the integration process affected output synchronisation over more than a decade. Such a time span is indeed necessary to capture the long-term developments induced by a monetary union, such as trade integration (De Santis and Vicarelli, 2007). Second, it adopts a time-varying framework to analyse the determinants of output synchronisation as previously done only in a few relevant studies (Kalemli-Ozcan et al., 2009; Imbs, 2010; Caporale and Girardi, 2012). Third, it distinguishes between core and peripheral economies and is therefore able to contribute to the debate on the “endogeneity” properties of EMU.

According to our estimates the introduction of the euro has not been associated with an endogenously increasing role for trade intensity as a factor driving output synchronisation within EMU. Furthermore, diverging patterns have been emerging between the

core and the peripheral countries. This phenomenon might represent a severe obstacle to the financial stability of EMU as shown by the recent financial crisis, especially in terms of the effectiveness of the “one fits all” monetary policy. The absence of an endogenously determined process of business cycle convergence à la Frankel and Rose within the euro zone suggests that to guarantee financial stability more coordinated policies and a more strict surveillance procedure might be needed.<sup>2</sup>

This paper is organised as follows. In Section 2 the empirical strategy is outlined. Section 3 describes the dataset. Section 4 discusses the results of the full sample analysis, those from a time-varying approach to modelling the relationship between trade intensity and output synchronisation, and the evidence based on a number of alternative specifications. Section 5 offers some concluding remarks.

## 2. The empirical strategy

Since the study of Frankel and Rose (1998) a large body of empirical research (Clark and van Wincoop, 2001; Calderon et al., 2007; among others) has shown that bilateral trade flows (*tra*) can affect output synchronisation ( $\rho$ ) across countries and/or regions. The positive effect of bilateral trade flows on the degree of international business cycle synchronisation has been widely confirmed in the most recent literature even when controlling for other possible determinants, such as capital flows or industry specialisation (Imbs, 2004; Baxter and Kouparitsas, 2005; Bower and Guillemineau, 2006; Inklaar et al., 2008). In particular, given the important role of mutual financial flows within the European Union we include in our analysis some measures of financial integration, in line with a number of recent contributions (Imbs, 2010; Kalemli-Ozcan et al., 2013a, 2013b).

Thus, a canonical regression model can be specified as

$$\rho = \varphi_1 tra + \varphi_2 fin + \varepsilon \quad (1)$$

where *fin* stands for an index of (bilateral) financial integration.<sup>3</sup>

Standard international business cycle models, however, have difficulty in matching the Frankel and Rose (1998) empirical results, leading to a “trade-comovement puzzle” (Kose and Yi, 2006). According to standard theory, trade intensity has an ambiguous effect on the co-movement of output. Openness to trade could lead to increased specialisation in production (inter-industry patterns of trade) or to more similar production mainly due to scale economies (intra-industry trade). If business cycles are hit by industry-specific shocks and trade-induced specialisation dominates, this leads to decreasing business cycle correlations. However, if trade is dominated by intra-industry trade industry-specific shocks may lead to more symmetric business cycles. Consequently, the positive link between trade and business cycle synchronisation is often seen as an indication that intra-industry dominates inter-industry trade as a spillover channel for shocks.<sup>4</sup>

<sup>2</sup> It has to be underlined, however, that in the aftermath of the crisis some reforms have already been implemented. For example, a new surveillance and enforcement mechanism was set up in December 2011 as part of the so-called “Six-Pack” legislation, which reinforced economic governance in the EU and the euro area.

<sup>3</sup> In our estimated equations we do not control for industrial specialisation due to the lack of freely available homogeneous bilateral indicators at industry level for all the countries in our sample. Reducing the number of countries or the time span would have meant discarding useful information provided by the additional data. We follow Imbs (2010) and include a measure of mutual openness to financial flows as a control when assessing the effect of trade intensity on business cycle co-movements.

<sup>4</sup> For the specific case of euro area, intra-industry is found to be very relevant by di Giovanni and Levchenko (2010).

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