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Research Paper

The Real Effects of Global Financial Integration

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ABSTRACT

Purpose: Most studies on Business Cycles Synchronisation (BCS) propose bilateral explanations for bilateral business cycle comovement. This paper purpose a global financial integration measure which allows disentangling the financial integration effect in two channels, global and bilateral.

Design/Methodology/Approach: We build a panel dataset with annual data from 20 advanced economies covering the period 1995-2011. Their methodological approach on regressing bilateral measures of financial integration on bilateral measures of output comovement. In fact, the common procedure is based on regressions that account for local country-pair interaction under the form of bilateral flow, exposure or correlation.

Findings: The empirical results suggest that accounting for global financial integration matters even for such disaggregated level of interactions. In particular, we find a large positive effect of global financial integration on bilateral output comovement. This effect outstands from the estimates of other standard BCS determinants such as bilateral financial openness, bilateral trade intensity or sector similarity.

Research limitations: Understanding the main forces driving financial and Business Cycle Synchronisation has important implications for supranational economic policies such as financial regulation and the establishment of monetary unions. Intriguingly, understanding the role of financial integration in the synchronisation of financial cycles as well as their interactions with business cycles is a matter that has received relatively little attention in the BCS literature. We plan to extend our analysis in these directions in a follow-up paper.

Pratical implications: This paper contributes to the BCS literature by proposing a global financial integration measure which allows disentangling the financial integration effect in two channels, global and bilateral. ¬ The first contribution of this paper is the development of a new measure of the financial integration displayed by the global financial network in each period of time. The second contribution of this paper is to test empirically at what extent this new global financial integration measure improves the understanding of BSC. The third contribution of the paper is to give further insights about the discrepancy between the predicted negative relationship between financial integration and BSC by the standard comparative advantage theory and evidence from most BSC empirical studies that report a positive impact of financial integration on output comovement.

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Originality/Value: This paper contributes to the BCS literature by proposing a global financial integration measure which allows disentangling the financial integration effect in two channels, global and bilateral.

Keywords: Financial Integration; Business Cycle Synchronisation; International Comovement; Output Comovement; Global shocks.

1. Introduction

This paper contributes to the literature on business cycles comovement by developing a new global financial integration measure, which is evaluated alongside alternative standard determinants of output comovement from the literature on Business Cycles Synchronisation (BCS for the remainder of the paper). A sample of twenty advanced economies is considered.

The recent financial crisis highlighted the strength of spillovers across economies and financial markets as well as of common global financial risks. The importance of close linkages across financial markets (versus trade and commodity prices channels) as major source of large spillovers (Bayoumi and Vitek, 2013) became evident. As well as the role of financial markets in creating common global risk sources through channels such as capital flows, funding availability, risk premia, liquidity shocks, versus common macroeconomic shocks on economic fundamentals (Ang and Longstaff, 2013; Cespa and Foucault, 2014). Revisiting the real effects, understood in this paper as the impact on the cross-countries business cycles dynamics from increased financial markets integration, has therefore become a relevant topic to be addressed not only for macroeconomic policy makers and governments but also for worldwide investors and capital providers.

The first contribution of this paper is the development of a new measure of the financial integration displayed by the global financial network in each period of time. This measure enables our empirical analysis to disentangle effects from global financial integration and effects from bilateral financial relationships captured by the standard proxies in the BCS literature. As the recent financial crisis suggests, considering this additional level of financial integration (global) may be of major relevance. Moreover, the global financial risk measure is build up on a network perspective, which recent literature has shown to complement standard econometric analysis when it arrives to topics as risk sharing and contagion, and allows the inspection of structural changes throughout time in the network itself.

The second contribution of this paper is to test empirically at what extent this new global financial integration measure improves the understanding of BSC. For a sample of twenty advanced economies, a panel regression is estimated and the main conclusion is that there is a large positive effect of global financial integration on bilateral output comovement, clearly dominating the relevance of other BCS determinants such as bilateral financial openness, bilateral trade intensity and bilateral sector similarity.

The third contribution of the paper is to give further insights about the discrepancy between the predicted negative relationship between financial integration and BSC by the standard comparative advantage theory and evidence from most BSC empirical studies that report a positive impact of financial integration on output comovement. By disentangling the financial integration effect in two channels, global and bilateral, we are able to shed additional light about the direction of the real effects of financial integration: the global financial integration generates a dominant positive effect on BSC but the bilateral financial openness in fact generates a negative effect on BSC, as predicted by

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economy theory. The corollary is that the BCS dynamics seems to be dominated by the strength of the financial links in global economic network, which more than compensates the smoothing effect from bilateral comparative advantages dynamics.

2. Related literature

A comprehensive analysis of the global nature of financial shocks and transmission mechanisms seems necessary to reconcile economic theory and empirical evidence.

Standard theoretical literature of international business cycles (IBC for the remainder of the paper) suggest that Foreign Direct Investment (FDI) and access to international financial markets can trigger a reduced level of comovement between countries as they stimulate specialisation of production through the reallocation of capital according to countries' comparative advantages. By allowing for cross-border ownership of means of production and assets, financial integration provide investors with better insurance against production risk derived from higher exposition to asymmetric shocks (Baele et al., 2004; Schiavo, 2008). In standard IBC literature, a positive productivity shock in one country is likely to attract investment from other economies and to increase sectorial specialisation as long as the marginal productivity of capital and labor is increasing (Backus, Kehoe and Kydland, 1995; Baxter and Crucini, 1995). On the negative side, corporate finance theories imply that negative productivity shocks should lead to capital withdrawals, amplifying output differences among financial integrated economies (Morgan, Rime and Strahan, 2004).

Yet empirical evidence presents mixed results regarding the relationship between financial integration and output comovement. Following what is predicted by standard theories, a negative correlation between financial integration and output comovement is reported by studies like García-Herrero and Ruiz (2008), Claessens, Kose and Terrones (2012) and Siedschlag and Tondl (2011). However, several studies suggest a positive effect of financial integration on output comovement (Inklaar, Jong-A-Pin and De Haan, 2008; Artis, Fidrmuc and Scharler, 2008; Imbs, 2010). Moreover, a vast body of empirical research reported a historically high level of international comovement of real and financial variables following the 2007-08 global financial crisis (Banerji and Dua, 2010; Antonakakis and Scharler, 2012; Perri and Quadrini, 2018).

The discrepancies displayed by empirical studies may result from methodological disparities, whether due to differences in the adoption of proxy measures for financial and economic variables or in modeling their relationship. For example, cross-section studies which cover turbulent and calm periods, as Imbs (2006), Kose, Prasad and Terrones (2003) and Otto, Voss and Willard (2001), find a positive correlation between financial openness and GDP comovement. This relationship seems to have a stronger manifestation between economies sharing high levels of integration such as OECD economies (Otto, Voss and Willard, 2001; Imbs, 2010) and European economies (Schiavo, 2008; Antonakakis and Tondl, 2011). However, cross-section studies may suffer from not being able to account for country-specific factors and global shocks occurring over time, as it has been argued by Kalemli-Ozcan, Papaioannou and Peydró (2013).

Another possible explanation for the divergence between empirical results focuses on the transmission mechanisms of financial shocks. Foreign investment flows and foreign direct investments generate a positive correlation between source and target countries (Fidrmuc, Ikeda and Iwatsubo, 2012), generating spillovers effects from an idiosyncratic shock in one country towards other countries. Saving and investment decisions also affect

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asset prices and the business cycles in other countries via financial flows (Michael J. Artis, Jarko Fidrmuc and Scharler, 2008). Bayoumi and Vitek (2013) highlight the relevance of close linkages across financial markets as major sources of large spillovers. Local financial systems, and in particular the banking systems, are highly relevant transmission channels: there is evidence that a negative shock in the average level of capital of the banking system in one country implies reduced levels of lending from those banks to other economies, which implies an increase in the comovement of output with the country originally suffering the banking system shock (Kalemli-Ozcan, Papaioannou and Peydró, 2013). This has led many to argue that interdependence between banks reached such a degree that makes the system highly vulnerable (Imbs, 2010; Mitra and Sinclair, 2012; Perri and Quadrini, 2018).

A seminal model presented by Heathcote and Perri (2002) is based in the assumption that endogenous international diversification amplifies the correlation of real shocks by allowing for an endogenous determination of the volume of international asset trade. Also in Perri and Quadrini (2018) endogenous credit shocks motivated by common resale price of firm's assets are able to generate international comovement in both real and financial flows. Moreover, the introduction of market frictions in IBC models which may arise from asymmetric information and moral hazard, as in Calvo and Mendoza (2000), or from binding collateral constraints, as in Devereux and Yetman (2010), may generate contagion among financially integrated economies, as global investors herd behavior can lead to simultaneous capital withdrawal in diverse economies. There's compelling evidence from contagion literature that crises spread contagiously especially via financial linkages (Kaminsky, Reinhart and Végh, 2003; Baur, 2011; Ang and Longstaff, 2013; Bekaert et al., 2014; Cespa and Foucault, 2014). All in all, these findings suggest that financial integration stimulates the global propagation of shocks by enhancing the risk appetite and liquidity preferences of global investors and by making local banking sectors more sensitive to liquidity shocks in global markets.

The rest of the paper is structured as follows. Section 2 discusses measures of output comovement and of financial integration. Section 3 describes the data used. Section 4 presents the results from our empirical analysis. Section 5 concludes.

3. Methodological Approach

According to IBC literature, comovement may be a manifestation of common shocks or may result from country-specific shocks that spillover to other countries. Most empirical studies linking financial integration to BCS follow the latter reasoning and focus their methodological approach on regressing bilateral measures of financial integration on bilateral measures of output comovement. In fact, the common procedure is based on regressions that account for local country-pair interaction under the form of bilateral flow, exposure or correlation. Yet, accounting for global shocks and transmission as well as for country-pair characteristics is of primary importance, as noted above and as has also been exposed by Bordo and Helbling (2011) and Kalemli-Ozcan, Papaioannou and Peydró (2013). We argue that bilateral measures of financial integration may not be sufficient to grasp the global transmission nature of financial shocks. We investigate this issue within a framework that accounts for the effects of both global and local (bilateral) financial integration on local (bilateral) output comovement.

3.1. Measuring output comovement

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We compute a period-specific measure of the bilateral comovement between economies i and j, $\rho_t^{Y,ij}$, following Yetman (2011) and Trancoso (2014). This measure consists of the product between the z-score (x) of each economy's growth rate of output (Y) in each period in time (t), as follows:

$$\rho_t^{Y,ij} = x_{it}^Y x_{jt}^Y \,, \tag{1}$$

$$x_{it}^Y = \frac{(\Delta y_{it} - \Delta \bar{y}_i)}{\sqrt{\frac{1}{T-1}\sum_{t=1}^{T}(\Delta y_{it} - \Delta \bar{y}_i)^2}} \,. \tag{2}$$

where $(\Delta y_{it} - \Delta \bar{y}_i)$ represents the difference between the contemporaneous change in log real output of economy i and its arithmetic mean over time. It is worth noticing that the average of the scores obtained by this comovement measure will equal the Pearson correlation coefficient, ρ_t^{ij}, up to a degrees-of-freedom correction:

$$\frac{1}{T}\sum_{t=1}^{T}\rho_t^{ij} = \frac{T-1}{T}\rho^{ij} \tag{3}$$

In the light of IBC literature, (1) can also be considered a measure of business cycle comovement as we adopt the classical definition of the cycle, which measures cycles according to output growth rates, instead of determining deviations from growth trends. In fact, it has been reported that business cycle facts are not robust to different detrending techniques (Canova, 1998), which have been criticised for generating spurious cycles (Hodrick-Prescott filter) or for distorting key stylised facts such as the Phillips correlation between inflation and output or the countercyclical role of the real wage[3] . In addition, the classical cycle methodology is particular suited in this paper since we analyse business cycles in advanced economies where growth rates have been relatively low during the period of interest.

3.2. Measuring financial integration

A variety of indicators have been proposed in recent years to measure the degree of international financial integration, ranging from composite indices of restrictions to capital flows (de jure measures) to indices reflecting actual cross-border capital stocks/flows (de facto measures). Notwithstanding their increasing sophistication, de jure measures have been criticised for not always reflecting the degree of financial openness and integration of an economy or the effectiveness of its capital controls (for a review see Baele et al., 2004, and Kose et al., 2009). We adopt a de facto volume-based measure of bilateral financial integration, $bilf_t^{ij}$, which consists of the sum of gross stocks of foreign assets (A) and liabilities (L) as a ratio to country-pair nominal GDP (Y), as follows:

[3] See Benati (2001) for a critique to the use of the Baxter and King band pass filter.

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$$bilf_t^{ij} = \frac{A_{it} + L_{it} + A_{jt} + L_{jt}}{Y_{it} + Y_{jt}} \quad (4)$$

Stock data are less vulnerable to measurement errors than flow data, while de facto measures are less influenced by factors difficult to quantify, as risk and liquidity premia, in comparison to price-based measures (Kose et al., 2009). This measure (4) has been widely used, some examples are Cerqueira (2013), Claessens et al. (2011) and García-Herrero and Ruiz (2008). The rational supporting it is the observation that the degree of financial integration between two economies should depend positively on their joint level of financial openness, measured by the relative weight of joint foreign assets (A_i , A_j) and liabilities (L_i , L_j) with respect to the joint output (Y_i , Y_j).

As previously mentioned, we additionally consider a measure of the financial integration revealed by the global financial network in each period in time. We approximate the degree of global financial integration ($globalf_t$) by the average level of financial comovement with N countries, exhibited in each period in time, as follows:

$$globalf_t = \frac{1}{N(N-1)/2} \sum_{i,j=1}^{N} \rho_t^{F,ij} \quad (5)$$

where $\rho_t^{F,ij}$ denotes bilateral financial openness comovement, and is defined as:

$$\rho_t^{F,ij} = x_{it}^F x_{jt}^F , \quad (6)$$

$$x_{it}^F = \frac{(\Delta f_{it} - \Delta \bar{f}_i)}{\sqrt{\frac{1}{T-1}\sum_{t=1}^{T}(\Delta f_{it} - \Delta \bar{f}_i)^2}} , \quad (7)$$

$$f_{it} = \frac{A_{it}+L_{it}}{Y_{it}} , \quad (8)$$

where f_{it} denotes the economy's *i* level of financial openness in the period of time *t*, and $(\Delta f_{it} - \Delta \bar{f}_i)$ represents the difference between the contemporaneous change in financial openness and its arithmetic mean over time.

There are several reasons supporting the use of the measure described by equation (5). First, it follows a long strand of literature considering financial openness as a key determinant of correlation between business cycles, which dates back to the seminal work of Mitchell (1927). Second, it introduces a multilayer network perspective consisting of comoving bilateral interactions (links) connecting economic and financial systems (nodes), a view that is increasingly adopted by international finance network studies due to its potential to unveil complex relationships undetected by econometric tools (Trancoso, 2014), particularly evident in risk sharing and contagion diffusion processes (Gallegati et al., 2008; Battiston et al., 2012) Third, the use of stock data enables us to account for third party connections (e.g. via intermediate and structured assets/liabilities) that may not be entirely captured by bilateral flow data. Fourth, stock data measures preserve the spirit of de facto integration measures, as stocks are constructed as a

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cumulated version of the underlying flows corrected for valuation effects (Kose et al., 2009).

3. Empirical analysis

We build a panel dataset with annual data from 20 advanced economies covering the period 1995-2011. We use real GDP data from the Total Economy Database, financial data from Lane and Milesi-Ferretti (2007) and trade data from IMF and OECD (see Appendix for data description).

Figure 1a plots the evolution of the median levels of bilateral output comovement measured by (1), bilateral financial openness measured by (4) and global financial integration measured by (5). The evolution of bilateral output comovement captured by our measure detects some features also observed by other empirical studies (Cerqueira, 2013; Perri and Quadrini, 2018): i) a historically high degree of comovement in 2009 and ii) comovement between economies mostly positive during the whole period. Regarding financial integration, Figure 1b shows an upward trend for the evolution of the degree of bilateral financial openness which culminates with historical highs between 2007 and 2010. Although there is evidence of increased heterogeneity among country-pair openness, as given by the enlargement of the spread between median values for the quantile 10% and 90%, similar dynamics is observed within each of those quantiles. Figure 1c shows that global financial comovement has been positive, reaching an extraordinary high level in 2008, as widely reported by the post-2008 crisis contagion literature (Baur, 2011; Corsetti, Pericoli and Sbracia, 2011; Dungey et al., 2011; Bekaert et al., 2014).

Figure 1 – Variable dynamics

Figure 1a

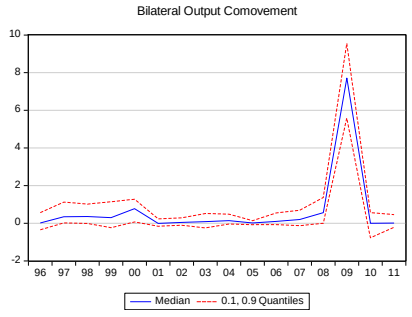


Figure 1b

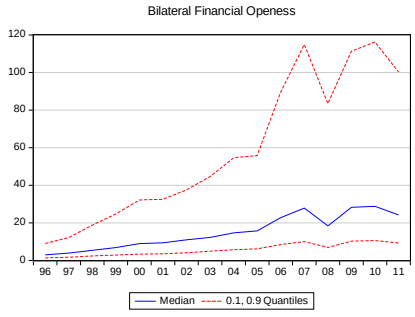
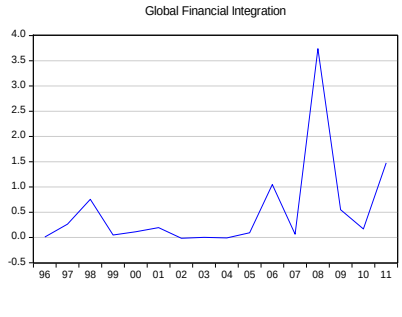


Figure 1c



Notes: Figure 1 depicts the evolution of bilateral real GDP comovement, as given by expression (1) in the text, bilateral financial openness, given by expression (6) in the text, and global financial integration , given by expression (5) in the text, during the period 1995-2011, in panels a, b and c respectively. Figures also plot median levels and quantiles at 10% and 90% levels.

In order to access the impact of financial integration in each country-pair real comovement, we conduct a formal regression analysis and estimate variants of the following specification:

$$\rho_t^{Y,ij} = \alpha^{ij} + \beta bilf_{t-1}^{ij} + \gamma globalf_{t-1} + \delta \mathrm{X}_t^{ij} + \varepsilon_t^{ij} \qquad (9)$$

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where α^{ij} represents country-pair effects to account for geographical or cultural proximity, political coordination and other time-invariant unobservable factors, X_t^{ij} is a vector comprised of other determinants of business cycle comovement between economies i and j at time t, and ε_t^{ij} is the vector of estimation errors. Regarding the vector X_t^{ij}, we test different determinants: bilateral trade intensity and two proxies of sectorial similarity.

In the equation (9), the financial variables are reported to the previous year (t-1) allowing us to investigate the causal effect on output correlation (at time t). This causality assumption is standard in the macrofinance literature and reflects a long-standing view that real variables do not react contemporaneously to financial shocks (Friedman, 1968; Christiano, Eichenbaum and Evans, 2005).

Table 1 presents the results of panel regressions of (9), using the least square error method. We start considering two specifications ([I] and [II]) of equation (9), which analyse the orthogonal impact of each financial variable; for both specifications, X_t^{ij} is zero. In specification (II) we control for unobservable heterogeneity by introducing country-pair fixed effects, which are handled using orthogonal projections from cross-section demeaned data. Global financial integration shows a strong positive effect on GDP comovement while bilateral financial openness displays a relatively weak negative effect on GDP comovement, both estimates being highly significant (at 0.001 level). Global financial integration coefficient does not change significantly from specification (I) and (II), largely reflecting the cross-country nature of this measure. Obtained results suggest that a 1-point increase in the level of global financial integration predicts an increase in bilateral output comovement by almost the double amount. Conversely, bilateral financial openness reveals a negative impact on next year bilateral business cycle comovement, an effect which more than triples when accounting for country-pair effects (although the effect continues to be low). While this result is distinct from the majority of cross-section studies, it stands in line with fixed-effects panel studies like Kalemli-Ozcan, Papaioannou and Peydró (2013), who argue that cross-section studies suffer from omitted-variable bias. Accounting for global interaction and country-pair effects, our results lend some support to the classical argument of the specialisation effect, which may have been detected by the level of bilateral interactions

Specifications (I) and (II) assume bilateral financial openness to be independent from global financial integration. This may not be the case, even though the correlations between the two variables are not particularly high[4]. Theoretically, the degree of global financial integration could magnify the impact of bilateral financial openness, for example through the propagation of global shocks, and vice-versa, through emerging structural changes in the network due to complex bilateral interactions. We account for this scenario in specifications (III) and (IV) in Table 1. Despite displaying slightly lower t-statistics and R2 scores than "orthogonal" specifications (I) and (II), the empirical results suggest that such magnifying possibility should not be rejected.

[4] Pearson coefficients in the range 0.11-0.18 for the correlation of bilateral financial openness and global financial integration, considering contemporaneous and one-year lead/lag relationships (further information is available upon request to the authors).

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Table 1 - GDP Comovement and Financial Integration: Reduced-form panel regressions

Dependent variable	**Bilateral Output Comovement ($\rho_t^{Y,ij}$)**			
	(I)	**(II)**	**(III)**	**(IV)**
Bilateral Financial Openness ($bilf_{t-1}^{ij}$)	-0.059 ***	-0.191 ***		
	(0.006)	(0.022)		
	-9.971	*-8.593*		
Global Financial Integration ($globalf_{t-1}$)	1.884 ***	1.905 ***		
	(0.033)	(0.032)		
	57.695	*58.730*		
$bilf_{t-1}^{ij} * globalf_{t-1}$)			0.546 ***	0.555 ***
			(0.015)	(0.015)
			36.896	*36.784*
Country-pair FE	No	Yes	No	Yes
R-squared	0.804	0.813	0.718	0.735
Observations	2850	2850	2850	2850
Country-pairs	190	190	190	190

Notes: The Table reports panel regression coefficients. $\rho_t^{Y,ij}$ denotes the bilateral output comovement in year *t* according to equation (1). $bilf_{t-1}^{ij}$ denotes the one year lagged value of bilateral financial openness according to equation (4) in the text. $globalf_{t-1}$ denotes the one year lagged value of global financial integration according to equation (5) in the text. Standard errors are adjusted for country-pair level heteroskedasticity and autocorrelation and corresponding t-statistics are reported below the estimates. Panel specifications (II) and (IV) include a vector of country-pair fixed-effects. The symbol *** represents statistical significance at 0.01 level.

Next we control for other potential determinants of BCS, namely bilateral trade intensity, $trade_t^{ij}$, and sectorial similarity, $sec1$ and $sec2$. These alternative candidates as BCS determinants are included in equation (9) through the variable X_t^{ij}. We adopt a commonly used measure of bilateral trade intensity

(Bordo and Helbling, 2004; Artis, Fidrmuc and Scharler, 2008; Schiavo, 2008; Antonakakis and Tondl, 2011) consisting of the sum of country-pair bilateral exports (EXP) and imports (IMP) as a ratio to its nominal GDP (Y):

$$trade_t^{ij} = \frac{EXP_{ijt} + IMP_{ijt}}{Y_{it} + Y_{jt}} \tag{10}$$

with summary statistics reported in Table A.3 in the Appendix.

We represent sectorial similarity by two alternative proxy measures. The first measure, $sec1$, is the intra-industry trade share as measured by the Grubel-Lloyd index, followed by studies like Fidrmuc (2004), Imbs (2004) and Rana (2008). It is given by

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$$sec1_t^{ij} = 1 - \frac{\sum_k \left| EXP_{k,ijt} - IMP_{k,ijt} \right|}{\sum_k \left(EXP_{k,ijt} + IMP_{k,ijt} \right)} \quad (11)$$

where k is the set of two-digit commodity groups as published by the OECD STAN database.

The second measure, $sec2$, introduces export similarity as suggested by Baxter and Kouparitsas (2005) and Inklaar, Jong-A-Pin and De Haan (2008):

$$sec2_t^{ij} = \sum_k \left| \frac{EXP_{k,it}}{EXP_{it}} - \frac{EXP_{k,jt}}{EXP_{jt}} \right| \quad (12)$$

Summary statistics for sec1 and sec2 are reported in Table A.3

We control for the dynamics of the interactions by estimating alternative equations where are considered contemporaneous (specifications [V] and [VII] in Table 2) and lagged effects of the regressors (specifications [VI] and [VIII] in Table 2). Results presented in Table 2 corroborate the reduced-form equation estimates displayed in Table 1[5]. With respect to real variables coefficients, bilateral trade intensity showed a relatively small positive one year lagged effect on output comovement across the period 1995-2011. Despite its highly statistically significance, this effect is less sizeable than in early estimates by Frankel and Rose (1998). One possible explanation is that trade moves together with output comovement because of common shocks, as suggested by Busl and Kappler (2013): in our setting we are able to disentangle those effects by introducing a new variable representing the common (global) shock. A different picture is depicted by sectorial similarity estimates. Both intra-industry trade and export similarity coefficients show no statistical significance (at 0.10 level) in our fixed-effects panel regressions. Overall our results are consistent with the findings of Baxter and Kouparitsas (2005), which perform an extreme-bounds analysis on the determinants of business cycle comovement and find that bilateral trade intensity is robustly correlated with a higher output correlation but not with greater similarity in industrial structure.

4. Conclusion

Most studies on BCS propose bilateral explanations for bilateral business cycle comovement. This paper contributes to the BCS literature by proposing a global financial integration measure which allows disentangling the financial integration effect in two channels, global and bilateral. ¬ The empirical results suggest that accounting for global financial integration matters even for such disaggregated level of interactions. In particular, we find a large positive effect of global financial integration on bilateral output comovement. This variable clearly outstands from other claimed BCS determinants such as bilateral financial openness, bilateral trade intensity or bilateral sector similarity. We conclude that global financial integration is the determinant with higher impact in global GDP comovement and such impact has a positive sign. BCS dynamics seems to be

[5] We estimated an additional set of specifications analogous to V-VIII replacing the financial variables by the joint financial variable tested on specifications III and IV. We obtained financial parameter estimates similar to III and IV (Table 4) and trade and specialisation estimates similar to the ones reported in Table 5.

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dominated by the strength of the financial links in the global economic network which more than compensates the smoothing effect from bilateral comparative advantages dynamics.

We add two notes concerning our methodological approach. First, our measure of global financial integration is based on a comovement indicator so our results may be interpreted as grossly measuring the impact of financial comovement on real comovement (similar results, not reported, were found by employing a bilateral measure of financial comovement). This approach is much in the spirit of IBC seminal works which describe international business cycles as international comovements arising from pervasive economic connections (Backus, Kehoe and Kydland, 1995; Artis and Okubo, 2011). Second, by accounting for global shocks as well as for structural changes in the network, in certain conditions our global dynamic measure may compose a finer alternative to panel period fixed-effects.

Understanding the main forces driving financial and Business Cycle Synchronisation has important implications for supranational economic policies such as financial regulation and the establishment of monetary unions. Intriguingly, understanding the role of financial integration in the synchronisation of financial cycles as well as their interactions with business cycles is a matter that has received relatively little attention in the BCS literature. We plan to extend our analysis in these directions in a follow-up paper.

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APPENDIX A

Table A1 – Data source and description

Symbol	Description	Source	Frequency	Equation in text
Y_{it}	Real output of country *i* in year *t*	Total Economy Database of the University of Groningen	Annual	(2);(4);(8);(10)
A_{it}	Gross stock of foreign assets of country *i* in year *t*	Lane and Milesi-Ferretti (2007)	Annual	(4);(8)
L_{it}	Gross stock of foreign liabilities of country *i* in year *t*	Lane and Milesi-Ferretti (2007)	Annual	(4);(8)
EXP_{ijt}	Exports of economy *i* to economy *j* in year *t*	IMF-DOTS	Annual	(10);(12)
IMP_{ijt}	Imports of economy *i* from economy *j* in year *t*	IMF-DOTS	Annual	(10);(12)
$EXP_{k,it}$	*k* commodity exports from economy *i* to economy *j* in year *t*	OECD-STAN Database	Annual	(11);(12)
$IMP_{k,it}$	*k* commodity imports of economy *i* from economy *j* in year *t*	OECD-STAN Database	Annual	(11);(12)

Table A2 – List of countries

Australia	Austria	Belgium	Canada	Denmark
Finland	France	Germany	Iceland	Ireland
Italy	Japan	Netherlands	Norway	Portugal
Spain	Sweden	Switzerland	United Kingdom	United States

Table A3 – Descriptive Statistics

	Obs.	Mean	Std. Dev.	Minimum	Median	Maximum
Bilateral Output Comovement ($\rho^{Y,ij}$)	3040	0.694	1.881	-3.007	0.142	10.859
Bilateral Financial Openness ($bilf^{ij}$)	3040	25.634	39.504	0.780	13.226	460.093
Global Financial Integration ($globalf$)	3040	0.532	1.235	-4.824	0.132	8.126
Bilateral Trade Intensity (*trade*)	3040	0.006	0.012	0.000	0.002	0.293
Intra-industry trade (*sec1*)	3040	0.354	0.215	0.000	0.354	0.805
Export similarity (*sec2*)	3040	0.969	0.365	0.317	0.883	1.847