

Financial Regulation, Financial Globalization, and the Synchronization of Economic Activity

SEBNEM KALEMLI-OZCAN, ELIAS PAPAIOANNOU, and JOSÉ-LUIS PEYDRÓ*

ABSTRACT

We analyze the impact of financial globalization on business cycle synchronization using a proprietary database on banks' international exposure for industrialized countries during 1978 to 2006. Theory makes ambiguous predictions and identification has been elusive due to lack of bilateral time-varying financial linkages data. In contrast to conventional wisdom and previous empirical studies, we identify a strong negative effect of banking integration on output synchronization, conditional on global shocks and country-pair heterogeneity. Similarly, we show divergent economic activity due to higher integration using an exogenous de-jure measure of integration based on financial regulations that harmonized EU markets.

WHAT IS THE ROLE of global financial intermediaries in the international propagation of country-specific shocks? This question is at the center of the current academic and policy debate involving financial stability, new financial architecture, and monetary policy coordination. In particular, following the 2007 to 2009 financial crisis, there has been heated debate as to whether it was the outcome of a common shock to industrial countries' asset markets

*Kalemli-Ozcan is with University of Maryland, Centre for Economic Policy Research (CEPR), and National Bureau of Economic Research (NBER); Papaioannou is with London Business School, CEPR, and NBER; and Peydró is with Universitat Pompeu Fabra and Barcelona Graduate School of Economics. This paper was previously circulated under the title "Financial Integration and Business Cycle Synchronization." Essential parts of the paper were prepared while Sebnem Kalemli-Ozcan was visiting the European Central Bank (ECB) as a 2008 Duisenberg Fellow. She thanks the economists at the Bank for providing a stimulating research environment. This paper was written when Kalemli-Ozcan was at University of Houston and Kuc University and Papaioannou was at the Economics Department of Dartmouth College and Harvard University. We thank two anonymous referees, the Associate Editor, an advisor, Cam Harvey (the Editor), John Campbell, Harris Dellas, Domenico Giannone, Jean Imbs, Simone Manganelli, Gian Maria Milesi-Ferretti, Bent Sørensen, Marco Pagano, Fabrizio Perri, Andrei Shleifer, Aaron Tornell, Francis Warnock, Axel Weber, and seminar participants at University of California Los Angeles, Brown, Dartmouth College, Harvard Business School, University of Maryland, the ECB, the Oesterreichische Nationalbank, Athens Laboratory of Business Administration, the 5th ECB Central Banking Conference, the Bank for International Settlements-Committee on the Global Financial System Workshop on Global Financial Stability, Conference on Research on Economic Theory and Econometrics, the CEPR-European University Institute workshop on Globalization, the NBER Summer Institute, the Federal Reserve Bank of Dallas, and the 2010 American Economic Association Meetings for helpful comments and suggestions. Dimitrios Rakitzis and Francesc Rodriguez-Tous provided excellent research assistance.

DOI: 10.1111/jofi.12025

or whether financial globalization generally, and banking integration more specifically, amplified and transmitted a moderate shock from a corner of the U.S. capital markets to the rest of the world.

Although we still lack direct evidence on these arguments, both find support in the observation that the evolution of economic activity and financial globalization go hand in hand. Yet this co-evolution does not necessarily imply a causal relationship. A fundamental problem with this view is the lack of systematic evidence for the benchmark, namely, the comovement of output and financial integration during periods of financial stability (i.e., how financial globalization affects output during normal times). If two financially integrated countries show a high degree of output and equity return synchronization during tranquil times, then a high correlation after one country experiences a financial shock does not necessarily constitute contagion. Contagion would emerge only if the synchronization of economic activity between financially integrated countries is higher after the shock, relative to the benchmark, conditional of course on common shocks and other factors that may simultaneously affect world market integration and business cycle synchronization. A key question is thus whether output comovement has increased as a result of financial globalization during the last few decades. In this paper, we show that, in contrast to conventional wisdom and previous empirical studies, this is not the case.

Theoretically, the correlation between financial integration and business cycle synchronization is ambiguous. Both finance/banking and macroeconomic theoretical models make opposing predictions on the association between financial integration and the synchronization of economic activity, depending on whether financial shocks to the banking sector or collateral/productivity shocks to nonfinancial firms dominate. The commonality in both set of models is as follows. In a financially integrated world, if firms in certain countries are hit by negative (positive) shocks to their collateral or productivity, both domestic and foreign banks decrease (increase) lending in these countries and increase (decrease) lending in the nonaffected countries, thereby causing a further divergence of output growth. In contrast, if the negative shock is to the banking sector, globally operating banks pull funds out of all countries, transmitting the domestic banking shock internationally and making the business cycles of the two countries more alike.¹

The identification of the one-way effect of financial integration on business cycle synchronization entails various empirical challenges. First, a positive association between cross-border financial linkages and output comovement does not necessarily imply causation since such a relationship might be spuriously driven by commonalities between countries. Proximate countries with stronger economic, social, cultural, and political ties tend to have both more synchronized output fluctuations and stronger cross-border financial linkages. In fact,

¹ See Holmstrom and Tirole (1997), Morgan, Rime, and Strahan (2004), Allen and Gale (2000), Perri and Quadrini (2011), Mendoza and Quadrini (2010), and Enders, Kollman, and Müller (2010), among others. In Section I we discuss in detail the theoretical mechanisms and discuss previous empirical studies.

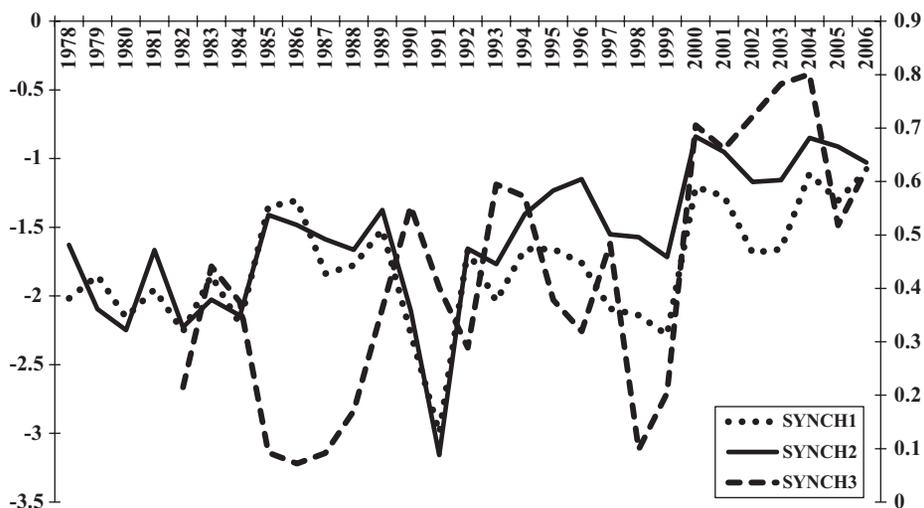


Figure 1. GDP synchronization over time. This figure plots the evolution of the average value of each of the three synchronization measures employed in the empirical analysis across the 1978 to 2006 period. For each year the average is estimated across 153 country pairs (our sample spans 18 countries). *SYNCH1* is the negative absolute difference in real GDP growth between country i and country j in year t . *SYNCH2* is the negative absolute difference in residual real GDP growth between country i and country j in year t . *SYNCH3* is the correlation of the cyclical component of real GDP between country i and j (estimated with the Baxter and King Band-Pass filter (2,8)). The correlation is estimated with a 5-year rolling window.

previous empirical studies show that most of the robust correlates of output comovement and financial integration are indeed related to proximity.²

Second, the response of integrated economies to common shocks is similar. There has been a common trend in both financial globalization and synchronization of economic activity over the past few decades. Figures 1 and 2 illustrate these patterns in our data. Yet the co-evolution of financial integration and output synchronization does not necessarily imply a causal relationship, as the common trend can be driven by other features of globalization, such as trade integration, outsourcing, increased coordination of monetary policy, and financial and/or real shocks that are common to *all* country pairs.³

Third, a significant negative association between banking linkages and business cycle synchronization may reflect reverse causation from output dynamics to financial integration. International diversification benefits become larger when stock returns are less correlated across countries, and thus financial

² Baxter and Kouparitsas (2005) show that geographic and cultural proximity variables are the most robust correlates of output synchronization. Portes and Rey (2005), Guiso, Sapienza, and Zingales (2009), Ekinci, Kalemli-Ozcan, and Sørensen (2009), Giannetti and Yafeh (2008), Mian (2006), and Papaioannou (2009), among others, show that distance and cultural ties are strong correlates of international financial activities in general and banking in particular.

³ See Rose (2009) and Inklaar, Jong-A-Pin, and de Haan (2008) on the business cycle synchronization effects of monetary policy and fiscal policy coordination, respectively.

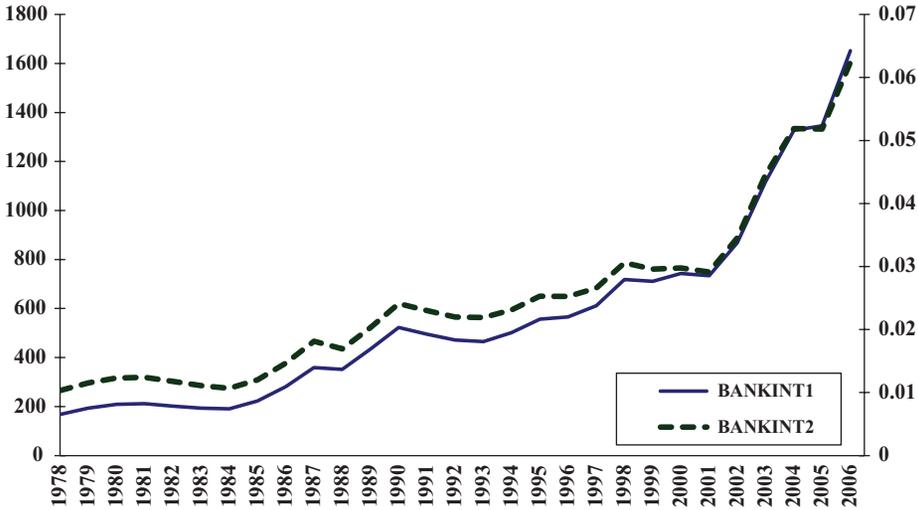


Figure 2. Banking integration over time. This figure plots the evolution of the two banking integration measures, expressed in levels (solid lines) and in logs (dashed lines). *BANKINT1* denotes the average of the logs of bilateral stocks of assets and liabilities normalized by the sum of the two countries' population. *BANKINT2* denotes the average of the logs of bilateral stocks of assets and liabilities normalized by the sum of the two countries' GDP.

flows may increase among dissimilar economies. These return and growth differentials may also affect risk sharing/taking, which in turn affect financial integration.⁴

Fourth, measurement error in the bilateral data on international capital holdings might attenuate the estimates (or even lead to systematic biases). International capital holdings and flows data are far from perfect as they tend to miss indirect links via small financial centers, are usually based on surveys, and are mostly available for the recent years.

Currently, the empirical and theoretical literatures are disconnected since only a proper identification that accounts for all of the above empirical challenges can credibly lend itself to a causal interpretation. This is the task we undertake in this paper. In contrast to previous empirical studies that mainly explore cross-sectional (cross-country) variation, our methodology for estimating the impact of financial integration on business cycle synchronization focuses on changes over time within more than 150 pairs of advanced economies over the 1978 to 2006 period. Our panel estimates assess how the evolution of business cycle synchronization is affected when (de facto and de-jure) bilateral financial integration changes within each country pair, conditional on common shocks, unobserved country-pair heterogeneity, and hard-to-account-for

⁴ For the effect of financial integration on international risk sharing and volatility see Bekaert, Harvey, and Lundbad (2005, 2006, 2011), Bekaert et al. (2007), Kose et al. (2009), Kalemli-Ozcan, Sørensen, and Yosha (2001, 2003), Kalemli-Ozcan, Sørensen, and Volosovych (2010), and Kalemli-Ozcan et al. (2009), among others.

dynamics. To the extent that this *within*-country-pair comparison fully absorbs country-pair-specific differences in synchronization and integration, the estimated difference can be plausibly attributed to changes in the degree of financial integration over time. To the best of our knowledge, our paper is the first that uses this methodology.

In the first part of our empirical analysis we use a quantity-based measure of financial integration exploiting a proprietary database from the Bank of International Settlements (BIS) that reports bilateral international bank assets and liabilities over the past three decades for a group of developed countries.⁵ The extensive time dimension of the data allows us to account for fixed country-pair factors and global shocks (the first and second identification challenge). Our results show that accounting for these factors (and primarily for time-invariant country-pair characteristics) is fundamental. While in the cross-section of country pairs there is a significant positive correlation between banking integration and output synchronization, our panel estimates show that (within-country-pair) increases in cross-border banking activities are followed by less synchronized (more divergent) output fluctuations. This result stands in contrast to previous empirical work that lacks high-quality time-series bilateral data on cross-border financial linkages. While in line with theory that characterizes the correlation between financial integration and output synchronization in times when there are no major financial shocks, our findings are in contrast to the conventional wisdom that financial globalization has increased the synchronicity of economic activity even before the recent financial crisis.

While the supervisory BIS data reflect more than 99% of the international exposure of the local banking system, they do not capture other forms of international investment (such as foreign direct investment (FDI) and portfolio investment) between nonbanks. Moreover, the BIS data (as most international capital data) mis-record investment channeled via off-shore financial centers. To account for these caveats (related to the fourth identification challenge), we construct a structural index of financial integration. This index is based on the adoption timing of financial sector legislation that aims to harmonize the regulatory framework in financial intermediation across the European Union (EU) financial markets. Compared to outcome-based indicators (such as international capital holdings and return correlations), a time-varying *de jure* measure of financial integration allows us to account for reverse causation arising from the fact that international banking may react to the synchronization of output fluctuations (the third identification challenge), while at the same time accounting for country-pair heterogeneity, global shocks, and common trends.

To construct the structural *de-jure* index of financial integration, we exploit in a “quasi-natural” experimental setting the peculiar nature of adopting

⁵ The literature on cross-border financial integration employs either *de-facto* or *de-jure* measures (see Adam et al. (2002) for a general discussion). *De-facto* indicators are typically outcomes, such as the quantity of international bank or equity holdings (Lane and Milesi-Ferretti (2007)) or return correlation (Bekaert and Harvey (1995)). *De-jure* measures are based on the timing of stock market liberalization (Bekaert and Harvey (2000), Henry (2000)) or the removal of capital account restrictions (such as the widely used AREAER index of the International Monetary Fund).

EU-wide legislation across EU member countries—the EU Directives transposition system. The Financial Services Action Plan (FSAP) was a package of financial reforms launched by the EU in 1998 aiming to integrate the segmented EU financial markets and reduce the costs of cross-border financial intermediation. The FSAP included 29 major pieces of legislation (27 EU Directives and two EU Regulations) in banking, capital markets, corporate law, payment systems, and corporate governance. Examples include the Directive on Money Laundering, the Directive on Financial Collateral Arrangements, the Directive on Prospectuses, and the Directive on Insider Trading and Market Manipulation. In contrast to EU Regulations that become immediately enforceable across EU member countries, EU Directives are acts that become enforceable only after each EU member country passes domestic legislation adopting the Directive. The legal adoption of the EU Directive (the so-called “transposition” process) is notoriously slow, since it requires modifications of existing institutional structures, the removal of previous regulations, and in many cases the establishment of new agencies and infrastructure. In practice the transposition of the EU Directives takes several years and differs considerably across EU member states. Using information from the EU Commission on the adoption timing of each of the Directives of the FSAP across EU countries, we construct a bilateral time-varying index that reflects the degree of similarity between the legal-regulatory structures governing the functioning of financial intermediation across each country pair in each year.

Our panel estimates show that a higher degree of legislative-regulatory harmonization in financial services is associated with less synchronized output cycles. After showing that the simultaneous adoption of the EU-wide legislative acts by member countries is followed by strong increases in cross-border banking activities, we combine the structural index of financial integration based on legislative convergence in financial intermediation with the quantity-based banking integration measure (from the BIS) into a bilateral panel instrumental variables method. Our identification scheme builds on the insights of the law and finance literature showing that sound investor protection and legal quality lead to deep and efficient capital markets (see La Porta et al. (1997, 1998), La Porta, Lopez-de-Silanes, and Shleifer (2008)). It is also related to a new strand in the corporate finance and law and economics literatures that examines the effects of legal convergence on capital markets (see Balas et al. (2009), Enriques and Volpin (2007), and Christensen, Hail, and Leuz (2011), among others). Our identification method associates changes in the legal-regulatory environment governing financial intermediation that aim to harmonize segmented financial systems with changes in cross-border banking activities among countries that adopt the same piece of legislation, and in turn with changes in output synchronization. The panel instrumental variable (IV) analysis reveals that the component of banking integration stemming from the harmonization of the regulatory environment in financial services makes business cycles less alike.

The paper is structured as follows. In Section I we detail the theoretical predictions of finance/banking models and international macro models. We also

discuss previous empirical work. Section II describes our data. Section III reports and compares the cross-sectional and panel estimates on the effect of cross-border banking integration on business cycle synchronization. In Section IV we report panel estimates associating business cycle synchronization with a de-jure structural index of financial integration that reflects legislative-regulatory harmonization policies in banking, insurance, corporate law, and capital markets. Section V presents IV estimates associating legal convergence in financial services with banking integration (in the first stage) and output synchronization (in the second stage). Section VI decomposes bilateral banking activities into foreign assets and liabilities to shed further light on the theoretical mechanism. Section VII concludes.

I. Related Literature

Theory makes opposing predictions about the effect of financial integration on international business cycle synchronization depending on the nature of the underlying shocks. In this section, we explain in detail the alternative theoretical channels modeled in the finance/banking and international macro/finance literatures. We then go over previous empirical work.

A. Theory: Financial Integration and Lower Synchronization

Morgan, Rime, and Strahan (2004) develop a multi-economy variant of the canonical banking model of Holmstrom and Tirole (1997) and test it using cross-state banking exposure data across U.S. states. They show that, if firms in certain states are hit by positive shocks that increase the value of their collateral, then under financial integration they receive more credit both from in-state and from out-of-state banks. As a result, output increases in the affected region relatively more as compared to output in other regions, making cycles diverge. If a negative collateral shock hits one region (because productivity falls, for example), then both local and out-of-state banks move away from the affected region, delivering the same asymmetry result for regional business cycles.

Working in an international context, Bekaert, Harvey, and Lundblad (2005) argue that, if a country that liberalizes its equity markets has better growth opportunities than others (for example, because its production is concentrated in high global demand sectors or because capital scarcity is associated with high returns), then following a financial liberalization episode capital will flow to that country and therefore output patterns between the two integrated countries will diverge (see also Bekaert et al. (2007)). By the same token, negative shocks will lead to capital withdrawals and thus output differences among financially integrated economies will get amplified.

International real business cycle theories model a similar mechanism that also yields a negative correlation between financial integration and output synchronization. In the workhorse dynamic general equilibrium framework of Backus, Kehoe, and Kydland (1992) with complete financial markets, the

country hit by a positive productivity shock experiences an increase in the marginal product of capital and labor, workers increase their labor supply by decreasing time spent for leisure, and the country receives capital on net—a mechanism that leads to negative output correlations between the two countries.

In general equilibrium causality can also run in the other direction, from output divergence to financial integration. Heathcote and Perri (2004) show that a lower degree of output (and hence return) synchronization due to the changing nature of shocks increases demand for diversification and hence increases bilateral financial integration via a higher volume of asset trade. Kalemli-Ozcan et al. (2010) show that, under full diversification of capital income, investment patterns are solely determined by relative productivities. Their model (and empirical results) suggests that capital will flow to the states with the highest productivity growth, creating even more divergent output growth patterns.

A different mechanism linking financial integration and output synchronization based on industrial specialization is studied by Obstfeld (1994). In his model, financial integration shifts investment towards risky projects as it enables countries to specialize according to their comparative advantage; this implies that output growth among financially integrated countries should be negatively correlated.⁶

B. Theory: Financial Integration and Higher Synchronization

The model of Morgan, Rime, and Strahan (2004) also predicts that banking integration may lead to more, rather than less, synchronized output cycles. This occurs if the shock is to the banking sector rather than to a firm's productivity/collateral. If there is a negative shock to banks' capital, the induced contraction of credit supply has negative real effects for the domestic economy.⁷ If the domestic credit supply reduction is significant, under banking integration the business cycles of the two interconnected regions/economies will become more synchronized, since banks that operate in financially interconnected regions pull funds out of the nonaffected region to continue lending

⁶ In line with this argument, using regional-level data, Kalemli-Ozcan, Sørensen, and Yosha (2003) show that financial integration leads to higher industrial specialization. Using country-level data, Imbs (2004) and Kalemli-Ozcan, Sørensen, and Yosha (2001) show that higher industrial specialization leads to less synchronized cycles.

⁷ Firms do not generally seem to be affected by the reduction in credit supply in developed countries as shown by Rice and Strahan (2010) for the United States and Jimenez et al. (2011) for Spain. In the current crisis there is also a reduction in credit supply as shown by Jimenez et al. (2012) and Puri, Rocholl, and Steffen (2011), but again there is no obvious evidence on the real effects of such reductions. In developing countries, in contrast, credit supply contractions may be more binding for firms, as shown, for example, by Paravisini (2008) for Argentina, Khwaja and Mian (2008) for Pakistan, Paravisini et al. (2011) for Peru, and Kalemli-Ozcan, Kamil, and Villegas-Sanchez (2010) for six Latin American countries. The last two papers show real effects in terms of declining exports (Peru) and declining investment (six Latin American countries) of firms. In a global financial crisis, such as the 2007 to 2009 one, even developed country firms may suffer from credit supply shocks (see, for example, Ivashina and Scharfstein (2010) and Cornett et al. (2011) for the United States, and Maddaloni and Peydró (2011) for the euro area and the United States).

in the affected region. Allen and Gale (2000) model this contagion-type mechanism through interconnected bank balance sheets. In their model shocks are transmitted through the interbank markets by banks from affected countries pulling their international deposits out and thus transmitting the local shock internationally.⁸

Dynamic stochastic general equilibrium models may also yield a positive (rather than a negative) relation between banking integration and business cycle synchronization (stemming from the feedback from interest rates to capital values). The early literature models this by introducing financial frictions into the standard international real business cycle model (with productivity/technology shocks), which stop or reverse the direction of capital flows (Calvo and Mendoza (2000)), or by introducing leveraged and constrained firms that liquidate and run asset prices down when they are hit by a negative shock to their capital (Devereux and Yetman (2010)).⁹ The recent literature introduces banking shocks in addition to productivity shocks (e.g., Perri and Quadrini (2011), Mendoza and Quadrini (2010), Enders, Kollmann, and Müller (2010), Kalemli-Ozcan, Papaioannou, and Perri (2013)). In these models, banks and/or firms have collateral constraints. When there is a negative shock to the banking sector in the domestic economy, banks cut their lending globally since their net worth goes down and they have to shrink their balance sheet. Foreign banks from nonaffected countries stop lending to firms in the affected economy due to limited enforcement of debt contracts that increases the cost of default in bad times. As a result of the drop in asset prices, the initial shock to domestic banks' balance sheet spreads internationally. Hence, foreign banks' net worth also falls; consequently they also need to shrink their balance sheet. This leads in turn to rising financing costs in both financially integrated countries. All these mechanisms reinforce each other and lead to a higher synchronization of economic activity between financially integrated countries.

C. Empirical Evidence

Independent of the period, country, and empirical method used, almost all empirical studies document a positive correlation between financial integration and GDP co-movement.¹⁰ Using cross-country data over a long period, Kose, Prasad, and Terrones (2003) find that financially open countries without capital account restrictions have business cycles that are more

⁸ Rochet and Tirole (1996) and Freixas, Parigi, and Rochet (2000) also model interbank contagion. While in the second paper the effects are through balance-sheet pecuniary externalities among banks as in Allen and Gale (2000), in the first paper financial contagion comes through bad peer (interbank) monitoring. Iyer and Peydró (2011) test these interbank contagion models.

⁹ See Brunnermeier, Eisenbach, and Sannikov (2012) and Pavlova and Rigobon (2011) for surveys of the literature on international macroeconomics with financial frictions.

¹⁰ For the broader literature that quantifies the effects of financial integration on economic growth, output volatility, and risk sharing, see Bekaert, Harvey, and Lundblad (2005, 2006, 2011), Bekaert et al. (2007), Henry (2000), Kose et al. (2009), and Kalemli-Ozcan, Sørensen, and Volosovych (2010).

synchronized with world output. Imbs (2006) uses bilateral (country-pair) data on equity and debt holdings constructed by the International Monetary Fund (IMF) on a large cross-section of countries and shows a significant positive correlation between bilateral portfolio holdings and output synchronization. Similarly, Otto, Voss, and Willard (2001) find that OECD countries with strong FDI linkages have more similar cycles.¹¹ While examining the cross-sectional data patterns is the natural first thing to do, these types of cross-sectional correlations, though informative, do not identify causal effects, as they might be driven by common global shocks and/or unobserved country-pair heterogeneity. Another problem with most previous studies is that they pool developed, emerging, and underdeveloped countries in the estimation. Theoretically this is not ideal, as these countries have experienced different types of shocks in the past three decades (for example, industrial countries did not experience major financial crises until 2007, while emerging and underdeveloped economies experienced many currency and banking crises over the past few decades). Moreover, parallel work examining the effects of trade integration on business cycle synchronization suggests that there are fundamental differences between advanced and emerging/underdeveloped countries (Kraay and Ventura (2000, 2007), Calderon, Chong, and Stein (2007)).

Morgan, Rime, and Strahan (2004) show that banking deregulation in the United States over the late 1970s and early 1980s dampened economic volatility and made state business cycles more alike. They interpret their findings as suggesting that bank capital supply shocks were the dominant source of output fluctuations during this period in the United States. Our results are in contrast to those of Morgan, Rime, and Strahan (2004). We think the difference is due to our sample of mostly developed European countries, which under all accounts did not experience major credit supply shocks (with the exception of the Scandinavian banking crisis) during our period of study, 1978 to 2006.

A few papers focus empirically on the international transmission of a shock and contagion via financial linkages. Kaminsky, Reinhart, and Vegh (2003) find that contagion episodes involve a leveraged common creditor, and hence contagion happens through balance sheets of financial intermediaries, a channel originally proposed by Calvo (1998). Peek and Rosengren (2000), for example, study the transmission of the Japanese crisis to the United States by investigating the real estate activity in the U.S. states where Japanese banks are present.

Kaminsky and Reinhart (2000) focus on the role played by commercial banks in spreading shocks by cutting bank lending during the debt crisis of 1982 and the crisis in Asia in 1997. Likewise, Van Rijckeghem and Weder (2003) document that the Latin American and the East Asian crises were spread internationally via banking linkages. Similarly, Schnabl (2012) studies the effect

¹¹The only study to our knowledge that documents a negative association between financial integration and synchronization is Garcia-Herrero and Ruiz (2008). These authors use capital account data for Spain and document lower GDP synchronization between Spain and countries with which Spain has strong financial linkages.

of the 1998 Russian default on international bank lending in Peru. He finds a stronger transmission effect for the domestic Peruvian banks that borrow internationally compared to foreign-owned banks, which mitigate the effect of a shock through better risk management. Focusing on the recent crisis, Cetorelli and Goldberg (2012) find that credit supply in emerging markets was affected through a contraction in cross-border lending by foreign banks, a contraction in local lending by foreign banks' affiliates in emerging markets, and a contraction in lending supply by domestic banks due to a funding shock to their balance sheet. Ongena, Peydró, and van Horen (2012) use detail firm-, bank-, and bank-firm-level data and find that foreign ownership and liquidity transmitted the recent crisis to the eastern and central European countries. In contrast, Rose and Spiegel (2010) and Lane and Milesi-Ferretti (2011) do not find any role of financial linkages, in general, in transmitting the crisis of 2007 to 2009.

Most papers in finance examine whether equity or debt return correlations increase after a financial shock (see, for example, Forbes and Rigobon (2002) and Bekaert, Harvey, and Ng (2005)). Frankel and Schmukler (1998) and Kaminsky, Lyons, and Schmukler (2001, 2004) show evidence of U.S.-based mutual funds spreading shocks throughout Latin America by selling assets from one country when prices fall in another (especially in the case of the Mexican peso crisis). A similar finding is shown by Jotikasthira, Lundblad, and Ramadorai (2012), who provide evidence on the importance of global fund flows in driving up emerging market returns. Bartram, Griffin, and Ng (2010) find a strong effect of foreign ownership linkages on the correlation of international stock returns. Their results are mainly for developed countries.

II. Data

A. Banking Integration

Our banking integration data come from the confidential version of the BIS International Locational Banking Statistics Database. This database reports asset and liability holdings of banks located in roughly 40 (mainly industrial) countries (the “*reporting area*”) in more than 150 countries (the “*vis-a-vis area*”) at a quarterly frequency since the end of 1977. In other words, we have data from 40 countries where we know their external assets and liabilities for 150 countries. However, half of the reporting area countries started providing data to the BIS only recently (mostly after 2000). Thus, our panel data set consists of annual bilateral (country-pair) data from and to 18 rich economies over the 1978 to 2006 period.¹² These countries are: Australia, Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, the United

¹² We prefer to use annual data given the noisy nature of quarterly data (though this has no effect on our results). Cross-border capital (or trade) flows data usually have gaps that make logarithmic transformations questionable. This is not the case in our data. There are only a few missing observations, mainly in the initial years (as some countries like Spain and Finland start reporting in 1983).

Kingdom, Ireland, Italy, Japan, Netherlands, Portugal, Sweden, and the United States.¹³

The data are originally collected from domestic monetary authorities and local supervisory agencies, which pass the data to the BIS, which in turn performs a series of consistency checks to construct the database. The supervisory data include banks' on-balance sheet exposure and reflect more than 99% of the overall international exposure of a country's banking institutions. The data mainly capture international bank-to-bank debt holdings, such as interbank credit lines, loans, and deposits. Assets include deposits and balances placed with nonresident banks, including a bank's own related offices abroad. They also include holdings of securities and participations (i.e., permanent holdings of financial interest in other undertakings) in nonresident entities. The data also include trade-related credit, arrears of interest and principal that have not been written down, and holdings of banks' own issues of international securities. The data also cover a bank's investment in equity-like instruments as well as foreign corporate and government bonds.

The BIS data set does not distinguish between interbank debt activities and portfolio equity investment. Yet the data mainly reflect holdings of debt-like financial instruments. BIS (2003a, 2003b) and Wooldridge (2002) argue that, while FDI and equity have become more important after the late 1990s, their weight is still small as standard banking activities still comprise the bulk of cross-border holdings. International bank M&A activity and direct lending to foreign residents have been limited overall (see Lane and Milesi-Ferretti (2008)). According to our calculations based on the unilateral (at the country-time level) data of Lane and Milesi-Ferretti (2008), debt holdings reflect 67% of the total foreign positions between 1978 and 2006 for our group of countries, with equity and FDI jointly accounting for a third of total foreign investment. Banking activities in particular account for half (48.5%) of total foreign holdings and flows in 2006. For most of the 28-year period they accounted for around 60% (and in the early years for almost 80%) of total international holdings.

The BIS data are expressed originally in current U.S. dollars. We convert the data into constant U.S. dollars by deflating the series with the U.S. consumer price index (CPI). Following previous work, we use the total stock of external assets and liabilities and construct two quantity-based measures of financial integration. The first measure (*BANKINT1*) is the average value of (the logs of) real bilateral asset and liability holdings normalized by the sum of the population of the two countries. The second measure (*BANKINT2*) is the average of (the logs of) real bilateral asset and liability holdings as a share of the two countries' GDP.¹⁴

¹³ In the previous version of the paper we also included Luxemburg and Greece. We dropped Luxemburg because the international position of banks in and from Luxemburg is extremely high. We also dropped Greece because data become available only after 2003. Including these countries does not affect our results.

¹⁴ In the previous version of the paper we experiment with other proxy measures of financial integration using transactions data. The results are similar. We report data based on holdings

B. Output Synchronization

We construct three different measures of business cycle synchronization ($SYNCH_{i,j,t}$) using GDP data from the latest update of the World Bank's World Development Indicators database (WB WDI 2012). First, following Giannone, Lenza, and Reichlin (2008), we measure business cycle synchronization with the negative of divergence, defined as the absolute value of real GDP growth differences between country i and j in year t :

$$SYNCH1_{i,j,t} \equiv -|(\ln Y_{i,t} - \ln Y_{i,t-1}) - (\ln Y_{j,t} - \ln Y_{j,t-1})|. \quad (1)$$

Second, we follow Morgan, Rime, and Strahan (2004) and construct $SYNCH2_{i,j,t}$ as follows. We begin by regressing real GDP growth for country i and country j on country fixed effects and year fixed effects.

$$\ln Y_{i,t} - \ln Y_{i,t-1} = \gamma_i + \phi_t + v_{i,t} \quad \forall i, j.$$

The residuals for these regressions ($v_{i,t}$ and $v_{j,t}$) reflect the degree to which GDP growth differs in each country and year compared to the average growth in the country and the average growth in the year over the estimation period. We then construct the business cycle synchronization proxy as the negative of the absolute difference of residual GDP growth:

$$SYNCH2_{i,j,t} \equiv -|v_{i,t} - v_{j,t}|. \quad (2)$$

Intuitively, this index measures how similar GDP growth rates are between two countries in any given year, accounting for the average growth in each country and the average growth in each year.

These two indicators are simple and intuitive. In contrast to the correlation measures that cross-country studies mainly work with, the above indices are not sensitive to the various filtering methods that have been criticized on many grounds (e.g., Canova (1998, 1999)). They also do not contain estimation error that emerges, for example, from self-selecting a rolling estimating window. Again, unlike the correlation measures, these indices do not directly reflect the volatility of output growth. Doyle and Faust (2005) underline the importance of a synchronization measure that (ideally) does not include volatility. Isolating the covariance part is desirable because, over the past two decades, global output volatility has fallen considerably in the industrial economies (e.g., Cecchetti, Flores-Lagunes, and Krause (2006)). Nevertheless, for comparison purposes with previous cross-country studies, we also report some specifications with the correlation of the cyclical component of output as measured by Baxter and King's (1999) Band-Pass filter (2, 8; $SYNCH3_{i,j,t}$) (e.g., Imbs (2006), Baxter and Kouparitsas (2005)).

(rather than transactions) because theory and previous empirical work focus on the outstanding stock of international investors (banks in our application).

Table I
Descriptive Statistics

The table reports summary statistics of the main variables used in the empirical analysis. *SYNCH1* is the negative of the absolute difference in real GDP growth between country *i* and country *j* in year *t*. *SYNCH2* is the negative of the absolute difference in residual real GDP growth between country *i* and country *j* in year *t*. *BANKINT1* denotes the average of the logs of bilateral stocks of assets and liabilities of countries *i* and *j* normalized by the sum of the two countries' population in year *t*. *BANKINT2* denotes the average logs of bilateral stocks of assets and liabilities normalized by the sum of the two countries' GDP (*BANKINT2*). *HARMON* is a bilateral index of legislative, harmonization policies in financial services in the context of the Financial Services Action Plan (FSAP), initiated by the EU in 1998 to integrate financial services in Europe. The value for each country pair ranges from 0 to 27, with higher values suggesting a higher degree of harmonization. For details on the construction of all variables, see Section II and Appendix A. Panel A gives summary statistics. Panel B reports summary statistics that explore the within-country-pair time variation of the data (conditioning on country-pair fixed effects). Panel C reports summary statistics that explore the across-country-pair cross-sectional variation of the data (conditioning on year fixed effects).

	Obs.	Mean	st. dev.	Min	p25	p50	p75	Max
Panel A: Summary Statistics								
<i>SYNCH1</i>	4,229	-1.776	1.560	-11.184	-2.438	-1.351	-0.633	0.000
<i>SYNCH2</i>	4,229	-1.551	1.413	-12.109	-2.121	-1.168	-0.537	0.000
<i>BANKINT1</i>	4,229	3.311	1.977	-2.546	1.924	3.423	4.749	8.183
<i>BANKINT2</i>	4,229	-6.629	1.917	-12.579	-7.998	-6.509	-5.213	-1.966
<i>HARMON</i>	4,229	0.965	3.684	0.000	0.000	0.000	0.000	22.000
Panel B: Accounting for Country-Pair Fixed Effects (Within Country-Pair Time)								
<i>SYNCH1</i>	4,229	0.000	1.413	-8.777	-0.653	0.273	0.937	3.584
<i>SYNCH2</i>	4,229	0.000	1.338	-10.283	-0.549	0.310	0.878	3.227
<i>BANKINT1</i>	4,229	0.000	0.964	-4.417	-0.519	0.056	0.497	3.863
<i>BANKINT2</i>	4,229	0.000	0.854	-4.146	-0.443	0.032	0.431	3.633
<i>HARMON</i>	4,229	0.000	3.558	-2.522	-1.786	0.000	0.000	20.286
Panel C: Accounting for Year Fixed Effects (Across Country-Pair Cross Section)								
<i>SYNCH1</i>	4,229	0.000	1.500	-8.197	-0.650	0.335	1.027	2.973
<i>SYNCH2</i>	4,229	0.000	1.315	-8.971	-0.547	0.243	0.859	3.077
<i>BANKINT1</i>	4,229	0.000	1.880	-6.195	-1.301	0.208	1.352	4.433
<i>BANKINT2</i>	4,229	0.000	1.860	-6.166	-1.307	0.181	1.371	4.366
<i>HARMON</i>	4,229	0.000	2.689	-10.176	0.000	0.000	0.000	12.477

C. Descriptive Statistics

Table I, Panel A reports descriptive statistics for the main variables employed in the empirical analysis. To illustrate the within-country-pair time variability and the cross-sectional variability, in Panel B we report summary statistics conditioning on country-pair fixed effects and in Panel C we report descriptive statistics conditioning on time (year) fixed effects. The average divergence in real GDP growth over the sample period is 1.78% (*SYNCH1*). Once we control for country and year fixed effects (*SYNCH2*) the differences are somewhat

smaller (mean of 1.56%). Both synchronization indicators exhibit significant variation across and within country pairs over time (the standard deviation is 1.5% and 1.41%, respectively).

Figure 1 gives a graphical illustration of the evolution of the average (across country pairs) value of the three measures of business cycle synchronization over our 28-year sample. The growth divergence measures, *SYNCH1* and *SYNCH2*, are plotted on the left *y*-axis; the correlation measure, *SYNCH3*, is tabulated on the right *y*-axis. There is a considerable degree of short-term variability, which is quite useful in our empirical exercise. Overall output synchronization has been steadily increasing according to all measures since the mid-1980s (see also Kose, Otrok, and Prasad (2012) and Rose (2009)). The average correlation of the cyclical component of GDP (*SYNCH3*) was around 0.1 to 0.3 in the 1980s. In the 1990s the correlation increased on average to 0.4, while in the 2000s the correlation reached 0.6 to 0.7 before falling to around 0.5 before the 2007 to 2009 financial crisis. Likewise, average differences in real GDP growth in the late 1970s and the 1980s were in the range of 2.5% to 3.5%, while after the late 1990s the average difference fell to 1% to 1.5%.

Figure 2 plots the evolution of cross-border banking holdings in the 1978 to 2006 period. Cross-border bank holdings have increased dramatically over the past three decades. Lane and Milesi-Ferretti (2007) document similar patterns for other types of cross-border investment flows, such as FDI and equity. Yet international banking activities are by far the largest component of foreign capital holdings/flows. Figure 2 shows that real international bilateral bank holdings (per capita) have increased from an average value (across the 153 country pairs of our sample) of roughly 170 dollars to almost 1,600 dollars per person as of the end of 2006.

III. Banking Integration and Business Cycle Synchronization

A. Econometric Specification

We start our analysis estimating OLS variants of the following specification:

$$SYNCH_{i,j,t} = \alpha_{i,j} + \alpha_t + \beta BANKINT_{i,j,t-1} + \mathbf{X}'_{i,j,t-1} \Psi + \varepsilon_{i,j,t}, \quad (3)$$

where $SYNCH_{i,j,t}$ reflects the co-movement of output as reflected in the three synchronization measures between countries i and j in period t , and $BANKINT_{i,j,t-1}$ is one of our two measures of cross-border banking integration between countries i and j in the previous year ($t - 1$).¹⁵ The specification includes year (α_t) and country-pair fixed effects ($\alpha_{i,j}$). The year fixed effects account for the effect of global shocks and other common time-varying factors

¹⁵ We use lagged values to partly account for reverse causation. We also estimate specifications using contemporaneous values of financial/banking integration and find similar (if anything stronger) results. We formally deal with reverse causation and other forms of endogeneity in Sections IV and V.

that affect both business cycle patterns and banking integration. The year fixed effects also account in a flexible nonparametric way for the overall decrease in output volatility over our sample period. The country-pair effects account for hard-to-measure factors such as cultural ties and similarities, informational frictions, and other time-invariant unobservable factors, all of which have been shown to have an effect on both financial integration and business cycle patterns. Vector $\mathbf{X}'_{i,j,t-1}$ captures other country-pair time-varying factors that may affect the dynamic evolution of output synchronization, such as “gravity” measures (GDP and population), trade, specialization, and time trends.

B. Cross-Sectional Estimates

Table II presents cross-sectional and panel fixed effects estimates on the effect of banking integration on GDP synchronization. For comparability with previous studies analyzing the correlation between financial integration and output synchronization, we start our analysis in Panel A estimating cross-sectional models that pool the time-series observations across all country pairs. The “between” estimator removes the time dimension by averaging the dependent and explanatory variables across country pairs. Thus, for these models we have a single observation for each country pair.

Columns (1) to (4) report cross-sectional estimates using synchronization in GDP growth rates (*SYNCH1* and *SYNCH2*) as the dependent variable. The cross-sectional coefficient on the two banking integration measures is positive and significant at the 99% confidence level, a result in line with previous cross-country studies (e.g., Imbs (2006)). The estimates imply that across the 153 pairs of industrial countries, there is higher covariation of GDP growth among economies with stronger financial ties.

Columns (5) to (8) report estimates using the cyclical component of GDP (*SYNCH3*) estimated over a 5-year period as the dependent variable. These models are estimated in six nonoverlapping 5-year periods. The unconditional coefficients on banking integration reported in (5) and (7) are positive and highly significant; this implies that countries with stronger financial linkages have more correlated output cycles. In columns (6) and (8) we examine whether our results reflect differences in trade intensity and industrial specialization. Following Calderon, Chong, and Stein (2007), we control for differences in trade intensity using the log of bilateral real (deflated with the U.S. price deflator) exports and imports as a share of the two countries' GDP. Following Krugman (1991) and Kalemli-Ozcan, Sørensen, and Yosha (2003), we measure specialization with an index that reflects how dissimilar industrial production is in manufacturing ($SPEC_{i,j,t} \equiv \sum_{n=1}^N |s_{i,t}^n - s_{j,t}^n|$, where $s_{i,t}^n$ and $s_{j,t}^n$ denote the GDP share of manufacturing industry n in year t in countries i and j , respectively). A priori it appears important to account for differences in bilateral trade when working with long-term data as trade in goods and financial services tends to move in tandem (e.g., Rose and Spiegel (2004)) and previous studies show that trade has a significantly positive effect on business cycle synchronization (e.g.,

Table II
Banking Integration and Business Cycle Synchronization:
Cross-Sectional and Panel (Country-Pair) Fixed-Effects
Specifications

Panel A reports cross-sectional “between” coefficients. Panel B reports panel fixed-effect “within” coefficients that include a vector of country-pair fixed effects and a vector of year fixed effects. In the panel models in Panel B standard errors are adjusted for country-pair-level heteroskedasticity and autocorrelation. In specifications (1) and (3) the dependent variable is minus one times the absolute difference in real GDP growth between country i and country j in year t (*SYNCH1*). In specifications (2) and (4) the dependent variable is minus one times the absolute difference in residual real GDP growth between country i and country j in year t (*SYNCH2*). These models are based on annual observations that cover the 1978 to 2006 period. In columns (5) to (8) the dependent variable is the correlation of the cyclical component of real per capita GDP between country i and j in each of the six 5-year periods that cover the 1978 to 2006 period (*SYNCH3*; estimated with the Baxter and King Band-Pass filter (2,8)). *BANKINT1* denotes the one-period-lagged value of the average of the logs of bilateral stocks of assets and liabilities normalized by the sum of the two countries’ population in year t . *BANKINT2* denotes the 1-year-lagged value of the average of the logs of bilateral stocks of assets and liabilities normalized by the sum of the two countries’ GDP in year t . *TRADE* denotes the log of the sum of real bilateral imports and exports of both countries as a share of the two countries’ GDP. *SPEC* is an index of specialization that reflects the dissimilarities in industrial production (in manufacturing) between the two countries in each period. In columns (5) to (8) we use the values of *BANKINT1*, *BANKINT2*, *TRADE*, and *SPEC* in the end of the previous (5-year) period. Appendix A and Section II give details on the construction and the sources of all variables. The table also gives the number of country-pairs, the number of observations, the between R^2 (for the cross-sectional models), and the within R^2 (for the panel fixed-effect specifications).

	Annual Data				Five-Year Data			
	<i>BANKINT1</i>		<i>BANKINT2</i>		<i>BANKINT1</i>		<i>BANKINT2</i>	
	<i>SYNCH1</i> (1)	<i>SYNCH2</i> (2)	<i>SYNCH1</i> (3)	<i>SYNCH2</i> (4)	<i>SYNCH3</i> (5)	<i>SYNCH3</i> (6)	<i>SYNCH3</i> (7)	<i>SYNCH3</i> (8)
Panel A: Cross-Sectional (“Between”) Estimates								
Banking Integration (<i>BANKINT</i>)	0.1272 (0.0288)	0.1014 (0.0192)	0.1327 (0.0289)	0.1095 (0.0191)	0.0391 (0.0106)	0.0451 (0.0168)	0.0429 (0.0106)	0.0530 (0.0174)
Trade (<i>TRADE</i>)	4.42	5.27	4.59	5.72	3.70	2.68 (2.1797)	4.04	3.05 (2.1858)
Specialization (<i>SPEC</i>)						2.00 (0.0270)	4.3568 (0.0270)	3.8234 (0.0270)
R^2 (between)	0.114	0.161	0.122	0.180	0.178	−0.0123 (0.0270) −0.46	−0.0076 (0.0270)	−0.28 (0.0270)
Panel B: Panel Estimates (“Within”) with Country-Pair and Year Fixed Effects								
Banking Integration (<i>BANKINT</i>)	−0.3852 (0.0622)	−0.0822 (0.0280)	−0.3959 (0.0639)	−0.0856 (0.0286)	−0.0430 (0.0270)	−0.0741 (0.0263)	−0.0429 (0.0270)	−0.0745 (0.0270)
Trade (<i>TRADE</i>)	−6.19	−2.94	−6.19	−3.00	1.62	−2.81 (1.2100)	−1.59	−2.76 (1.2158)
Specialization (<i>SPEC</i>)						−2.5686 (1.2100) −2.12	−2.5885 (1.2158)	−2.13 (1.2158)
R^2 (within)	0.130	0.147	0.130	0.151	0.152	−0.0089 (0.0204) −0.44	−0.0088 (0.0205)	−0.43 (0.0205)
Observations	4,229	4,229	4,229	4,229	755	0.280	0.231	0.28
Country pairs	153	153	153	153	153	480	755	480
						153	153	153

Frankel and Rose (1998)). Likewise, accounting for specialization patterns appears important as financial integration affects specialization patterns and vice versa (e.g., Obstfeld (1994), Kalemli-Ozcan, Sørensen, and Yosha (2001)). In line with previous studies, trade enters with a positive estimate. The regressions further show that countries with dissimilar production structures have less synchronized cycles. However, this effect is not statistically significant, most likely because of the limited variability of the specialization index over a 5-year horizon. Most importantly for our focus, the estimate on *BANKINT* continues to be at least two standard errors above zero in both permutations.¹⁶

C. Panel Fixed Effect Estimates

In Table II, Panel B we report results for specifications similar to those in Panel A, but we add country-pair fixed effects and time fixed effects in the empirical model (as shown in equation (3)). Due to serial correlation, standard errors in the panel models in Panel B (and all subsequent tables) are clustered at the country-pair level (Bertrand, Duflo, and Mullainathan (2004)). This method allows for arbitrary heteroskedasticity and autocorrelation for each country pair.¹⁷ The panel estimates (in Panel B) stand in contrast to the cross-sectional coefficients (in Panel A). In all perturbations with the annual data reported in columns (1) to (4) the estimate on banking integration enters with the opposite sign as in the cross-sectional specifications. The panel fixed effect models thus imply that a higher level of international banking integration is associated with a lower degree of output synchronization. This result is present with both banking integration measures and both synchronization indicators. In columns (5) to (8) we estimate panel fixed effects models using the correlation of the cyclical component of GDP estimated over five nonoverlapping five-year periods as the dependent variable. Again there is a sharp difference between the cross-sectional and within-country-pair estimates. The estimates in columns (6) and (8) show that this result is not driven by changes in goods' trade or changes in industrial structure.

As a result, while in the cross-section there is a positive association between output co-movement and financial integration, as financial linkages become stronger within country pairs over time, output growth rates diverge. (Appendix Figures B.1 and B.2 give a graphical illustration of the sharp differences in the correlation between financial integration and output synchronicity). The striking difference between the cross-sectional and panel estimates

¹⁶ When we control for trade intensity and differences in industrial specialization we lose roughly 35% of our sample due to data unavailability on the industrial statistics needed to construct *SPEC*. We thus also augment the empirical model with trade and specialization separately, and obtain similar results.

¹⁷ Newey and West (1987) standard errors that allow for common across-country-pairs autocorrelation are similar (and if anything somewhat smaller) compared to standard errors clustered at the country-pair dimension. We also estimate standard errors using the multi-way clustering method of Cameron, Gelbach, and Miller (2011), clustering at the year t , country i , and country j dimensions, and find similar results.

suggests that omitted variable bias arising from common global time-varying shocks and hard-to-account-for country-pair characteristics plagues estimates in previous cross-sectional studies.

D. Further Evidence and Sensitivity Analysis

In Internet Appendix Table IA.I¹⁸ we explore the underlying reasons behind the sharp difference in cross-sectional and within-country-pair correlation between financial integration and output synchronization. In Panel A, we report specifications adding only year constants. In all permutations the coefficient on banking integration is positive and highly significant, implying that solely accounting for shocks common to all countries does not suffice to switch the sign of the estimate. Yet the coefficients on banking integration drop by half as compared to the analogous estimates in columns (1) to (4) of Panel A, Table II, where we were not conditioning on time fixed effects. This shows that accounting for common global factors is economically important. In Panel B, we condition on country-pair fixed effects to explore the within-panel variation. To account for the upward trend and the nonstationary nature of banking integration (see Figure 2), we simply add a single (common to all countries) linear time trend. The coefficient on banking integration turns negative. This suggests that accounting for hard-to-observe country-pair fixed factors is fundamental. While in the cross-section there is a strong positive correlation between output synchronization and banking integration, within-country-pair increases in banking activities are followed by less synchronized output cycles. In Panels C and D we account for unobserved dynamics by including in the empirical specification country-specific time trends and country-pair-specific time trends, respectively. In Panels E and F we also include time (year) fixed effects (on top of the country- and the country-pair-specific time trends). Across all model permutations the banking integration measures enter with highly significant negative coefficients.

A potential drawback of the results in Table II, columns (5) to (8), is that the correlation measure (*SYNCH3*) is estimated over a short (5-year) period. Thus, we re-estimate the specifications, splitting the sample into two periods, and use as the dependent variable the correlation of the cyclical component of GDP estimated over each 14-year period. Internet Appendix Table IA.II reports the results. Panel A gives cross-sectional estimates while Panel B reports country-pair fixed effects estimates with a period constant (i.e., time effect). The panel estimate on banking integration in the beginning of each of the two 14-year periods is negative and statistically different from zero at the 1% level. The long-run analysis therefore also points out that increases in cross-border banking activities have been associated with less synchronized output cycles.

In Table III we examine whether the significantly negative within-country-pair association between output synchronization and banking integration is

¹⁸ The Internet Appendix may be found in the online version of this article.

Table III
Banking Integration and Business Cycle Synchronization: Sensitivity Analysis Panel (Country-Pair) Fixed-Effects Specifications

The table reports panel fixed-effects estimates. Standard errors are adjusted for country-pair-level heteroskedasticity and autocorrelation and corresponding t -statistics are reported below the estimates. The dependent variable is minus one times the absolute difference in real GDP growth between country i and country j in year t (*SYNCH1*). *BANKINT1* denotes the one-period-lagged value of the average of the logs of bilateral stocks of assets and liabilities normalized by the sum of the two countries' population in year t . The specifications in all columns (1) to (5) and (5) to (7) include as additional controls the log of the product of the two countries' GDP in the previous year and the log of the product of the two countries' population in the previous year. The specifications in columns (2), (3), and (5) to (7) also include as a control the absolute value of the difference in log per capita GDP between countries i and j in the previous year. The specifications in columns (4) to (7) include as control the absolute value of the difference in log trade shares between countries i and j in the previous year, where trade share of country i is given by sum of exports and imports as a share of country i 's GDP. The specification in column (6) includes a vector of country-specific linear time trends (coefficients not reported). The specification in column (7) includes a vector of country-pair specific linear time trends (coefficients not reported). All specifications include a vector of country-pair fixed effects and a vector or time (year) fixed effects (constants not reported).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Banking Integration (<i>BANKINT1</i>)	-0.2626 (0.0623)	-0.3606 (0.0593)	-0.2612 (0.0619)	-0.3810 (0.0654)	-0.2559 (0.0666)	-0.1321 (0.0638)	-0.2173 (0.0833)
Product of Log GDP p.c.	-4.22 (0.4300)	-6.08	-4.22 (0.4398)	-5.82	-3.84 (0.4588)	-2.07 (0.6158)	-2.61 (0.6524)
Product of Log Population	-1.5290 (0.9432)		-1.2654 (0.9023)		-1.3093 (0.9626)	0.9098 (3.1815)	1.1328 (3.3701)
Difference in Log GDP p.c.	-3.56	2.84	-2.88 (0.4765)	2.80	-2.85 (0.4822)	1.48 (0.5206)	1.74 (0.8017)
Difference in Log Trade		1.5761 (0.4915)	1.3788 (0.4765)	-0.0091 (0.3278)	0.1958 (0.3043)	0.3317 (0.2768)	0.4852 (0.3327)
R^2 (within)	0.137	0.137	0.142	-0.03 0.133	0.64 0.145	1.20 0.194	1.46 0.224
Year Fixed Effects	Yes						
Country-Pair Fixed Effects	Yes						
Country Time Trends	No	No	No	No	No	Yes	No
Country-Pair Time Trends	No	No	No	No	No	No	Yes
Observations	4,229	4,229	4,229	3,860	3,860	3,860	3,860
Country Pairs	153	153	153	153	153	153	153

driven by other factors. In column (1) we control for the two usual gravity variables reflecting size, namely, the log of the product of the two countries' GDP in the previous year and the log of the product of the two countries' population in the previous year.¹⁹ By conditioning on the product of GDP, we account for

¹⁹ Including GDP and population for country i and country j separately (i.e., not taking the product) yields almost identical estimates. The factors capturing proximity, such as geographic distance, cultural ties, and genetic similarities, are absorbed by the country-pair fixed effects.

the possibility that our estimates are driven by countries receiving a lot of foreign bank capital and at the same time converging to a new steady state. In including GDP we also account for the cyclical properties of international business cycle synchronization. The coefficient on banking integration falls somewhat compared to the analogous estimate in column (1) of Table II, Panel B, from 0.385 to 0.263, but the estimate is more than four standard errors below zero.

In columns (2) and (3) we include in the empirical specification the lagged value of the absolute difference in the log per capita GDP. In doing so we control for the possibility that the negative effect of banking integration on output growth synchronization is driven simply by the fact that financial integration increases among dissimilar (in terms of income per capita) countries, which may also experience different growth patterns since poor countries will grow faster than rich countries. Relatively low income countries might experience an increase in their banking integration since international banks (from rich economies) chase higher returns in capital scarce countries. The negative within-country-pair association between banking integration and output synchronization remains intact. In columns (4) and (5) we condition on the lagged value of the absolute value of the difference in bilateral trade, to control for the possibility that the significant negative association between banking integration and output synchronization operates via goods trade. The estimate on the difference in goods trade is statistically indistinguishable from zero, while the coefficient on banking integration is highly significant. Thus, there is no evidence that banking integration leads to output divergence by amplifying trade imbalances.

One may be worried that the significant negative association between output synchronization and banking integration is driven by hard-to-measure country (or even country-pair) dynamics. For example, the adoption of the euro may have changed the dynamics of output growth and financial integration well before its introduction in 1999. To account for this type of concern, in columns (6) and (7) we include in the empirical specification country-specific and country-pair-specific linear time trends, respectively. This has no major effect. Increases in banking integration are followed by divergent output cycles, even when we condition on country-pair-specific time trends.

We perform additional sensitivity checks to investigate the stability of our OLS estimates that reveal a striking difference between the cross-sectional and the over-time within-country-pair correlation of banking integration and output synchronization. We first check whether our results are driven by influential observations. The change in the sign of the coefficient on banking integration is not due to any particular country-year observations. We also estimate a weighted least square (WLS) regression, weighted by population and GDP, to guard against the influence of small country pairs and obtain similar results. We further use unstandardized measures of banking integration and control directly for population and/or GDP, and again find similar results. In the previous version of the paper we also estimated autoregressive specifications, controlling for inertia in business cycle synchronization (though differences

in GDP fluctuations are not particularly persistent; the first autoregressive coefficient is around 0.15); again the results were similar.

IV. Financial Sector Legislative-Regulatory Harmonization and Output Synchronization

Our results in Table II, Panel B and Table III show a strong negative effect of banking integration on business cycle synchronization in a panel of industrialized countries. Although this result is robust to a variety of sensitivity checks, the OLS coefficients do not capture the one-way effect of financial integration on output synchronization.

A first concern emerges from potential omitted variables. Most of the robust correlates of business cycle synchronization are time-invariant, and hence our country-pair fixed effects account for these factors (Baxter and Kouparitsas (2005)). Inclusion of time effects also mitigates concerns that our estimates are driven by a common shock. Moreover, the results are not driven by unobserved country- or even country-pair-specific trends in the dynamics of output synchronicity and banking integration. Nevertheless, we cannot completely rule out that an omitted time-varying country-pair factor may affect both output synchronization and banking integration.

Second, there is the possibility of reverse causation. This type of endogeneity may arise if banking integration is the outcome rather than the cause of business cycle divergence. To partly account for this possibility, in our panel estimates we use lagged values of banking integration (and the other controls). Given the low persistence of output co-movement, employing lagged values seems reasonable. Yet, clearly it is not ideal.

Third, there are worries that measurement error may affect the OLS estimates. The supervisory nature of the BIS data that capture all cross-border banking activities implies that classical errors-in-variables is negligible. Yet the BIS data do not include other types of international investment, such as portfolio investment by nonbanks and FDI (see, for example, Bartram, Griffin, and Ng (2010) and Jotikasthira, Lundblad, and Ramadorai (2012) for recent studies exploring the effect of foreign ownership and mutual fund holdings in the international transmission of shocks). Since there is a high correlation between equity flows and debt flows, this concern is not severe in our context.²⁰ A probably more important problem is that our data (as is the case for most data on cross-country investment that are based on the “residence” principle) miss banking activities channeled via small off-shore financial centers. Below,

²⁰ According to the latest vintage of the Lane and Milesi-Ferretti data set of aggregate (at the country level) foreign holdings, the correlation of total debt, portfolio debt, banking, FDI, and equity in levels (expressed either as a share of total assets or as a share of GDP) is in the range of 0.75 to 0.99. In first differences the correlation weakens, but is always larger than 0.50. Country-pair data sets on foreign capital holdings also suggest a strong correlation of the various types of international investment. For example, Kubelec and Sa (2009) document that the correlation between our BIS data and CPIS bilateral debt data, which have a broader coverage of debt assets and liabilities, is 80%.

we construct an exogenous structural index of financial integration that reflects regulatory/legislative harmonization reforms in financial services across Europe that allows us to account for these concerns.

A. De-Jure Measure of Financial Integration

We construct a structural measure of financial integration using data on financial sector harmonization policies across EU15 countries on the implementation of the legislative acts of the Financial Services Action Plan (FSAP). The FSAP was a major policy initiative launched in 1998 by the EU Commission and the EU Council (the two main bodies of the European Union) that aimed to remove regulatory and legislative barriers across European countries in financial intermediation. Besides technical recommendations and communications, the FSAP included 29 major pieces of legislation, 27 EU Directives and two EU Regulations. The FSAP included legislation on securities markets (e.g., the Prospectus Directive and the Directive on Insider Trading), corporate governance (e.g., the Transparency Directive and the Takeover Bids Directive), banking (e.g., Directive on Capital Adequacy), and insurance (e.g., the Solvency Directive), among others.²¹ By the official completion date at the end of 2003, the EU Commission had passed 21 of these measures. The remaining six Directives of the FSAP passed in the period 2004 to 2006.

In contrast to EU Regulations that instantly become part of the legal order of all EU member countries, EU Directives are legal acts that do not become immediately enforceable across the EU. Instead, member countries are given time to adopt, modify, and eventually transpose the EU Directives into domestic law. As with other pieces of EU-initiated legislation, there is a great deal of heterogeneity on the speed with which European countries adopted the FSAP Directives (see Appendix Tables B.I and B.II). The time of the transposition/adoption of EU Directives takes many years, as EU member states delay the adaptation for various reasons, such as parliamentary delays, the fact that new agencies need to be established and existing laws need to be removed, and many other technical obstacles. Moreover, member states may delay adoption of the EU law to shield domestic firms from foreign competition or due to other political considerations. For example, in our context only four EU countries (Denmark, France, Finland, and the United Kingdom) transposed into the domestic legal order the Directive on the Supervision of Credit Institutions, Insurance Undertakings and Investment Firms in a Financial Conglomerate within the first two years after its circulation (in November 2002) by the EU Commission. It took five years for the Netherlands and Sweden to adopt this important piece of financial legislation, while one country (Portugal) had not transposed the Directive by the end of our sample period.

We use the transposition timing across member states to construct a time-varying structural measure of financial integration for each country pair. We

²¹ Malcom, Tilden, and Wilsdon (2009) and Enriques and Gatti (2008) give details on the FSAP and the transposition of EU financial legislation into national law.

construct the bilateral legislative-regulatory harmonization index as follows. First, we define 27 indicator variables ($LEX_{i,j,t}^k$, one for each FSAP Directive k) that equal one if in any given year both countries in each country-pair cell have transposed each EU Directive into national law, and zero otherwise. Second, we create a country-pair time-varying legislative harmonization measure by summing the values of these 27 indicator variables ($LEX_{i,j,t}^k$). Since the variable is highly skewed, in the regressions we use the log value, adding one, that is, $HARMON_{i,j,t} \equiv \ln(\sum_{k=1}^{K=27} (1 + LEX_{i,j,t}^k))$.

The legislative-regulatory harmonization index reflects the degree of similarity between the structures governing financial intermediation among EU member countries. Thus, one could think of this measure as a de-jure index of financial integration, similar in spirit to cross-country integration measures based on the removal of capital account restrictions (e.g., Quinn and Toyoda (2008)) and the liberalization of equity market investment (e.g., Bekaert, Harvey, and Lundblad (2005)). The harmonization index in financial services is also similar in spirit to measures dating banking deregulation policies across U.S. states (e.g., Jayaratne and Strahan (1997)). However, in contrast to these measures that produce country- (or state-) level indicators of financial integration, the harmonization index we construct exhibits within-country-pair across-time variation as it reflects the situation in which two countries have adopted the *exact* same regulatory legislation in financial intermediation.

B. Harmonization in Financial Intermediation and Business Cycle Synchronization

In Table IV we examine the effect of legislative-regulatory harmonization policies in financial services on output synchronization. The estimate on $HARMON_{i,j,t-1}$ in column (1) is negative and highly significant. This suggests that, conditional on time-invariant country-pair factors and common to all countries' time-varying factors, harmonization policies in financial services are associated with a lower degree of output growth co-movement. This result is in line with our previous estimates that reveal a strong negative within-country-pair association between output synchronization and the quantity measure of banking integration.

In column (2) we control for bilateral differences in exchange rate regime. This is important as there is the possibility that the legislative-regulatory harmonization index in financial services captures (at least in part) the effect of monetary unification that occurred around the same time as the launch of the FSAP. To do so, we exploit Ilzetzki, Reinhart, and Rogoff's (2008) update of the de-facto exchange rate regime classification of Reinhart and Rogoff (2004). The Reinhart and Rogoff "coarse" classification ranges from one to five, where lower values suggest a more rigid regime. For example, euro area countries get a score of one after 1999 and a score of two in the 1990s, when they were participating in the European Exchange Rate Mechanism. Using this data set we construct a bilateral time-varying exchange rate regime index by taking the sum of the log classification of countries i and j in the beginning of each

year t ($ERC = \ln(ER_{i,t}) + \ln(ER_{j,t})$). The exchange rate flexibility index enters with an insignificant estimate (not reported), while the structural index of financial integration that reflects regulatory-legislative harmonization policies in financial services (*HARMON*) continues to enter with a highly significant negative coefficient.

In column (3) we control for the lagged values of the log of the product of the two countries' GDP, the log of the two countries' population, and the absolute value of the difference in log per capita GDP (all entered with significant estimates in Table III). This has little effect on our main result. The coefficient on the structural index of financial integration continues to be negative and almost two standard errors below zero.

In columns (4) and (5) we include country-specific and country-pair-specific linear time trends, respectively. The bilateral regulatory/legislative harmonization index in financial services continues to enter with a negative and significant estimate. The estimate is quite similar to the coefficient in the more parsimonious specifications in columns (1) and (2), suggesting that accounting for differential convergence paths, the nature of the exchange rate regime, and unobserved dynamics have no major effect on our main result.

To further account for the potential confounding effect of the European Monetary Union (EMU), in column (6) we augment the specification with two dummy variables that take the value of one when one of the two countries is a member of the EU or the euro area in each year and zero otherwise; and two indicators that take the value of one when both countries are members of the EU or the euro area and zero otherwise. The coefficient on legal-regulatory integration in financial services retains its economic and statistical significance.

One may be worried that the highly significant effect of legislative-regulatory harmonization policies on output synchronization is driven by hard-to-account-for factors distinguishing the recent period of financial globalization with the 1980s, when cross-border capital flows were small. Thus, in columns (7) to (12) we report specifications otherwise similar to those in columns (1) to (6) but focusing only on the 1995 to 2006 period. While we lose efficiency, in all permutations the structural measure of financial integration enters with a highly significant negative coefficient.

The quantitative impact of these estimates is significant. For a one standard deviation increase in our harmonization index (corresponding to a simultaneous adoption of four laws), an estimate of -0.2 explains 30% of the actual change in synchronization over our sample period, conditional on all the fixed effects. The estimates in Table IV advance crucially on the causality front. So far most of the literature on international financial integration has relied either on quantity-based measures, such as international holdings (e.g., Imbs (2006)), or price-based measures, such as the correlation of equity returns (e.g., Bekaert and Harvey (1995)). In contrast to these outcome measures, the legislative-regulatory harmonization index (*HARMON*) reflects structural features of the regulatory and supervisory system that governs financial intermediation; as such, reverse causation is quite unlikely to drive the significant negative correlation shown in Table IV. Moreover, since legislative transposition

policies on converting the EU Directives into the national legal order are unilateral (at the country level), while the harmonization index is *bilateral*, reflecting the situation when two countries have adopted the *exact* same piece of financial legislation, these specifications are unlikely to be driven by other forms of endogeneity.

In Internet Appendix Table IA.III we examine the robustness of the negative effect of legislative-regulatory harmonization policies in financial services on output synchronization. The literature on the determinants of world market integration (e.g., Kose, Otrok, and Prasad (2012), Bekaert et al. (2011)) explores the effect of various institutional and financial development indicators (such as creditor's rights, property rights institutions, private credit, etc.). Since most of the usual proxies for institutional efficiency exhibit little within-country variability, they are captured by the country-pair fixed effects. Internet Appendix Table IA.III, columns (1) to (2) show that it is the bilateral adoption of the various legislative acts of the FSAP that correlates with output synchronization rather than the unilateral (country-specific) transposition of Directives into national law. In columns (3) to (6) we control for two usually employed measures of financial development, namely, stock market turnover and stock market capitalization. The negative effect of the structural index of financial integration retains its economic and statistical significance.

V. Instrumental Variables Estimation

Having established a significant relationship between the structural measure of financial integration and output synchronization (in Table IV) and a similarly negative association between the de-facto quantity-based measure of banking integration and output synchronization (in Tables II and III), the next step is to combine the two results in an IV setting.

A. Identification

We posit the following first-stage relationship between legislative-regulatory harmonization policies in financial services (*HARMON*) and cross-border banking integration (*BANKINT*):

$$BANKINT_{i,j,t} = \delta_{i,j} + \delta_t + \gamma HARMON_{i,j,t} + X'_{i,j,t} \Phi + v_{i,j,t}. \quad (4)$$

The index of legislative harmonization policies in financial services (*HARMON*) serves as a valid "excludable" instrument if: a) it is significantly correlated with banking integration, that is, there is a strong first-stage relationship, and b) conditional on other factors, legislative-regulatory harmonization policies in financial services affect business cycle synchronization through cross-border financial integration (i.e., $COV(HARMON_{i,j,t}, \varepsilon_{i,j,t} | X'_{i,j,t}, \alpha_i, \delta_t) = 0$, where $\varepsilon_{i,j,t}$ is the error term in the second stage (equation (3)).

Our identification scheme links policy changes in a particular aspect of law (financial intermediation) with outcomes in exactly the same industry. Thus,

the key exclusion restriction for instrument validity seems plausible, because legislative harmonization policy reforms in financial services should affect the patterns of business cycle co-movement primarily by altering cross-border financial activities (see Angrist and Pischke (2008)). The FSAP was designed to spur cross-border financial linkages and develop a single market for financial services in Europe. Thus, conditional on other bilateral characteristics, it seems reasonable that harmonization policies in financial services affect output synchronization through increasing bilateral financial linkages.

Conceptually our identification builds on insights of the law and finance literature. This body of work shows that differences in the legal protection of shareholders and creditors have first-order effects on the development of deep and efficient financial markets and intermediaries (see La Porta et al. (1997, 1998)). Of most relevance is the study by La Porta, Lopez-de-Silanes, and Shleifer (2008), who compile a detailed cross-country data set of securities laws across countries and then examine the impact of such regulations on capital markets. Our identification setup is more restrictive and thus stronger since we link country-pair reforms in legal practices that aim to make the functioning of the financial system more alike with bilateral changes in financial patterns.

The country-pair dimension of the harmonization index further alleviates concerns of endogeneity, emerging either from reverse causation or from the instrument being correlated with omitted variables. While the timing of the transposition of the EU Directives into domestic law may be related to hard-to-account-for unilateral (domestic) conditions, the outcomes we study—financial integration in the first stage and output synchronization in the second stage—are bilateral (and time-varying).²² Thus, to challenge the exogeneity assumption would require that countries coordinate on the exact timing of the transposition of each piece of legislation, something that does not seem to be the case.

One might be worried about anticipation of these regulatory reforms. However, in practice anticipation effects are not particularly important in our context. First, even if investors have some idea about the timing of the legal adoption of each EU Directive in their country, it seems unlikely that they can also foresee the exact timing of the transposition in another country. Second, since most Directives reduce the cost of cross-border financial intermediation after their adoption, it makes sense for banks to wait for the transposition of the EU laws. Take, for example, the Settlements Directive that introduced central party clearing, legal enforceability of netting, and collateral security. Transaction costs and counterparty risk fall only when both countries transpose the EU Directive into the domestic legal order. Third, if foreign banks increase their lending and borrowing in anticipation of the legal adoption of the EU Directives, then we should not detect a significant first-stage relationship, something we do in fact detect (see below).

²² We investigated whether the legal adoption of the FSAP Directives correlates with country-level GDP growth, and found insignificant estimates.

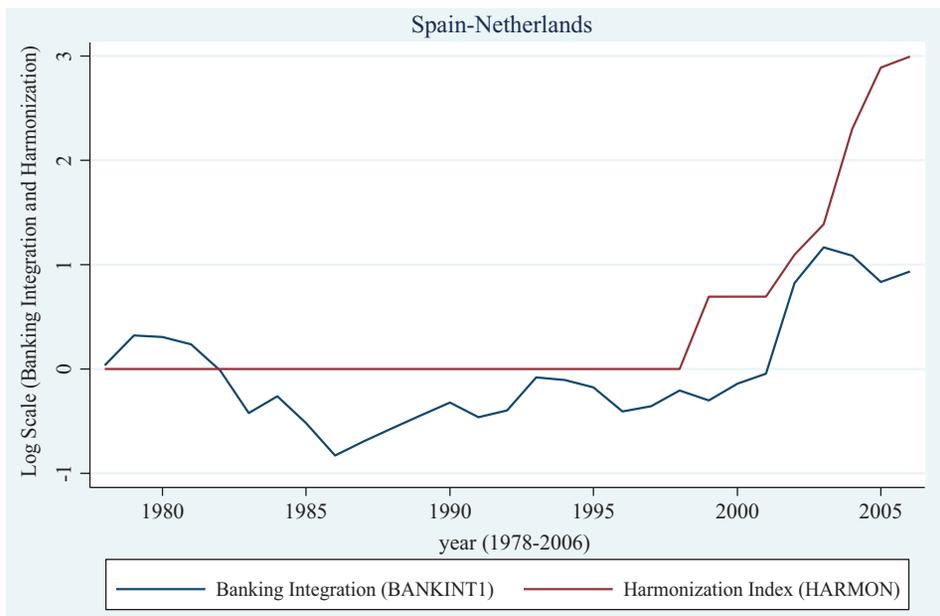


Figure 3. Legislative-regulatory harmonization in financial services and banking integration. This figure plots the within-country-pair and within-year evolution over time of banking integration (*BANKINT1*) and the legislative-regulatory harmonization index in financial services (*HARMON*) between Spain and the Netherlands, which increases in 1998.

B. First Stage: Legislative-Regulatory Harmonization in Financial Services and Banking Integration

In Panel A of Table V we examine whether the transposition of EU laws on financial intermediation are relevant for cross-border banking activities. We continue to include country-pair fixed effects and year fixed effects, so the coefficient on the harmonization index measures the extent to which financial integration increased or decreased after countries adopt into the local legal order the exact same pieces of financial legislation. The coefficient on *HARMON* in column (1) is positive (0.40) and significant at the 99% confidence level. This suggests that countries that quickly incorporated into domestic law the EU-wide regulatory-legislative harmonization policies on capital markets, insurance, and banking became more financially integrated through international banking activities.²³

Figure 3 illustrates this using as an example the evolution of banking activities and legislative-regulatory harmonization in financial services between Spain and the Netherlands. Banking activities between Spain and the Netherlands increase significantly after 1999 when, alongside euro membership, both

²³ Using country-level panel regressions, Christensen, Hail, and Leuz (2011) similarly find that following the transposition of the Directives on market abuse and the Directive on Transparency, market liquidity increases significantly.

countries adopt at the same time the first Directive of the FSAP on Cross-border Settlements. Banking activities between Spain and the Netherlands further increase in 2002, when both countries adopt at the same time the EU Directives that harmonized insurance services and electronic payments (see Appendix Tables B.I and B.II).

In column (2) we add to the specification a time-varying bilateral index capturing the flexibility of the exchange rate regime. This index enters with a negative and significant estimate, suggesting that banking activities have increased significantly among pairs of countries that have adopted more rigid currency regimes.²⁴ The first-stage coefficient on the harmonization index falls somewhat (0.33), but retains significance at the 99% level. In columns (3) and (4) we augment the specification with the gravity controls (i.e., the log of the product of the two countries' GDP and the log of the product of the two countries' population). We also control for differences in per capita GDP. While all three additional control variables enter with significant estimates (coefficients not reported), this has little effect on the impact of legislative-regulatory harmonization in financial services on cross-border banking integration. The positive and highly significant coefficient on *HARMON* across all perturbations suggests that a considerable portion of the recent increase in cross-border banking activities among EU member countries was driven by the harmonization policies in financial services.²⁵ In columns (5) to (8) we focus on the post-1995 period. While we lose efficiency, focusing on the period just before and after the introduction of the FSAP is useful to examine the robustness of our results. In all permutations the coefficient on the legislative-regulatory harmonization index is positive and highly significant.

The first-stage estimates are in line with the literature on law and economics that argues that, prior to FSAP, financial market integration in the EU was still unachievable given the diversity of legal regimes and the costs associated with this diversity (see Enriques and Gatti (2008) and Malcom, Tilden, and Wilsdon (2009)). While many argue that the FSAP could have included bolder harmonization measures, the elasticities in Panel A of Table V suggest a considerable economic effect: a one standard deviation increase in the harmonization index almost doubles banking integration. Kalemli-Ozcan, Papaioannou, and Peydró (2010) show that the strong effect of legislative-regulatory harmonization policies in financial services in spurring cross-border activities is robust to a variety of permutations. Most importantly for our focus here, the first-stage fit is strong. Across all specifications in the full sample the first-stage *F*-score

²⁴ This finding fits with the evidence from the fear-of-floating literature (e.g., Calvo and Reinhart (2002), Gelos and Wei (2005)). This research argues that, to attract foreign capital, emerging economies are unwilling to let their currencies float, and that, even when monetary authorities in developing countries argue that they do not manage the currency, in practice they do so (Reinhart and Rogoff (2004)). While this body of work focuses on developing economies, our evidence shows a similar pattern across developed countries.

²⁵ We also examined whether it is the joint adoption of EU Directives that fosters cross-border banking activities or the unilateral transposition by member countries. The estimates clearly show that it is legislative-regulatory harmonization that spurs cross-border banking activities.

of the excluded instrument (the legislative-regulatory harmonization index) is larger than 10, the rule-of-thumb value that signals for weak instrument problems (Staiger and Stock (1997), Stock, Wright, and Yogo (2002)). Even when we focus on the post-1995 period, the estimate for *HARMON* is three standard errors larger than zero, suggesting a reasonable first-stage fit.²⁶

C. 2SLS Estimates

We now turn to the second-stage estimates (reported in Panel B of Table V) that, under instrument validity, identify the one-way effect of financial integration on output synchronization.²⁷ The 2SLS coefficient on banking integration in column (1) is negative and highly significant. This suggests that on average within-country-pair increases in bilateral banking activities driven by legislative-regulatory harmonization policies in financial services lead to more divergent output patterns.

The second-stage estimate on *BANKINT* retains significance when we control for the flexibility of the exchange rate regime (in (2) and (4)).²⁸ The 2SLS coefficient on banking integration retains significance when we control for the log of the product of the two countries' GDP, the log of the product of the two countries' population, and differences in log per capita GDP in columns (3) and (4). The results are similar when we focus in the period 1995 to 2006. The estimates in columns (4) and (8) thus imply that, conditional on country-pair fixed factors, common global effects, the flexibility of the exchange rate regime, gravity factors, and output convergence, the component of banking integration explained by harmonization policies in financial services is associated with a lower degree of output synchronization.

The 2SLS coefficients on banking integration are somewhat larger in absolute value than the OLS estimates (in Panel B of Table II). For example, the analogous OLS estimate on banking integration to the 2SLS coefficient in column (1) of Table V is -0.385 . The larger absolute magnitude on the 2SLS estimates suggests that the OLS estimates are contaminated by measurement error and that, in practice, reverse causation is not a fundamental problem. Specifically, there are two main sources of attenuation in the OLS estimates that the 2SLS method helps resolve. First, bilateral banking activities are just one part of financial integration; although international banking activities are by far the largest component of foreign investment, theoretical studies suggest that the impact of other forms of financial integration, mostly equity investment and FDI, should have a larger impact on cross-border risk-sharing and output co-movement than integration that takes the form of debt and direct lending

²⁶ In our setup the Stock, Wright, and Yogo (2002) critical value for weak identification is 16.4, 8.96, and 6.66 for critical values of 10%, 15%, and 20%, respectively.

²⁷ The causal effect of banking integration on output synchronization is simply the ratio of the "reduced-form" coefficient of legislative-regulatory harmonization policies on output co-movement (reported in Table IV) to the "first-stage" coefficient of *HARMON* on banking integration (reported in Table V, Panel A).

²⁸ The same applies when, instead of using the bilateral time-varying measure of the flexibility of the exchange rate regime, we control for EU and euro area membership.

(see Morgan, Rime, and Strahan (2004)). As the harmonization index that we use as an “instrument” for banking integration is much broader than banking, covering legislative convergence in all segments of financial intermediation (specifically in capital markets, insurance industry, company law), the larger second-stage coefficients is not surprising. Second, attenuated OLS estimates may arise because a sizable portion of international investment and lending is redirected through financial centers (e.g., Kubelec and Sa (2009), Lane and Milesi-Ferretti (2007)) and thus standard measures of bilateral integration miss indirect linkages. Since our legislative-regulatory harmonization index is truly bilateral and not systematically biased for financial center countries (like Switzerland or the United Kingdom), it accounts for indirect transactions through financial centers.²⁹

Our analysis focuses on a sample of advanced economies under a period of unprecedented financial stability. This is key for identification, as theory makes opposing predictions on the partial effect of financial integration on output synchronization depending on the nature of the underlying shocks (as we discuss in Section I). When countries are hit by productivity shocks that affect the value of the firm’s collateral, banking/financial integration tends to amplify these shocks, leading to divergent output cycles. In contrast, integration facilitates contagion when financial shocks dominate. During our sample period, some financial shocks hit advanced economies. For example, the Scandinavian countries witnessed a significant banking crisis in the early 1990s, and the Japanese banking system was under stress in the mid-to-late-1990s.

In Table VI we report OLS and IV panel estimates, excluding from the analysis observations in which one of the two (or both) countries experienced a financial/banking crisis, to fully isolate periods in which productivity shocks dominate from financial turmoil episodes. In columns (1) to (3) we use the Reinhart and Rogoff (2008, 2009) chronology of major (systemic) financial crises and exclude Spain during the 1979 to 1985 period, Japan during the 1997 to 2001 period, and Finland and Sweden during the 1991 to 1994 period. In columns (4) to (6) we also exclude observations in which a minor (nonsystemic) financial crisis takes place (when a small number of banks face solvency problems), again using the Reinhart and Rogoff (2008, 2009) classification.³⁰ In line with our previous results, the OLS specifications in Panel A show that within-country-pair increases in banking integration in tranquil times are followed by more divergent output cycles. We obtain the same pattern when we

²⁹ Of course the larger absolute magnitude on the 2SLS coefficient may arise because the harmonization index that we use as an instrument is correlated with relevant time-varying country-pair variables. This seems unlikely, however, since most of the correlates of output synchronization and bilateral international capital holdings are either time-invariant (e.g., distance, trust, cultural ties) or slow-moving (e.g., specialization, trade). Thus, they will be captured by the country-pair fixed effects.

³⁰ According to this classification, the following countries (years) have experienced a minor (nonsystemic) banking crisis: Australia (1989 to 1992), Canada (1983 to 1985), France (1994), Germany (1977 to 1979), Italy (1990 to 1995), the United Kingdom (1984, 1991, 1995), and the United States (1989 to 1991). The results are similar if we use the Laeven and Valencia (2010) classification of banking crises.

Table VI
**Legislative-Regulatory Harmonization in Financial Services,
 Banking Integration, and Business Cycle Synchronization:
 Robustness Analysis, Panel (Country-Pair) Fixed-Effects
 Specifications**

The table reports ordinary least squares (in Panels A and B) and two-stage least squares (in Panel C) panel fixed-effects estimates. In columns (1) to (3) we exclude observations in which either country i or country j experiences a major financial crisis in the 1978 to 2006 period using the financial crisis classification of Reinhart and Rogoff (2009). In columns (4) to (6) we exclude observations in which either country i or country j experiences a major or a minor financial crisis in the 1978 to 2006 period using the financial crisis classification of Reinhart and Rogoff (2009). Panel A reports OLS estimates associating business cycle synchronization (*SYNCHI*) with banking integration (*BANKINTI*) in the previous year. The dependent variable is minus one times the absolute difference in real GDP growth between country i and country j in year t (*SYNCHI*). *BANKINTI* denotes the one-period-lagged value of the average of the logs of bilateral stocks of assets and liabilities normalized by the sum of the two countries' population in year t . Panel B reports OLS estimates associating business cycle synchronization (*SYNCHI*) with a bilateral time-varying measure of legislative-regulatory harmonization policies in financial services, conducted in the context of the FSAP (which covers capital markets, banking, and insurance) (*HARMON*). Panel C reports panel fixed-effect instrumental variable (two-stage least squares) estimates. The dependent variable in the second stage is minus one times the absolute difference in real GDP growth between country i and country j in year t (*SYNCHI*). The endogenous variable is the one-year-lagged value of the average of the logs of bilateral stocks of assets and liabilities normalized by the sum of the two countries' population in year t (*BANKINTI*). Banking Integration is instrumented with a bilateral time-varying measure of legislative-regulatory harmonization policies in financial services, conducted in the context of the FSAP (*HARMON*). In all panels standard errors are adjusted for country-pair-level heteroskedasticity and autocorrelation and corresponding t -statistics are reported below the estimates. The specifications in columns (2), (3), (5), and (6) include the log of the product of the two countries' GDP in the previous year, the log of the product of the two countries' population in the previous year, and the absolute value of the difference in the two countries' log GDP per capita in the previous year. The specifications in columns (3) and (6) also include as a control variable a bilateral time-varying measure of the flexibility of the exchange rate regime in the previous year, based on the "coarse" regime classification of Reinhart and Rogoff (2004).

	Excluding Major Financial Crises			Excluding Major and Minor Financial Crises		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: OLS Estimates: Dependent Variable Is Business Cycle Synchronization (<i>SYNCHI</i>)						
Banking Integration (<i>BANKINTI</i>)	-0.3656 (0.0646)	-0.2459 (0.0635)	-0.2470 (0.0644)	-0.3926 (0.0643)	-0.2851 (0.0642)	-0.2863 (0.0657)
	-5.66	-3.87	-3.84	-6.11	-4.44	-4.36
Adjusted R^2	0.125	0.141	0.141	0.140	0.159	0.159
Panel B: OLS Estimates: Dependent Variable Is Business Cycle Synchronization (<i>SYNCHI</i>)						
Financial Sector Harmonization (<i>HARMON</i>)	-0.2247 (0.0443)	-0.1292 (0.0706)	-0.1300 (0.0699)	-0.2370 (0.0428)	-0.1388 (0.0703)	-0.1375 (0.0695)
	-5.07	-1.83	-1.86	-5.53	-1.97	-1.98
Adjusted R^2	0.090	0.131	0.131	0.098	0.145	0.145

(Continued)

Table VI—Continued

	Excluding Major Financial Crises			Excluding Major and Minor Financial Crises		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel C: 2SLS Estimates: Dependent Variable Is Business Cycle Synchronization (<i>SYNCH1</i>)						
Banking Integration (<i>BANKINT1</i>)	-0.5678 (0.1505)	-0.6886 (0.3864)	-0.7664 (0.4317)	-0.6464 (0.1751)	-0.8521 (0.4617)	-0.9800 (0.5520)
	-3.77	-1.78	-1.78	-3.69	-1.85	-1.78
First Stage <i>F</i> -score	22.57	12.36	10.69	19.73	9.11	7.40
<i>p</i> -value	0.00	0.00	0.00	0.00	0.00	0.00
GDP Controls	No	Yes	Yes	No	Yes	Yes
ER Control	No	No	Yes	No	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,909	3,909	3,909	3,506	3,506	3,506
Country Pairs	153	153	153	153	153	153

regress output synchronization on the structural measure of financial integration that captures legislative-regulatory harmonization in financial services (Panel B): as a result of financial regulatory convergence, output cycles become less synchronized. Finally, the second-stage estimates in Panel C show that, during tranquil times, increases in cross-border banking activities driven by legislative-regulatory harmonization policies in financial intermediation are followed by divergent output cycles.

VI. A Primer on the Economic Mechanism

Our results of a significant negative association between cross-border banking integration and output synchronization, while in contrast to previous empirical work, support the key theoretical predictions of the workhorse international real business cycle model of Backus, Kehoe, and Kydland (1992) and the multi-economy version of the Holmstrom and Tirole (1997) banking model of Morgan, Rime, and Strahan (2004). These models imply that banking integration magnifies productivity shocks (to regions or to countries), making output growth among integrated economies diverge. In Table III we condition on differences in per capita GDP to account for the possibility that the negative partial effect of financial integration on output synchronization operates via output convergence. In Table III we also report specifications conditioning on differences in goods trade to control for the possibility that financial integration leads to divergent output patterns via enlarging trade imbalances.³¹

If banking integration leads to divergent output cycles in tranquil times because it magnifies productivity differences, then we should also observe capital

³¹ We thank an anonymous referee for bringing these two alternative theoretical mechanisms to our attention.

flowing into (out of) the country hit by a positive (negative) productivity shock. Since the BIS database records separately foreign bank assets and foreign bank liabilities, we explore this theoretical prediction. Specifically in Table VII, Panels A and B we use the information of the BIS on the direction of bank investment (foreign assets of country i banks to country j ; foreign liabilities of banks in country j to country i ; foreign assets of country j banks to country i ; foreign liabilities of banks in country i to country j) to shed light on the mechanism.

Table VII, Panel A reports panel fixed-effect estimates associating the difference in real GDP per capita growth between country i and country j with three different measures reflecting changes in the external position within each pair of countries. The dependent variable in all specifications is the difference in GDP per capita growth between countries i and j in year t . In contrast to our estimates in the main tables, we do not take the absolute value to sign the direction of foreign bank lending and investment; hence, a positive (negative) number implies that country i (j) is growing faster than country j (i). In columns (1) to (3) we regress the output per capita growth difference on the change in (the log of the) stock of net foreign external assets held by banks of country i in country j minus foreign liabilities of country i to country j , weighted by the sum of the two countries' population. In columns (4) to (6) we decompose changes in net foreign assets and associate GDP per capita growth differences with the change in foreign bank assets of country i in country j and the change in foreign bank assets of country j in country i , weighted again by the sum of the two countries' population.

As these specifications do not identify causal effects, we also run regressions switching the dependent and independent variables. In Table VII, Panel B GDP per capita growth differences between country i and country j is the explanatory variable, while the three measures on the change in foreign bank asset positions serve as the dependent variables.

The significantly negative coefficient in columns (1) to (3) in both panels suggests that, when country i experiences higher productivity growth than country j (or when country j experiences a relative negative shock), the foreign assets held by banks of country i in country j fall as capital flows into country i . The specifications reported in columns (4) to (6) of Table VII, Panel A and in columns (4) to (9) of Table VII, Panel B show that a positive growth differential between country i and country j is associated with both a reduction in local banks' exposure in country j and an increase in lending from banks in country j . Thus, while the contemporaneous correlations in Table VII do not identify causal relationships, they are in line with both international macro/finance theories and banking models predicting the quick movement of capital across countries. Financial-banking in our application-integration makes output cycles diverge.

Panel A: Banking Integration and Business Cycle Synchronization Role of Liabilities and Assets
 Table VII

Panel A reports panel fixed-effect (within) coefficients that include both a vector of country-pair fixed effects and a vector of year fixed effects; in addition, in columns (2) and (5) there are also country-specific time trends, and in columns (3) and (6) there are country-pair-specific time trends. Standard errors are adjusted for country-pair-level heteroskedasticity and autocorrelation. In all the specifications the dependent variable is the difference in real GDP per capita growth between country *i* and country *j*. These models are based on annual observations that cover the 1978 to 2006 period. Change in assets of country *j* to country *i* denotes the change in log assets of country *i* plus log liabilities of country *j* to country *j*, whereas change in overall asset net positions denotes change in assets of country *i* to country *j* minus change in assets of country *j* to country *i*. Appendix A gives details on the construction and sources of all variables. The table also gives the number of country pairs, the number of observations, and the within R^2 .

	(1)	(2)	(3)	(4)	(5)	(6)
Difference in Real GDP p.c. Growth between Country <i>i</i> and Country <i>j</i>						
Change in the Overall Net Asset Position	-0.1190 (0.0215)	-0.1140 (0.0207)	-0.1072 (0.0212)			
	-5.53	-5.51	-5.07			
Change in Assets of Country <i>i</i> to Country <i>j</i>				-0.1530 (0.0333)	-0.1410 (0.0312)	-0.1384 (0.0315)
				-4.59	-4.51	-4.40
Change in Assets of Country <i>j</i> to Country <i>i</i>				0.0841 (0.0285)	0.0862 (0.0260)	0.0752 (0.0275)
				2.95	3.31	2.73
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-Pair Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Trends	No	Country	Country-pair	No	Country	Country-pair
R^2 (within)	0.024	0.049	0.255	0.024	0.05	0.255
Observations	4,229	4,229	4,229	4,229	4,229	4,229
Country Pairs	153	153	153	153	153	153

(Continued)

VII. Conclusion

Identifying the effect of financial integration on the synchronization of economic activity has been difficult given ambiguous theoretical predictions and numerous empirical challenges. Theory predicts a positive association between financial integration and synchronization of economic activity if shocks to the financial sector are dominant and/or if there is financial contagion, while theory predicts a negative relationship between integration and synchronization if shocks to the real sector in the form of shocks to firms' productivity and/or collateral dominate. Identification has been elusive since common shocks and hard-to-account-for factors related to the sociopolitical proximity between country pairs simultaneously determine financial integration and synchronization among country pairs.

To account for the simultaneity bias and reverse causality, we use a unique supervisory data set to construct time-varying de-facto and de-jure financial integration measures for developed country pairs over last three decades. Our country-pair-time data set enables us to use a methodology that identifies the effect of financial integration on business cycle synchronization through within-country-pair over-time changes as opposed to cross-sectional differences as is typically done in the literature.

Our results point to the dominance of real productivity/collateral shocks to nonfinancial firms over shocks to the financial sector in a sample of developed countries over the last three decades. This is plausible given the fact that a 2007 to 2009–style global financial meltdown did not happen during our sample period. The major banking crisis that affected our countries was the Scandinavian crisis of the 1990s, but, given its relatively local nature and absence of contagion, this crisis was not enough to change the negative effect of financial integration on synchronization to being positive.

One caveat of our work is the fact that we focus only on bank integration. Although the de-jure measure of integration that we use based on legal changes due to harmonized financial intermediation across the EU markets is supposed to capture other forms of integration, we might still miss some alternative mechanisms such as institutional investors who may also respond to the changes in financial laws. Nevertheless, our findings suggest that we should reconsider the conventional wisdom. In particular, contrary to previous studies and conventional wisdom, we show that increased financial integration leads to divergent economic activity among country pairs. The policy implications of our study are such that, in the absence of a major worldwide banking crisis and associated contagion, developed country financial markets work as expected, channeling funds efficiently. The results can alter drastically in the event of a major shock to the financial system of a country such as the United States.

Appendix A: Variable Definitions

SYNCHRONIZATION INDEX 1 [SYNCH1]: The measure is defined as minus one times the difference in (logarithmic) real GDP growth between each pair of countries in each year, that is, $SYNCH1_{i,j,t} \equiv -[(\ln Y_{i,t} - \ln Y_{i,t-1}) - (\ln Y_{j,t} - \ln Y_{j,t-1})]$. For output (Y) we use the World Bank's real per capita GDP at constant prices series. This index follows Giannone, Lenza, and Reichlin (2008). Source: World Bank's World Development Indicators (2012).

SYNCHRONIZATION INDEX 2 [SYNCH2]: The measure follows Morgan, Rime, and Strahan (2004) and is constructed in two steps. First, we regress (logarithmic) real GDP growth separately for each country on country fixed effects and year fixed effects, that is, $\ln Y_{i,t} - \ln Y_{i,t-1} = \gamma_i + \phi_t + v_{i,t} \forall i, j$. Second, we construct the business cycle synchronization index as the negative of the difference in the residuals for each country-pair, that is, $SYNCH2_{i,j,t} \equiv -|v_{i,t} - v_{j,t}|$. Source: World Bank's World Development Indicators (2012).

SYNCHRONIZATION INDEX 3 [SYNCH3]: The measure is the correlation of the cyclical component of (logarithmic) real GDP as measured with Baxter and King (1999) Band-Pass filter (2, 8). Source: World Bank's World Development Indicators (2012).

BANKING INTEGRATION 1 [BANKINT1]: The banking integration index is based on bilateral cross-border holdings (stocks) of banks. Data on banks' cross-border bilateral stocks of assets and liabilities come from the confidential version of BIS's Locational Banking Statistics. BIS defines banking institutions broadly: "reporting institutions should include not only commercial banks but also savings banks, savings and loan associations, credit unions or cooperative credit banks, building societies, and post office giro institutions, other government-controlled savings banks and other financial institutions if they take deposits or issue close substitutes for deposits" (BIS 2003a, 2003b). For each country pair and year there are up to four observations: i) asset holdings (stocks) of banks located in country i in all sectors of the economy in country j , ii) asset holdings (stocks) of banks located in country j in all sectors of the economy in country i , iii) liabilities (stocks) of banks located in country i to country j , and iv) liabilities (stocks) of banks located in country j to country i . The data are originally expressed in current U.S. dollars. First, we deflate the four series with the U.S. deflator. Second, we standardize the series by dividing assets and liabilities by the sum of the two countries' population in each year (using data from World Bank's World Development Indicators). Third, we take the average of the log value of real bilateral assets and liabilities in each year. Source: Bank of International Settlements, Locational Banking Statistics (2008).

BANKING INTEGRATION 2 [BANKINT2]: The banking integration index is based on bilateral cross-border holdings (stocks) of banks. Data on banks' cross-border bilateral stocks of assets and liabilities come from the confidential version of BIS's Locational Banking Statistics. BIS defines banking institutions broadly: "reporting institutions should include not only commercial banks but also savings banks, savings and loan associations, credit unions or

cooperative credit banks, building societies, and post office giro institutions, other government-controlled savings banks and other financial institutions if they take deposits or issue close substitutes for deposits” (BIS 2003a, 2003b). For each country pair and year there are up to four observations: i) asset holdings (stocks) of banks located in country i in all sectors of the economy in country j , ii) asset holdings (stocks) of banks located in country j in all sectors of the economy in country i , iii) liabilities (stocks) of banks located in country i to country j , and iv) liabilities (stocks) of banks located in country j to country i . The data are originally expressed in current U.S. dollars. First, we deflate the four series with the U.S. deflator. Second, we standardize the series by dividing assets and liabilities by the sum of the two countries’ GDP in each year (using data from World Bank’s World Development Indicators). Third, we take the average of the log value of real bilateral assets and liabilities in each year. Source: Bank of International Settlements, Locational Banking Statistics (2008).

TRADE INTEGRATION [TRADE]: Index of bilateral trade intensity. The measure is the log of bilateral real (deflated with the U.S. price deflator) exports and imports as a share of the two countries’ GDP. Source: IMF Direction of Trade Database (2008).

SPECIALIZATION [SPEC]: Index of industrial specialization, based on dissimilarities in production. The measure is the sum of the absolute differences in the share of industrial production for nine manufacturing sectors as a share of total manufacturing production in each pair of countries in each year, that is, $SPEC_{i,j,t} \equiv \sum_{n=1}^N |s_{i,t}^n - s_{j,t}^n|$. Source: United Nations Industrial Statistics Database (2008).

LEGISLATIVE HARMONIZATION IN FINANCIAL SERVICES [HARMON]: Index of regulatory-legislative harmonization in financial services based on the transposition of the EU Directives of the EU Financial Services Action Plan (FSAP). We construct the bilateral harmonization index in two steps. First, we define 27 indicator variables ($LEX_{i,j,t}^k$, one for each Directive k) that equal one if in any given year both countries in each country-pair cell have transposed the Directive into national law and zero otherwise. Second, we create the country time-varying legislative harmonization measure by summing the values of these 27 indicator variables ($LEX_{i,j,t}^k$). Since the variable is highly skewed, in the regressions we use the log value and add one, that is, $HARMON_{i,j,t} \equiv \ln(\sum_{k=1}^{K=27} (1 + LEX_{i,j,t}^k))$. Source: Kalemli-Ozcan, Papaioannou, and Peydró (2010), based on data from the EU Commission and each EU15 member country.

EXCHANGE RATE FLEXIBILITY [ERC]: Bilateral index of the flexibility of the exchange rate. The country-specific index ranges from one to five where lower values suggest a more rigid regime. We construct the bilateral index by taking the sum of the log classification of countries i and j in the beginning (January) of each year t ($ERC = \ln(ER_{i,t}) + \ln(ER_{j,t})$). Source: Ilzetzki, Reinhart, and Rogoff (2008) and Reinhart and Rogoff (2004).

EURO AREA BOTH [EZ2]: Bilateral index of membership in the euro area. The measure is an indicator variable that takes the value of one if both countries

are members of the euro-zone in year t and zero otherwise. Source: European Central Bank.

EURO AREA ALONE [*EZ1*]: Bilateral index of membership in the euro area. The measure is an indicator variable that takes the value of one if only one country is a member of the euro-zone in year t and zero otherwise. Source: European Central Bank.

EUROPEAN UNION BOTH [*EU2*]: Bilateral index of membership in the EU. The measure is an indicator variable that takes the value of one if both countries are members of the EU in year t and zero otherwise. Source: EU Commission.

EUROPEAN UNION ALONE [*EU1*]: Bilateral index of membership in the EU. The measure is an indicator variable that takes the value of one if only one country is member of the EU in year t and zero otherwise. Source: EU Commission.

INCOME [*GDP*]: Log level of real GDP (in constant U.S. dollars) for country i and country j in year t . In the regressions we use the log of the product of the two countries' GDP (in the previous year). Source: World Bank World Development Indicators (2012).

POPULATION [*POP*]: Log level of population for country i and country j in year t . In the regressions we use the log of the product of the two countries' population (in the previous year). Source: World Bank World Development Indicators (2012).

INCOME DIFFERENCES [*GDPDIFF*]: Absolute value of the difference in the log level of real per capita GDP (in constant U.S. dollars) between country i and country j (in the previous year). Source: World Bank World Development Indicators (2012).

TRADE DIFFERENCES [*TRADEDIFF*]: For each country pair there are four observations in a year: exports from country i to country j , imports of country i from country j , exports of country j to country i , and imports of country j from country i . After deflating the data with the U.S. CPI, we take the sum of the logs of exports of country i to country j and the imports of country j from country i (exports from i to j) and the sum of the logs of exports of country j to country i and the imports of country i from country j (exports from j to i). We then take the absolute value of the difference of the log level of bilateral exports between country i and country j (in the previous year). Source: IMF Direction of Trade Database (2008).

Appendix B

Table B.1

Legislative Measures (Directives) of the Financial Services Action Plan (FSAP)

The table reports the timing of circulation by the EU Commission of the 27 Directives of legislative-regulatory harmonization in banking, insurance, and capital markets included in the FSAP. Kalemlı, Papaıannou, and Peydró (2010) give details on each of these Directives.

Directive No.	Directive Title	Deadline
1	Implementation of the Settlement Finality Directive	27/04/2002
2	Directive on the taking up, pursuit and prudential supervision of the businesses of electronic money institutions	17/11/2002
3	Directive amending the insurance directives and the ISD to permit information exchange with third countries	20/04/2003
4	Directive on the reorganisation and winding-up of insurance undertakings	05/05/2004
5	Directive on the reorganisation and winding-up of banks	9/10/2004
6	Directive amending the 4th and 7th Company Law Directives to allow fair value accounting	10/10/2004
7	Directive supplementing the Statute for a European Company with regard to the involvement of employees	15/06/2003
8	Directive amending the money laundering directive	13/08/2003
9	1st Directive on UCITS (Undertakings for Collective Investments in Transferable Securities)	13/08/2003
10	2nd Directive on UCITS (Undertakings for Collective Investments in Transferable Securities)	20/09/2003
11	Directive amending the solvency margin requirements in the insurance directives	17/12/2003
12	Directive on financial collateral arrangements	1/01/2004
13	Directive on the distance marketing of financial services	08/11/2004
14	Directive on the supervision of credit institutions, insurance undertakings, and investment firms in a financial conglomerate	20/09/2003
15	Solvency 1 Directive for life insurance	15/01/2005
16	Directive on insurance mediation	10/12/2004
17	Directive on insider dealing and market manipulation	23/09/2005
18	Directive on the prudential supervision of pension funds	01/01/2004
19	Directive on the taxation of savings income in the form of interest payments	1/01/2005
20	Directive modernising the accounting provisions of the 4th and 7th Company Law Directives	1/01/2005
21	Directive on prospectuses	20/01/2007
22	Directive on Take Over Bids	1/07/2005
23	Transparency Directive	20/05/2006
24	Directive on Markets in Financial Instruments (update of ISD)—MiFID	20/01/2007
25	10th Company law Directive on cross-border mergers	15/12/2007
26	Directive on relating to the taking up and pursuit of the business of credit institutions	31/12/2006
27	Directive on the capital adequacy of investment firms and credit institutions	31/12/2006

Table B.II
Transposition Date (Year Quarter) for the Directives of the Financial Services Action Plan (FSAP)

The table reports the year and quarter of the transposition of each of the 27 Directives of the FSAP by EU15 countries. See Section II on details of the FSAP. Appendix Table B.I reports a brief description of each Directive. Data on the transposition of the legislative-harmonization Directives come from the EU Commission and each of the EU15 countries.

Directive	AT	BE	DE	DK	ES	FR	FI	GR	IE	IT	LU	NL	PT	SE	UK
1998/26/EC	1999 Q4	1999 Q2	1999 Q4	2000 Q2	1999 Q4	2001 Q2	1999 Q4	2000 Q1	1999 Q1	2001 Q2	2001 Q1	1999 Q1	2000 Q1	2000 Q1	1999 Q4
2000/46/EC	2002 Q2	2003 Q2	2002 Q3	2005 Q1	2002 Q4	2003 Q1	2003 Q1	2003 Q2	2002 Q2	2002 Q2	2002 Q2	2002 Q3	2002 Q1	2002 Q2	2002 Q2
2000/64/EC	2003 Q3	2004 Q1	2002 Q1	2004 Q1	2003 Q4	2006 Q1	2004 Q1	2004 Q4	Not Yet	Not Yet	2001 Q3	2003 Q1	2000 Q4	2000 Q3	2003 Q2
2001/17/EC	2003 Q3	2004 Q4	2003 Q4	2006 Q3	2003 Q3	2005 Q1	2004 Q2	Not Yet	2003 Q2	2003 Q2	2004 Q2	2004 Q2	2000 Q4	2006 Q2	2003 Q2
2001/24/EC	2003 Q3	2004 Q4	2004 Q1	2004 Q2	2005 Q2	2004 Q4	2004 Q2	2006 Q2	2004 Q2	2004 Q3	2004 Q2	2005 Q2	2006 Q4	2006 Q1	2004 Q2
2001/65/EC	2004 Q1	2005 Q1	2004 Q4	2002 Q1	2004 Q1	2004 Q4	2004 Q4	2006 Q2	2004 Q4	2005 Q1	2006 Q2	2005 Q3	2004 Q2	2004 Q1	2004 Q4
2001/86/EC	2004 Q4	2004 Q4	2004 Q4	2004 Q2	2006 Q3	2005 Q3	2004 Q4	2006 Q2	2006 Q4	2005 Q4	2006 Q3	2005 Q1	2005 Q4	2004 Q4	2004 Q4
2001/97/EC	2003 Q2	2004 Q1	2002 Q3	2005 Q1	2003 Q3	2004 Q1	2003 Q2	2005 Q4	2003 Q3	2004 Q1	2004 Q4	2001 Q4	2004 Q2	2005 Q1	2004 Q2
2001/107/EC	2003 Q3	2004 Q2	2004 Q1	2004 Q1	2004 Q1	2003 Q4	2004 Q3	2004 Q4	2003 Q4	2003 Q4	2003 Q1	2005 Q3	2004 Q1	2004 Q2	2004 Q1
2001/108/EC	2003 Q3	2004 Q2	2004 Q1	2005 Q3	2004 Q1	2003 Q4	2004 Q3	2004 Q4	2003 Q4	2003 Q4	2003 Q1	2005 Q3	2004 Q1	2004 Q2	2004 Q1
2002/47/EC	2003 Q3	2004 Q1	2004 Q1	2004 Q1	2004 Q1	2004 Q2	2004 Q2	2005 Q1	2005 Q1	2004 Q1	2004 Q2	2003 Q4	2003 Q4	2004 Q2	2004 Q1
2002/47/EC	2003 Q4	2005 Q1	2004 Q2	2004 Q4	2002 Q4	2005 Q1	2004 Q1	2004 Q4	2004 Q1	2004 Q3	2005 Q3	2004 Q2	2004 Q2	2005 Q2	2005 Q4
2002/65/EC	2004 Q4	2006 Q1	2004 Q4	2005 Q3	Not Yet	2005 Q2	2005 Q2	2005 Q2	2004 Q4	2005 Q4	Not Yet	2006 Q1	Not Yet	2004 Q2	2004 Q4
2002/87/EC	2005 Q1	2005 Q1	2005 Q1	2004 Q3	2005 Q2	2004 Q4	2004 Q3	2006 Q2	2005 Q1	2005 Q3	2006 Q4	2007 Q1	Not Yet	2006 Q3	2004 Q3
2002/83/EC	2003 Q3	2004 Q2	2004 Q1	2004 Q1	2004 Q1	2004 Q2	2004 Q2	2005 Q1	2005 Q1	2004 Q1	2004 Q1	2003 Q4	2003 Q4	2004 Q4	2005 Q1
2002/92/EC	2004 Q4	2005 Q1	Not Yet	2005 Q3	2006 Q3	2005 Q4	2005 Q3	2005 Q1	2005 Q1	2006 Q2	2005 Q4	2005 Q3	2006 Q4	2005 Q3	2005 Q1
2003/6/EC	2005 Q1	2005 Q3	2004 Q4	2005 Q2	2005 Q4	2005 Q3	2005 Q3	2005 Q3	2005 Q3	2005 Q2	2006 Q2	2005 Q4	2006 Q2	2005 Q3	2005 Q3
2003/41/EC	2005 Q3	2006 Q4	2005 Q3	2005 Q4	2005 Q1	2006 Q2	2006 Q2	2005 Q3	2005 Q3	Not Yet	2005 Q3	2006 Q1	2006 Q1	2006 Q1	2005 Q4
2003/48/EC	2004 Q1	2005 Q3	2005 Q1	2004 Q2	2004 Q1	2004 Q4	2004 Q1	2005 Q1	2003 Q4	2005 Q2	2005 Q2	2004 Q1	2005 Q3	2005 Q3	2005 Q1
2003/51/EC	2005 Q1	2006 Q1	2004 Q4	2002 Q1	2005 Q1	2004 Q4	2004 Q4	2006 Q3	2005 Q1	Not Yet	2006 Q2	2005 Q3	2005 Q1	2006 Q1	2005 Q1
2003/71/EC	2005 Q3	2006 Q3	2005 Q3	2005 Q2	2005 Q1	2005 Q3	2005 Q4	2005 Q3	2005 Q3	Not Yet	2005 Q3	2005 Q3	2005 Q2	2005 Q3	2005 Q3
2004/25/EC	2006 Q2	2007 Q3	2006 Q3	2005 Q2	2007 Q3	2006 Q2	2006 Q4	2006 Q2	2006 Q2	2007 Q4	2006 Q2	2007 Q4	2006 Q4	2006 Q3	2006 Q2
2004/109/EC	2007 Q4	Not Yet	2007 Q4	2007 Q4	2007 Q4										
2004/39/EC	2007 Q4	2008 Q3	2007 Q1	2007 Q2	2007 Q2	2007 Q4	2007 Q1	2007 Q2	2007 Q2	2007 Q4	2008 Q3	2007 Q4	2007 Q4	2007 Q4	2007 Q1
2005/56/EC	2007 Q4	2008 Q3	2007 Q2	2007 Q2	Not Yet	2008 Q3	2007 Q4	Not Yet	2008 Q2	2008 Q3	2007 Q1	2008 Q3	Not Yet	2008 Q1	2007 Q4
2006/48/EC	2007 Q1	2007 Q4	2006 Q4	2007 Q1	2008 Q1	2007 Q2	2007 Q1	2007 Q3	2007 Q1	2007 Q1	2007 Q1	2007 Q1	2007 Q2	2007 Q1	2007 Q1
2006/49/EC	2007 Q4	2007 Q4	2006 Q4	2007 Q1	2008 Q1	2007 Q2	2007 Q1	2007 Q3	2007 Q1	2007 Q1	2007 Q4	2007 Q1	2007 Q2	2007 Q1	2007 Q1

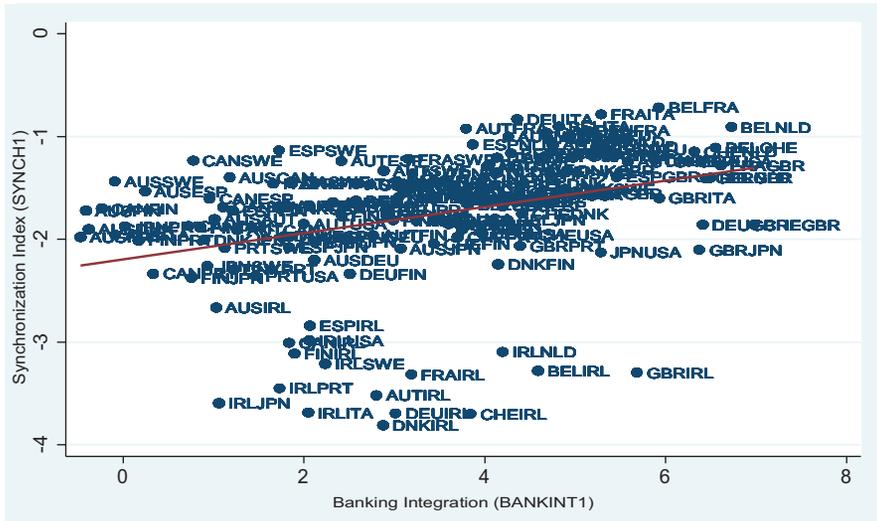


Figure B1. The figure plots the cross-sectional correlation between output synchronization (*SYNCH1*) in the vertical axis and banking integration (*BANKINT1*) in the horizontal axis. Each observation corresponds to a country pair and both output synchronization and banking integration are averages within each country pair.

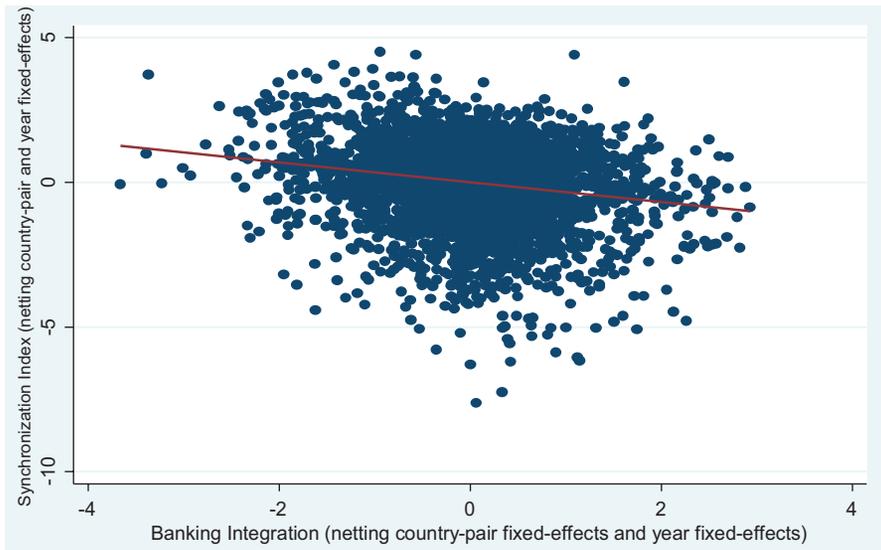


Figure B2. The figure plots the within-country pair and within-year correlation between output synchronization (*SYNCH1*) in the vertical axis and banking integration (*BANKINT1*) in the horizontal axis. Each observation corresponds to a particular country pair in each year. To generate the figure we first regress output synchronization and banking integration on country-pair fixed effects and year fixed effects. Then we plot the residuals of the synchronization regression in the vertical axis against the residuals from the banking integration regression in the horizontal axis.

REFERENCES

- Adam, Klaus, Tullio Jappelli, Annamaria Menichini, Mario Padula, and Marco Pagano, 2002, Analyse, compare and apply alternative indicators and monitoring methodologies to measure the evolution of capital market integration in the European Union, Working Paper, Centre for Studies in Economics and Finance, Department of Economics and Statistics, University of Salerno.
- Allen, Franklin, and Douglas Gale, 2000, Financial contagion, *Journal of Political Economy* 108, 1–33.
- Angrist, Joshua D., and Jorn-Steffen Pischke, 2008, *Mostly Harmless Economics: An Empiricist's Companion* (Princeton University Press, Princeton, NJ).
- Backus, David, Patrick Kehoe, and Finn Kydland, 1992, International real business cycles, *Journal of Political Economy* 100, 745–775.
- Balas, Aron, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2009, The divergence of legal procedures, *American Economic Journal: Economic Policy* 1, 138–62.
- Bank of International Settlements (BIS), 2003a, Guide to international financial statistics, BIS Monetary and Economic Department Papers No. 14.
- Bank of International Settlements (BIS), 2003b, Guide to international banking statistics, BIS Monetary and Economic Department Papers No. 16.
- Bartram, Sohnke, John Griffin, and David Ng, 2010, How important are foreign ownership linkages for international stock returns?, SSRN Working Paper 1571120.
- Baxter, Marianne, and Robert G. King, 1999, Measuring business cycles: Approximate band-pass filters for economic time-series, *Review of Economics and Statistics* 81, 575–593.
- Baxter, Marianne, and Michael Kouparitsas, 2005, Determinants of business cycle co-movement: A robust analysis, *Journal of Monetary Economics* 52, 113–157.
- Bekaert, Geert, and Campbell R. Harvey, 1995, Time-varying world integration, *Journal of Finance* 50, 403–444.
- Bekaert, Geert, and Campbell R. Harvey, 2000, Foreign speculators and emerging equity markets, *Journal of Finance* 55, 565–613.
- Bekaert, Geert, Campbell R. Harvey, and Christian Lundblad, 2005, Does financial liberalization spur economic growth?, *Journal of Financial Economics* 77, 3–55.
- Bekaert, Geert, Campbell R. Harvey, and Christian Lundblad, 2006, Growth volatility and financial liberalization, *Journal of International Money and Finance* 25, 370–403.
- Bekaert, Geert, Campbell R. Harvey, and Christian Lundblad, 2011, Financial openness and productivity, *World Development* 39, 1–19.
- Bekaert, Geert, Campbell R. Harvey, Christian Lundblad, and Stephan Siegel, 2007, Global growth opportunities and market integration, *Journal of Finance* 62, 1081–1137.
- Bekaert, Geert, Campbell R. Harvey, Christian Lundblad, and Stephan Siegel, 2011, What segments equity markets, *Review of Financial Studies* 24, 3841–3890.
- Bekaert, Geert, Campbell R. Harvey, and Angela Ng, 2005, Market integration and contagion, *Journal of Business* 78, 1–31.
- Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, 2004, How much should we trust difference in differences estimates?, *Quarterly Journal of Economics* 119, 249–275.
- Brunnermeier, Markus, Thomas Eisenbach, and Yuliy Sannikov, 2012, Macroeconomics with financial frictions: A survey, NBER Working paper 18102.
- Calderon, Cesar, Alberto Chong, and Ernesto Stein, 2007, Trade intensity and business cycle synchronization: Are developing countries any different?, *Journal of International Economics* 71, 2–21.
- Calvo, Guillermo, 1998, Capital market contagion and recession: An explanation of the Russian Virus, Mimeo.
- Calvo, Guillermo, and Enrique Mendoza, 2000, Rational contagion and the globalization in securities markets, *Journal of International Economics* 51, 79–119.
- Calvo, Guillermo, and Carmen Reinhart, 2002, Fear of floating, *Quarterly Journal of Economics* 117, 379–408.

- Cameron, A. Colin, Jonah Gelbach, and Douglas Miller, 2011, Robust inference with multi-way clustering, *Journal of Business and Economic Statistics* 28, 238–249.
- Canova, Fabio, 1998, Detrending and business cycles facts, *Journal of Monetary Economics* 41, 475–512.
- Canova, Fabio, 1999, Does detrending matter for the determination of the reference cycle and the selection of turning points?, *Economic Journal* 109, 126–150.
- Cecchetti, Stephen G., Alfonso Flores-Lagunes, and Stefan Krause, 2006, Assessing the sources of changes in the volatility of real growth, NBER Working Paper 11946.
- Cetorelli, Nicola, and Linda Goldberg, 2012, Banking globalization and monetary transmission, *Journal of Finance* 67, 1811–1843.
- Christensen, Hans, Luzi Hail, and Christian Leuz, 2011, Capital-market effects of securities regulation: implementation Hysteresis, and enforcement. NBER Working paper 16939.
- Cornett, Marcia, Jamie McNutt, Philip Strahan, and Hassan Tehranian, 2011, Liquidity risk management and credit supply in the financial crisis, *Journal of Financial Economics* 101, 297–213.
- Devereux, Michael, and James Yetman, 2010, Leverage constraints and the international transmission of shocks, *Journal of Money, Credit and Banking* 42, 71–105.
- Doyle, Brian, and Jon Faust, 2005, Breaks in the variability and co-movement of G7 economic growth, *Review of Economics and Statistics* 87, 721–740.
- Ekinci, Mehmet Fatih, Sebnem Kalemli-Ozcan, and Bent Sørensen, 2009, Financial integration within EU countries: The role of institutions, confidence, and trust, NBER 2007, *International Seminar on Macroeconomics* 325–391.
- Enders, Zeno, Robert Kollman, and Gernot Müller, 2010, Global banking and international business cycles, CEPR Discussion Paper 7972.
- Enriques, Luca, and Matteo Gatti, 2008, Is there a uniform EU securities law after the Financial Services Action Plan?, *Stanford Journal of Law, Business, and Finance* 14, 43–82.
- Enriques, Luca, and Paolo Volpin, 2007, Corporate governance reforms in continental Europe, *Journal of Economic Perspectives* 21, 117–140.
- Forbes, Kristin, and Roberto Rigobon, 2002, No contagion, only interdependence: Measuring stock market comovements, *Journal of Finance* 57, 2223–2261.
- Frankel, Jeffrey, and Andrew Rose, 1998, The endogeneity of the optimum currency area criterion, *Economic Journal* 108, 1009–1025.
- Frankel, Jeffrey, and Sergio Schmukler, 1998, *Crisis, contagion, and country funds: Effects on East Asia and Latin America*, in R. Glick, ed.: *Management of Capital Flows and Exchange Rates: Lessons from the Pacific Rim* (Cambridge University Press, Cambridge, UK).
- Freixas, Xavier, Bruno M. Parigi, and Jean-Charles Rochet, 2000, Systemic risk, interbank relations, and liquidity provision by the Central Bank, *Journal of Money, Credit and Banking* 32, 611–638.
- García-Herrero, Alicia, and Juan M. Ruiz, 2008, Do trade and financial links foster business cycle synchronization in a small open economy?, *Moneda y Crédito* 226, 187–226.
- Gelos, Gaston, and Shang-Jin Wei, 2005, Transparency and international portfolio holdings, *Journal of Finance* 60, 2987–3020.
- Giannetti, Mariassunta, and Yishay Yafeh, 2008, Do cultural differences between contracting parties matter? Evidence from syndicated bank loans, ECGI Finance Working Paper No. 224/2008.
- Giannone, Domenico, Michele Lenza, and Lucrezia Reichlin. 2008, *Business cycles in the Euro Area*, in Alesina and Giavazzi, eds. *Alberto/Francisco Europe and the Euro* (Chicago University Press, Chicago, IL).
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales, 2009, Cultural biases in economic exchange?, *Quarterly Journal of Economics* 124, 1095–1131.
- Heathcote, Jonathan, and Fabrizio Perri, 2004, Financial globalization and real regionalization, *Journal of Economic Theory* 119, 207–243.
- Henry, Peter Blair, 2000, Stock market liberalization, economic reform, and emerging market equity prices, *Journal of Finance* 55, 529–564.

- Holmstrom, Bengt, and Jean Tirole, 1997, Financial intermediation, loanable funds, and the real sector, *Quarterly Journal of Economics* 112, 663–691.
- Ilzetzki, Ethan, Carmen Reinhart, and Kenneth Rogoff, 2008, Exchange rate arrangements entering the 21st century: Which anchor will hold?, Working Paper, University of Maryland.
- Imbs, Jean, 2004, Trade, specialization and synchronization, *Review of Economics and Statistics* 86, 723–734.
- Imbs, Jean, 2006, The real effects of financial integration, *Journal of International Economics* 68, 296–324.
- Inklaar, Robert, Richard Jong-A-Pin, and Jakob de Haan, 2008, Trade and business cycle synchronization in OECD countries—A re-examination, *European Economic Review* 52, 646–666.
- Ivashina, Victoria, and David Scharfstein, 2010, Bank lending during the financial crisis of 2008, *Journal of Financial Economics* 97, 319–338.
- Iyer, Rajkamal, and Jose-Luis Peydró, 2011, Interbank contagion at work: Evidence from a natural experiment, *Review of Financial Studies* 24, 1337–77.
- Jayarathne, Jith, and Philip Strahan, 1997, The finance-growth nexus: Evidence from bank branch deregulation, *Quarterly Journal of Economics* 111, 639–670.
- Jimenez, Gabriel, Atif Mian, Jose-Luis Peydró, and Jesus Saurina, 2011, Local versus aggregate lending channels: The effects of securitization on corporate credit supply in Spain, NBER Working Paper 16595.
- Jimenez, Gabriel, Steven Ongena, Jose-Luis Peydró, and Jesus Saurina, 2012, Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications, *American Economic Review* 102, 2301–2326.
- Jotikasthira, Chotibhak, Christian Lundblad, and Tarun Ramadorai, 2012, Asset fire sales and purchases and the international transmission of financial shocks, *Journal of Finance* 67, 2015–2050.
- Kalemli-Ozcan, Sebnem, Herman Kamil, and Carolina Villegas-Sanchez, 2010, What hinders investment in the aftermath of financial crises? *Insolvent firms or illiquid banks?*, NBER Working Paper 16528.
- Kalemli-Ozcan, Sebnem, Simone Manganelli, Elias Papaioannou, and Jose-Luis Peydró, 2009, Financial integration and risk sharing: The role of monetary union, in: Bortosz Maćkowiak, Francesco Paolo Mongelli, Gilles Noblet, and Frank Smets, eds.: *The Euro at Ten: Lessons and Challenges*, European Central Bank, Frankfurt, Germany.
- Kalemli-Ozcan, Sebnem, Elias Papaioannou, and Fabrizio Perri, 2013, Global banks and crisis transmission, *Journal of International Economics* 89, 495–510.
- Kalemli-Ozcan, Sebnem, Elias Papaioannou, and Jose-Luis Peydró, 2010, What lies beneath the euro's effect on financial integration? Currency risk, legal harmonization, or trade, *Journal of International Economics* 81, 75–88.
- Kalemli-Ozcan, Sebnem, Ariell Reshef, Bent E. Sørensen, and Oved Yosha, 2010, Why does capital flow to rich states?, *Review of Economics and Statistics* 92, 769–783.
- Kalemli-Ozcan, Sebnem, Bent E. Sørensen, and Vadym Volosovych, 2010, Deep financial integration and volatility, NBER Working Paper 15900.
- Kalemli-Ozcan, Sebnem, Bent E. Sørensen, and Oved Yosha, 2001, Regional integration, industrial specialization and the asymmetry of shocks across regions, *Journal of International Economics* 55, 107–137.
- Kalemli-Ozcan, Sebnem, Bent E. Sørensen, and Oved Yosha, 2003, Risk sharing and industrial specialization: Regional and international evidence, *American Economic Review* 93, 903–918.
- Kaminsky, Graciela, Richard K. Lyons, and Sergio Schmukler, 2001, Mutual fund investment in emerging markets: An overview, *World Bank Economic Review* 15, 315–340.
- Kaminsky, Graciela, Richard K. Lyons, and Sergio Schmukler, 2004, Managers, investors, and crises: Investment strategies of mutual funds, *Journal of International Economics* 64, 113–134.
- Kaminsky, Graciela, and Carmen Reinhart, 2000, On crises, contagion, and confusion, *Journal of International Economics* 51, 15–38.
- Kaminsky, Graciela, Carmen Reinhart, and Carlos Vegh, 2003, The unholy trinity of financial contagion, *Journal of Economic Perspectives* 17, 51–74.

- Khwaja, Asim Ijaz, and Atif Mian, 2008, Tracing the impact of bank liquidity shocks: Evidence from an emerging market, *American Economic Review* 98, 1413–1442.
- Kose, M. Ayhan, Christopher Otrok, and Eswar Prasad, 2008, Global business cycles: Convergence or decoupling?, *International Economic Review* 53, 511–538.
- Kose, M. Ayhan, Eswar Prasad, Kenneth Rogoff, and Shang-Jin Wei, 2009, Financial globalization: A reappraisal, *IMF Staff Papers* 56, 8–62.
- Kose, M. Ayhan, Eswar Prasad, and Marco Terrones, 2003, How does globalization affect the synchronization of business cycles?, *American Economic Review* 93, 57–62.
- Kraay, Aart, and Jaume Ventura, 2000, Current accounts in debtor and creditor countries, *Quarterly Journal of Economics* 115, 1137–1166.
- Kraay, Aart, and Jaume Ventura, 2007, Comparative advantage and the cross-section of business cycles, *Journal of the European Economic Association* 5, 1300–1333.
- Krugman, Paul, 1991, *Geography and Trade* (MIT Press, Cambridge).
- Kubelec, Chris, and Filipa Sa, 2009, The geographical composition of national external balance sheets: 1980–2005, Working Paper, Bank of England and University of Cambridge.
- La Porta, Rafael, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2008, The economic consequences of legal origins, *Journal of Economic Literature* 46, 285–332.
- La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 1997, Legal determinants of external finance, *Journal of Finance* 52, 1131–1150.
- La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 1998, Law and finance, *Journal of Political Economy* 106, 1113–1155.
- Laeven, Luc, and Fabian Valencia, 2010, Systemic banking crises: A new database, IMF Working Paper No. 08/224, August 2008. Available at: <http://www.luclaeven.com/Data.htm>.
- Lane, Philip R., and Gian Maria Milesi-Ferretti, 2007, The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, *Journal of International Economics* 73, 223–250.
- Lane, Philip R., and Gian Maria Milesi-Ferretti, 2008, International investment patterns, *Review of Economics and Statistics* 90, 518–537.
- Lane, Philip R., and Gian Maria Milesi-Ferretti, 2011, The cross-country incidence of the global crisis, *IMF Economic Review* 59, 77–110.
- Maddaloni, Angela, and Jose-Luis Peydró, 2011, Bank risk-taking, securitization, supervision, and low interest rates: Evidence from the euro area and U.S. lending standards, *Review of Financial Studies* 24, 2121–2165.
- Malcolm, Kyla, Mark Tilden, and Tim Wilsdon, 2009, Evaluation of the economic impacts of the Financial Services Action Plan, CRA International report prepared for the European Commission, Internal Market and Services DG.
- Mendoza, Enrique, and Vincenzo Quadrini, 2010, Financial globalization, financial crises and contagion, *Journal of Monetary Economics* 56, 78–111.
- Mian, Atif, 2006, Distance constraints: The limits of foreign lending in poor economies, *Journal of Finance* 61, 1465–1505.
- Morgan, Donald P., Bertrand Rime, and Philip Strahan, 2004, Bank integration and state business cycles, *Quarterly Journal of Economics* 119, 1555–1585.
- Newey, Whitney K., and Kenneth D. West, 1987, A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix, *Econometrica* 55, 703–708.
- Obstfeld, Maurice, 1994, Risk-taking, global diversification, and growth, *American Economic Review* 84, 1310–1329.
- Ongena, Steven, Jose-Luis Peydró, and Neeltje van Horen, 2012, Shocks abroad, pain at home? Bank-firm level evidence on financial contagion during the 2007–2009 crisis, Working Paper, Universitat Pompeu Fabra.
- Otto, Glenn, Graham Voss, and Luke Willard, 2001, Understanding OECD output correlations, Reserve Bank of Australia Research Discussion Paper No 2001/05.
- Papaioannou, Elias, 2009, What drives international bank flows? Politics, institutions and other determinants, *Journal of Development Economics* 88, 269–281.
- Paravisini, Daniel, 2008, Local bank financial constraints and firm access to external finance, *Journal of Finance*, 63, 2161–2193.

- Paravisini, Daniel, Veronica Rappoport, Philipp Schnabl, and Daniel Wolfenzon, 2011, Dissecting the effect of credit supply on trade: Evidence from matched credit-export data, NBER 16975 Working Paper.
- Pavlova, Anna, and Roberto Rigobon, 2011, International macro-finance, CEPR Discussion Paper 8218.
- Peek, Joe, and Eric Rosengren, 2000, Collateral damage: Effects of the Japanese bank crisis on real activity in the United States, *American Economic Review* 90, 30–45.
- Perri, Fabrizio, and Vincenzo Quadrini, 2011, International recessions, NBER Working Paper 17201.
- Portes, Richard, and Helene Rey, 2005, The determinants of cross-border equity flows, *Journal of International Economics* 65, 269–296.
- Puri, Manju, Jorg Rocholl, and Sacha Steffen, 2011, Global retail lending in the aftermath of the U.S. financial crisis: Distinguishing between supply and demand effects, *Journal of Financial Economics* 100, 556–578.
- Quinn, Dennis P., and A. Maria Toyoda, 2008, Does capital account liberalization lead to growth?, *Review of Financial Studies* 21, 1403–1449.
- Reinhart, Carmen, and Kenneth Rogoff, 2004, The modern history of exchange rate arrangements: A reinterpretation, *Quarterly Journal of Economics*, 119–48.
- Reinhart, Carmen, and Kenneth Rogoff, 2008, Banking crises: An equal opportunity menace, NBER Working Paper No. 14587.
- Reinhart, Carmen, and Kenneth Rogoff, 2009, *This Time Is Different: Eight Centuries of Financial Folly* (Princeton University Press, Princeton, NJ).
- Rice, Tara, and Philip Strahan, 2010, Does credit competition affect small-firm finance?, *Journal of Finance*, 65, 851–889.
- Rochet, Jean-Charles, and Jean Tirole, 1996, Interbank lending and systemic risk, *Journal of Money, Credit and Banking* 28, 733–762.
- Rose, Andrew, 2009, Understanding business cycle synchronization: Is inflation targeting paving the way to Asian monetary union?, Working Paper, University of California–Berkeley.
- Rose, Andrew, and Mark Spiegel, 2004, A gravity model of sovereign lending: Trade, default, and credit, NBER Working Paper 9285.
- Rose, Andrew, and Mark Spiegel, 2010, The causes and consequences of the 2008 crisis: International linkages and American exposure, *Pacific Economic Review*, 15, 340–363.
- Schnabl, Philipp, 2012, The international transmission of bank liquidity shocks: Evidence from an emerging market, *Journal of Finance*, 67, 899–932.
- Staiger, Douglas, and James H. Stock, 1997, Instrumental variables regression with weak instruments, *Econometrica* 65, 557–586.
- Stock, James H., Jonathan H. Wright, and Motohiro Yogo, 2002, A survey of weak instruments and weak identification in Generalized Method of Moments, *Journal of Business and Economic Statistics* 20, 518–529.
- Van Rijckeghem, Caroline, and Beatrice Weder, 2003, Spillovers through banking centers: A panel data analysis of bank flows, *Journal of International Money and Finance* 22, 483–509.
- Wooldridge, Philip D., 2002, Uses of the BIS statistics: An introduction, *BIS Quarterly Review*, March, 75–92.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web site:

Appendix S1: Internet Appendix