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

Sebnem Kalemli-Ozcan, Elias Papaioannou, and Jose Peydro

University of Houston and NBER, Dartmouth College and CEPR, and European Central Bank

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Financial Globalization: Shifting Balances
A key question in international economics and finance: **What is the effect of financial integration on business cycle synchronization?**

Many argue that financial globalization, banks’ international linkages especially, acted as catalysts for the transmission of the 2007–2008 crisis from a corner of the U.S. capital markets to the rest of the world.

**What did we know before 2007–2008 crisis about propagation?** We lack a good understanding of the effect of financial integration on the transmission of productivity and “financial” shocks.

- Elaborate theoretical models
- Empirical studies tend to contradict canonical models
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This Paper: Identification

- Analyze empirically the effect of financial (banking) integration on international output co-movement.
- Address some key open identification issues of previous empirical research
  - Omitted variables
  - Measurement error
  - Reverse causation
  - Underlying shocks
- Identify the one-way effect of financial integration on business cycle synchronization.
  - Sample: 20 advanced economies, period 1978-2007 (pre-crisis)
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Theory

- **Standard IRBC Theory** (e.g. Backus, Kehoe, Kydland, 1992): A higher degree of financial integration leads to less synchronized (more divergent) output cycles
- **Comparative Advantage/Specialization** (Obstfeld, 1995): Cross-border financial integration leads to specialization and to divergent output cycles
- **International Diversification** (e.g. Heathcote and Perri, 2005): Diversification gains are larger when output growth patterns are not much correlated
- **Contagion/Financial frictions** (e.g. Calvo and Mendoza, 1999): Negative financial shock might lead to a withdrawal from all markets
- **Synthesis** (e.g. Holmstrom and Tirole, 1997; Quadrini and Perri, 2009): Opposing effects of shocks; ambiguous effect
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Most country studies document a positive cross-country correlation between financial integration and output co-movement (e.g. Kose et al. 2008).

Most country-pair cross-sectional studies also document a positive cross-country correlation between bilateral financial integration and output co-movement (e.g. Imbs, 2004, 2006; Otto, Voss, and Willard, 2001).
Challenges to Identification

- **Omitted Variable Bias:**
  - Country-pair unobserved/hard-to-account-for factors
  - Global factors (related to other features of globalization)

- Isolating idiosyncratic from common (global/regional) shocks
- Separating productivity from financial shocks
- Reverse causality

- **Measurement Issues**
  - Classical measurement error may not be a major concern
  - Indirect exposure, financial centers
  - Other types of flows/holdings (FDI, FPI)
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Identification using time variation

- Confidential dataset from the BIS on banks’ international bilateral exposure over the past 30 years in a panel of 20 developed countries
  - Account for time-invariant bilateral factors (e.g. culture) via country-pair fixed effects
  - Account for global shocks and trends via time fixed effects

- Focus on high-income countries during last 3 decades (before recent crisis):
  - Minimize parameter heterogeneity and outlier problems since these countries are similar
  - Can separate (roughly) the types of shocks since there was no major financial shock during this period for these countries.
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Empirical Specification: Bilateral Panel OLS

**Question:** Do country-pairs whose banks are more integrated over time experience a higher degree of synchronization of their business cycles?

\[ SYNCH_{ijt} = \alpha_t + \alpha_{ij} + \beta BANKINT_{ijt-1} + X'_{ijt-1}\delta + \varepsilon_{ijt} \]

- \( \alpha_t \): Year fixed-effects (common global shocks)
- \( \alpha_{ij} \): Country-pair fixed-effects (bilateral unobserved or hard-to-account-for factors)
- \( X'_{ijt-1}\delta \): Other controls such as trade

Reverse causation may still drive the estimates.
Measurement error is still an issue (indirect exposure)

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Three alternative measures of synchronization

**1. SYNCH1:** Negative of absolute value of real GDP per capita growth differences between countries \(i\) and \(j\) in year \(t\)

(Giannone, Lenza, and Reichlin, 2009).

\[
SYNCH1_{ijt} \equiv -|\left( \ln Y_{it} - \ln Y_{it-1} \right) - \left( \ln Y_{jt} - \ln Y_{jt-1} \right)| \tag{1}
\]

**2. SYNCH2:** Same as SYNCH1 but look at the deviations from the country and time average growth

(Morgan, Rime, Strahan, 2004)

\[
SYNCH2_{ijt} \equiv -|\nu_{it} - \nu_{jt}| \tag{2}
\]

\[
\ln Y_{it} - \ln Y_{it-1} = \gamma_i + \phi_t + \nu_{it} \quad \forall i, j \tag{3}
\]

**3. SYNCH3:** 5-year correlation of the cyclical component of output of country-pairs

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Regulation, Globalization, Synchronization
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2. **SYNCH2**: Same as SYNCH1 but look at the deviations from the country and time average growth (Morgan, Rime, Strahan, 2004)

   \[
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   \]

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   \]

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   Regulation, Globalization, Synchronization
Evolution of Synchronization

Figure 2: GDP Synchronization across Time

Figure 2 plots the evolution of the average value of each of the three synchronization measures employed in the empirical analysis across the 1978-2007 period. For each year the average is estimated across 190 country pairs (our sample spans 20 countries).

- **SYNCH1** is the negative value of the absolute difference in real p.c. GDP growth between country \(i\) and country \(j\) in year \(t\).
- **SYNCH2** is the negative of the absolute difference of residual real p.c. GDP growth between country \(i\) and country \(j\) in year \(t\).
- **SYNCH3** is the correlation of the cyclical component of real p.c. GDP between country \(i\) and \(j\) in each five-year period (estimated with the Baxter and King Band-Pass filter (2,8)). The correlation is estimated with a five-year rolling window.

See the Supplementary Appendix for the evolution of the three synchronization measures for each of the twenty countries in our sample.
Bilateral Bank Integration Measures

- $BANKINT_{1ijt}$: average value of the (logs) of real bilateral STOCKS - HOLDINGS of bank asset and liabilities normalized with the sum of the population of the two countries.

- $BANKINT_{2ijt}$: average value of the (logs) of real bilateral GROSS FLOWS - TRANSACTIONS of bank assets and liabilities normalized with the sum of the population of the two countries.

According to the aggregate statistics of Lane and Milesi-Ferretti (2009):

- Debt holdings around 67% of the total stock of international positions for our group of countries.
- Banking activities (loans, debt) around 50% of total external positions.
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Figure 1: Banking Integration over Time

Figure 1 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 gross flows of assets and liabilities normalized by the sum of the two countries' population.

Evolution of Banking Integration

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Regulation, Globalization, Synchronization
**Bank Integration and Synchronization: Between Estimates**

<table>
<thead>
<tr>
<th>Dependent variable: Synchronization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchronization Measure</td>
</tr>
<tr>
<td>Bank Integration Measure</td>
</tr>
</tbody>
</table>

| | | |
| Banking Integration | .078*** | .087*** |
| | (.017) | (.023) |

| | | |
| Country-Pair Fixed Effects | no | no |
| Time (Year) Fixed Effects | no | no |
| R² | .100 | .071 |

| | | |
| Observations | 5376 | 5376 |
| Country-Pairs | 190 | 190 |

Sebnem Kalemli-Ozcan, Elias Papaioannou, and Jose Peydro

Regulation, Globalization, Synchronization
## Bank Integration and Synchronization: Within Estimates

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<thead>
<tr>
<th>Synchronization Measure</th>
<th>SYNCH2 BANKINT1</th>
<th>SYNCH2 BANKINT1</th>
<th>SYNCH2 BANKINT2</th>
<th>SYNCH2 BANKINT2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank Integration</td>
<td>.078*** (.017)</td>
<td>−.068*** (.029)</td>
<td>.087*** (.023)</td>
<td>−.082*** (.032)</td>
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<tr>
<td>Country-Pair Fixed Effects</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Time (Year) Fixed Effects</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>R²</td>
<td>.100</td>
<td>.131</td>
<td>.071</td>
<td>.132</td>
</tr>
<tr>
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<td>5376</td>
<td>5376</td>
<td>5376</td>
<td>5376</td>
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Robust result (control trade/spec. patterns, dynamic panel, GDP growth, WLS, outliers such as Luxemburg)

1. Across country-pairs: A positive correlation between banking integration and GDP synchronization
   - In line with previous empirical studies

2. Within country-pairs: A higher degree of bilateral banking integration leads to less synchronized (more divergent) GDP fluctuations.
   - Contrasts previous studies, but supportive to “standard” theory.
OLS: Results Summary

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Although we have dealt with omitted variables (arising from hard-to-account-for time-invariant country-pair factors and common to all countries trends), the panel OLS coefficients may be driven by reverse causation.

Moreover there is a possibility that we have omitted another country-pair time-varying factor (although we do control for trade and production differences).

Measurement error.
  - Non bank flows (FDI, FPI, other investment flows)
  - Indirect exposure
Shortcomings of OLS Estimation

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A heroic approach to account for these issues

Bilateral time-varying IV: Index of legislative-regulatory harmonization policies in financial markets used as an instrument for bilateral banking linkages (using data from Kalemli-Ozcan, Papaioannou, and Peydro JIE 2010)

Legislative-Regulatory Harmonization Policies in Financial Services ⇒ Banking Integration ⇒ Business Cycle Synchronization
Question: Do country-pairs who harmonized their financial markets sooner, experience a higher level of banking integration, which is followed by a higher degree of synchronization of their business cycles?

\[
\text{SYNCH}_{i,j,t} = \alpha_t + \alpha_{ij} + \beta \text{BANKINT}_{ij,t-1} + \mathbf{X}'_{i,j,t-1} \psi + \varepsilon_{i,j,t}
\]

\[
\text{BANKINT}_{i,j,t} = \delta_t + \delta_{ij} + \gamma \text{HARMON}_{i,j,t} + \mathbf{X}'_{i,j,t} \phi + \upsilon_{i,j,t}
\]

- \text{HARMON}_{i,j,t}: Index reflecting the degree of bilateral legislative-regulatory harmonization policies (in the context of EU’s Financial Services Action Plan (FSAP))
Financial Services Action Plan

- FSAP was package of legislative measures to create a single liquid financial market.
- FSAP were mainly contained in a set of EU-wide laws (27 EU Directives and 2 EU Regulations).
  - Directives do not mechanically become enforced across national borders (in contrast to Regulations).
  - EU countries delay the transposition of the Directives into national law.
  - Use information from the Commission on the implementation of each of the 27 Directives of the FSAP.
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Categories of legislative acts

- Banking
- Insurance
- Securities (Corporate law/governance)

Examples:

- Directive on the taking up, pursuit and prudential supervision of the business of electronic money institutions.
- Directive on insider dealing and market manipulation.
(1) Define 27 indicator variables (one for each Directive $k$) that equal one if at any given year both countries in each country-pair cell have transposed the Directive into national law and zero otherwise.

(2) Take the sum of these 27 indicator variables.

$$HARMON_{i,j,t} \equiv \ln \left( \sum_{k=1}^{K=27} LEX_{i,j,t}^k \right)$$
## Reduced Form Estimates

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<tr>
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<td><strong>Dependent variable:</strong> GDP Synchronization (<em>SYNCH2</em>)</td>
<td></td>
<td></td>
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<tr>
<td>Financial Harmonization</td>
<td>-.1246***</td>
<td>-.1380***</td>
</tr>
<tr>
<td></td>
<td>(.0355)</td>
<td>(.0374)</td>
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<td>R-squared (within)</td>
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Regulation, Globalization, Synchronization
### First Stage Estimates

Dependent variable: Banking Integration ($BANKINT2$)

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<tr>
<td>Financial Harmonization</td>
<td>.3146***</td>
<td>.2597***</td>
</tr>
<tr>
<td></td>
<td>(.0523)</td>
<td>(.0498)</td>
</tr>
<tr>
<td>Exchange Rate Regime</td>
<td></td>
<td>−.2221***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0589)</td>
</tr>
<tr>
<td>F-score</td>
<td>36.24</td>
<td>27.22</td>
</tr>
<tr>
<td>Country-Pair Fixed-Effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Time (Year) Fixed-Effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>5376</td>
<td>5376</td>
</tr>
<tr>
<td>Country-Pairs</td>
<td>190</td>
<td>190</td>
</tr>
</tbody>
</table>
Second Stage: Integration and Synchronization

<table>
<thead>
<tr>
<th>Dependent variable: Synchronization (SYNCH2)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Banking Integration (BANKINT2)</td>
<td>−0.4044***</td>
<td>−0.5417***</td>
</tr>
<tr>
<td></td>
<td>(0.1365)</td>
<td>(0.1800)</td>
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<tr>
<td>Exchange Rate Regime</td>
<td></td>
<td>−0.1746***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0726)</td>
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</table>

<table>
<thead>
<tr>
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<th>Panel OLS</th>
<th>Panel IV</th>
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<tr>
<td>F-score</td>
<td>36.24</td>
<td>27.22</td>
</tr>
<tr>
<td>Observations</td>
<td>5376</td>
<td>5376</td>
</tr>
<tr>
<td>Country-Pairs</td>
<td>190</td>
<td>190</td>
</tr>
</tbody>
</table>
### Sensitivity Analysis: Dynamic Panel IV with Controls

Dependent variable: Synchronization \((SYNCH2)\)

<table>
<thead>
<tr>
<th>Banking Integration Measure</th>
<th>BANKINT1</th>
<th>BANKINT2</th>
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</thead>
<tbody>
<tr>
<td>Banking Integration</td>
<td>−.6768***</td>
<td>−.7760***</td>
</tr>
<tr>
<td></td>
<td>(.2331)</td>
<td>(.2743)</td>
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<tr>
<td>Controls</td>
<td>GDP, EU, EURO, EXR, LAGS</td>
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<tr>
<td>F-score</td>
<td>16.08</td>
<td>15.59</td>
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<tr>
<td>Observations</td>
<td>5029</td>
<td>5024</td>
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<tr>
<td>Country-Pairs</td>
<td>190</td>
<td>190</td>
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</tbody>
</table>
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• Surprisingly, cross-country studies find the opposite

• We argued that for identification what is needed is a time-varying measure of financial integration per pair of countries
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To Conclude...

- Standard theory predicts that financial integration leads to a lower degree of business cycle synchronization.
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Using this type of measure for banking integration, we find:

- In the cross-section, a higher degree of financial integration is associated with more synchronized output cycles.
- Within estimates show a higher degree of financial integration is associated with less synchronized cycles.
- The instrumental variable specifications reveal that this negative association is most likely causal and quantitatively important.
  - Explain 20% of the actual variation in synchronization.
  - Pairs that pass 5 identical directives at the same time, experience the median increase in financial integration (50%) and their cycle synchronization decreases by 2 percentage points.
Our Paper

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Policy Implications

- Our results suggest that policy suggestions based on simple time-series or cross-sectional correlations can be quite misleading.

- When productivity shocks are dominant, financial integration leads to less synchronized cycles.

- When credit shocks are dominant, this result can be reversed.

- Future research should analyze the effect of financial globalization on the propagation of the recent financial crisis (a credit shock).
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