The Effects of Financial Integration on Structural Similarity: Consumption Risk-sharing and Specialization

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Abstract
Using panel data for 17 Organization for Economic Co-operation and Development (OECD) countries for the period 1983–2003, this paper investigates the effects of financial integration on specialization and international structural similarity. Theoretically, financial integration motivates countries to specialize on the basis of their comparative advantages and decreases the structural similarity between them. Our empirical analyses support the hypothesis.

JEL classification: E44; F30; F40
Keywords: Financial integration; Consumption risk-sharing; Specialization; Structural similarity

1 Introduction

We focus on the effects of financial integration on specialization and structural similarity. Financial integration motivates each country to specialize on the basis of its comparative advantage. Without an integrated financial market, a country—or consumers assumed to be the stockholders of firms only in their own country—has to diversify its production to smooth consumption. In other words, by diversifying production and smoothing the output, people have to smooth consumption, because domestic consumption is restricted by the domestic output in the absence of a well-integrated financial market. With an integrated financial market, a country—or consumers assumed to be stockholders of firms both in domestic and foreign economies—can smooth consumption without diversifying production. In this case, people prefer to obtain the benefits of specialization by utilizing integrated financial markets for risk-sharing rather than by diversifying production and abandoning the benefits of specialization. This has two important implications for the effects of development of financial markets on economic structures. First, a country specializes its production when its financial market is opened to...
the rest of the world. Secondly, according to the comparative advantages, economic structures diverge when the
financial markets of a pair of countries are integrated. The paper attempts to verify these hypotheses empirically.
Most importantly, this research provides time-series implications of the relationship between financial markets
and economic structures, namely, whether countries specialize and economic structures diverge when financial
markets are integrated, by employing the fixed effect (FE) method with a panel data set. This is not the same
as verifying whether countries with more opened capital markets have more diverse economic structures than
those with less opened capital markets and, thus, economic structures are less similar between such countries—a
question answered by cross-sectional regression analyses. Although the linkage between financial markets
and economic structures in itself is an interesting issue, the reason why we focus on the time-series relationship
relates to the discussion on the optimum currency area (OCA). The OCA theory fundamentally indicates that
a pair of countries with poorly correlated business cycles should not introduce a common currency, because
renouncing the monetary policy autonomy results in further costs for this pair. Given the positive correlations
between structural similarity and business-cycle synchronization, as obtained in works like Calderon, Chong
and Stein (2007), financial integration can reduce the optimality condition for a currency union by diverging
the economic structures. As Imbs (2004) notes, this becomes problematic when a currency union follows
financial integration as in the case of the euro because we cannot assess the validity of the integration processes
by referring to business-cycle correlations before policymakers even begin the processes. This motivates us to
question whether economic structures diverge when financial markets are integrated—a time-series question,
to be exact1). This is the indirect but important policy implication of the research. Several works including Imbs
The paper attempts to provide the time-series implications of the relationship since researchers have not yet
analyzed this aspect.

The remainder of this paper proceeds as follows. Section 2 presents a simple model that describes the effects
of financial integration on specialization and structural similarity. Section 3 introduces the definitions of the
variables employed in the empirical analyses. Section 4 shows the main results and, finally, section 5 provides the
conclusion.

2 Theoretical Background

2.1 Setting of the model

This section introduces the simple model that describes the effects of financial integration on specialization
and structural similarity. The model is the same as that constructed by Saint-Paul (1992). Consider two countries,
each of which have a continuum of consumers endowed with one unit of capital and a continuum of firms

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1) Glick and Rose (2002) state that a time-series question and not a cross-sectional one is the right policy question in a
discussion of the OCA.
endowed with the technical knowledge necessary to undertake production. The numbers of consumers and firms are the same. There are two goods (good 1 and good 2) and the firms in both countries can undertake the production of both these goods. Firms in countries 1 and 2 have the comparative advantage in producing goods 1 and 2, respectively: one unit of capital produces $A(1 - \psi)$ units of good 1 (good 2) or $Af\psi$ units of good 2 (good 1) in country 1 (country 2). $f$ is the degree of the comparative advantage and $0 < f < 1$. When $f$ is small, one unit of capital can produce small amounts of the good that firms have a comparative disadvantage in producing.

From this, it follows that a smaller $f$ indicates stronger comparative advantages. $\psi$ is an index of technological flexibility and represents the degree of the firms' preparations to produce the good with the comparative disadvantage. If $\psi = 0$, the firms in country 1 do not prepare for the production of good 2 at all. This suggests that capital inputs are never utilized to produce good 2 in country 1; in the other words, country 1 fully specializes in the production of good 1. Thus, $\psi$ is regarded as the degree of diversification in each country. $A$ is the output of the good with the comparative advantage when firms fully specialize in its production ($\psi = 0$).

In this model, people live in two periods. In the first period, firms choose a technology $\psi$ and compete to sell shares to consumers. In the second period, a taste shock is realized and consumers decide their demands. Either good 1 or good 2 is demanded, and regardless of which good is demanded, consuming $x$ units of the good yields a utility of $u(x)$. The utility function $u$ is assumed to be increasing in $x$, strictly concave, and continuously differentiable. Further, we assume that $\lim_{x \to 0} u'(x) = 0$. Consumers decide to purchase each good with probability 0.5 and firms understand the probability before the taste shock is realized. Firms sell their output and pay dividends to their shareholders or to consumers who supplied them with capital in the first period.

### 2.2 Independent financial market

When financial markets are not integrated, consumers can invest in firms only in their own countries. All firms choose the same technology $\psi$ at a symmetric equilibrium. Consumption in the second period will be $A(1 - \psi)$ of good 1 with probability 0.5 or $Af\psi$ of good 2 with probability 0.5; it yields an expected utility of

$$\frac{u(A[1-\psi])+u(Af\psi)}{2}. \quad (1)$$

Firms choose a technology to maximize this in the first period. The first order condition is derived as follows:

$$fu'(Af\psi)=u'(A[1-\psi]). \quad (2)$$

Suppose that firms set $\psi$ equal to zero and engage in full specialization. Condition (2) is violated in this case since the left-hand side of (2) approximates to infinity although the right-hand side is $u'(A)<\infty$. Further, the expected utility (1) can be rewritten as $u(A)/2$ when $\psi = 0$, and it is strictly smaller than the case with $\psi > 0$ because of the concavity of the utility function. Hence, $\psi$ must be strictly positive in the equilibrium, implying that there is some technological diversification when the financial markets are independent. In the absence of an integrated financial market, consumption is restricted to the domestic output. Firms are motivated to prepare for the production of both goods because there remains the risk that consumers demand the good that the firms do...
not prepare to produce. This results in technological diversification in both countries.

2.3 Integrated financial market

If financial markets are integrated, consumers can also buy shares of firms in the other country. Suppose \( s \) is the share of the consumers' capital invested in the other country. An expected utility of a consumer in country 1 is

\[
\frac{u[(1-s)A[1-\psi]+sAf\psi]+u[(1-s)Af\psi+sA[1-\psi]]}{2}.
\]

It is clear that a consumer chooses \( s=0.5 \) because he can be fully insured with an income of \( A[1-(1-f)\psi]/2 \) by doing so. For this, (3) can be rewritten as

\[
u\left(\frac{A[1-(1-f)\psi]}{2}\right).
\]

Thus, firms maximize this by choosing \( \psi=0 \), that is, full specialization. People prefer to obtain the benefits of specialization by utilizing integrated financial markets to smooth the path of consumption rather than by diversifying production and abandoning the benefits of specialization. This results in fully asymmetric economic structures between countries 1 and 2.

Saint-Paul (1992)'s simple model has two theoretical implications which we empirically assess in this research. Firstly, a country specializes more when its financial market is more opened to the world. Secondly, according to the comparative advantages, economic structures diverge when the financial markets of a pair of countries are integrated. The next section provides definitions of the measures employed in our empirical analysis.

3 Definition of Measures in the Empirical Analysis

The variables that have been defined in this section are specialization, financial openness, and the real GDP per capita for the first hypothesis, and structural similarity, financial integration, the difference in the real GDP per capita, and trade intensity for the second one. Variables for the first hypothesis are defined for 17 OECD countries for the period 1983-2003. The sample economies in this paper are Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Korea, Mexico, the Netherlands, Portugal, Spain, Sweden, the United Kingdom, and the United States, because we can retain panel data with a relatively long time series for these countries. Variables for the second hypothesis are defined for 136 pairs of these countries. The summary statistics including the number of observations, mean, standard deviation, and the minimum and maximum values are presented in Table 1. The definitions of the measures are based on representative works, for instance, Kalemli-Ozcan, Sørensen and Yoshia (2001), Lane and Milesi-Ferretti (2003), Prasad, Rogoff, Wei and Kose (2003), Imbs (2004), Baxter and Kouparitsas (2005), and Imbs (2006).

2) The sample lengths are mainly restricted by the output data of each industry. These data can be obtained till the year 2003 because they were mainly collected from the OECD STAN database, the latest version of which, released in 2005, only provides data till 2003.
First, we define specialization in production according to the industry-wise output differences in GDP shares between country \( i \) and the average of the other sample economies:

\[
P_{st}^i = -\sum_{n=1}^{N-1} \sum_{j \neq i}^{J-1} (s_{nt} - s_{jt})^2 - (s_{st} - s_{jother}^i)^2,
\]

where \( s_{nt} \) denotes the GDP share of the output of industry \( n \) in country \( i \) at time \( t \). Here, \( N \) is the number of industries and is equal to 16. Definitions of the industries are based on the two-digit International Standard Industrial Classification of All Economic Activities (ISIC). The details are presented in Table 2). \( J \) is the number of sample countries and is equal to 17. The nominal GDP data are collected from the International Financial Statistics (IFS), while the output data for industries are mainly collected from the OECD STAN Database; supplementary data is obtained from the United Nations Industrial Development Organization Industrial Statistics (UNIDO INDSTAT) Database and Eurostat. \( P_{st}^i \) takes 0 when country \( i \) has the same industrial structure as the other OECD economies and takes the value closer to 2 when it specializes more in an industry based on its comparative advantage. The adoption of an alternative measure

\[
\sum_{n=1}^{N} (s_{nt} - \bar{s}_i)^2 (s_{nother}^i - \bar{s}_{jother}) \left[ \sqrt{\sum_{n=1}^{N} (s_{nt} - \bar{s}_i)^2} \sqrt{\sum_{n=1}^{N} (s_{nother}^i - \bar{s}_{jother})^2} \right]^{-1},
\]

where \( \bar{s}_i = \sum_{n=1}^{N} \frac{s_{nt}}{N}, \ s_{nother}^i = \sum_{j \neq i} \frac{s_{nt}}{J-1} \), and \( \bar{s}_{jother} = \sum_{n=1}^{N} \frac{s_{nother}^i}{N} \), does not change the results.

Following Lane and Milesi-Ferretti (2003), we define the financial openness of country \( i \) as

\[
O_i = \frac{FA_i^i + FL_i^i}{GDP_i^i},
\]

where \( FA(L)_i \) refers to the stocks of aggregate foreign assets (liabilities) and \( GDP_i \) is the nominal GDP. \( O_i \) is the

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3) Acquiring time-series lengths is not compatible with retaining digit data higher than 2. We prioritize maintaining the time-series lengths and employ the two-digit classification as this paper mainly aims to obtain the time-series implications.
direct proxy for financial openness which we consider. For the purpose of this research, the FDI appears to be an important element of financial development as it may have direct effects on the economic structures. The results are not changed if we define the financial openness as \( \frac{FA_t^i + FL_t^i + FDIA_t^i + FDIL_t^i}{GDP_t^i} \), where \( FDIA_t^i \) and \( FDIL_t^i \) refer to the stocks of the foreign direct investment (FDI) assets and liabilities, respectively. We have also identified the financial openness based on the de-jure restriction on capital transactions.

\[ O_{i^t} = -CC_t^i. \]  

\( CC_t^i \) denotes the dummy variable, which the IMF reported in the *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER). \( CC_t^i \) takes 1 when capital transactions between country \( i \) and the other countries are restricted at time \( t \), and 0 when unrestricted. \( O_{i^t} \) can be a measurement of financial openness considered here although \( O_{i^t} \) reflects, in contrast to \( O_t^i \), the opportunity for country \( i \) to access the international capital market and smooth consumption. Imbs and Wacziarg (2003) argue that countries with a low GDP per capita tend to be specialized while those with high GDP per capita tend to diversify industrial structures. Thus, we also employ (natural log of) real GDP per capita, \( G_t^i \), as an explanatory variable. \( FA(L)_t^i, FDIA(L)_t^i, \) and \( G_t^i \) are computed by using the data from the IFS CD-ROM.

### 3.2 Structural similarity and bilateral financial integration

Structural similarity is defined based on the similar concept to \( P_t^i \):

\[ S_{ij}^t = 1 - \sum_{n=1}^{N} \left| s_{ij} - s_{ij}^t \right| / 2. \]

\( S_{ij}^t \) takes 1 when country \( i \) has the same industrial structure as country \( j \); this is because in such a situation, \( s_{ij}^t \) is
equal to \( s_i^j \) for all \( n \). Conversely, this measurement takes zero when each country perfectly specializes in different industries. Thus, \( S_i^j \) takes the value closer to 1 when the economic structures of countries \( i \) and \( j \) are more similar.

The adoption of an alternative measure

\[
\sum_{n=1}^{N} (s_{ni}^j - \bar{s}_i^j) (s_{nj}^i - \bar{s}_j^i) \left[ \sqrt{\sum_{n=1}^{N} (s_{ni}^j - \bar{s}_i^j)^2} \sqrt{\sum_{n=1}^{N} (s_{nj}^i - \bar{s}_j^i)^2} \right]^{-1},
\]

where \( \bar{s}_i^j = \sum_{n=1}^{N} s_{ni}^j/N_i \) does not change the results.

We have identified three measures of bilateral financial integration and verified the robustness by using them. The first measure directly focuses on the bilateral asset holdings between a country pair and is defined as

\[
\phi_1^{ij} = \frac{I_{ij}^t + I_{ji}^t}{I_i^t + I_j^t},
\]

where \( I_{ij}^t \) denotes the asset holdings of country \( i \) on country \( j \) and \( I_i^t \) implies the total asset holdings of country \( i \). The use of alternative measurement \((I_{ij}^t + I_{ji}^t)/(I_i^t + I_j^t)\) does not change the results. The data were collected by the IMF in the context of a Coordinated Portfolio Investment Survey (CPIS). The second and third measurements are directly based on the unilateral asset holdings and the \textit{de-jure} restriction on capital transactions \( O_i^t \), respectively:

\[
\phi_2^{ij} = \frac{FA_i^t + FL_i^t}{GDP_i^t} + \frac{FA_j^t + FL_j^t}{GDP_j^t},
\]

\[
\phi_3^{ij} = -(CC_i^t + CC_j^t).
\]

Countries with more opened financial markets are expected to have closer financial linkages with each other. Thus, higher \( \phi_2^{ij} \) reflects that the capital markets in countries \( i \) and \( j \) are more integrated. Further, countries \( i \) and \( j \) have greater opportunities to access the capital market in countries \( j \) and \( i \), respectively, when \( \phi_3^{ij} \) takes a higher value. Therefore, higher \( \phi_3^{ij} \) implies that the capital markets in countries \( i \) and \( j \) are more integrated and that the people have more opportunities to smooth consumptions by lending and borrowing with each other. \( \phi_2^{ij} \) and \( \phi_3^{ij} \) include capital transactions or restrictions with other countries that do not belong to the pair. However, these two measures may have significant linkages with bilateral financial integration between countries \( i \) and \( j \). We assess the robustness of the effects by using these two supplementary measures since \( \phi_1^{ij} \), our best proxy for bilateral financial integration, can be defined only for 1997 and 2001-2003 owing to the lack of data and the inadequate sample length.

Structural similarity may be affected by several variables other than financial integration. Here, two factors are defined. The first candidate is the difference in the real GDP per capita. Imbs and Wacziarg (2003)’s suggestion introduced when we define \( G_i \) implies that the pairs with large differences in GDP per capita have relatively dissimilar structures than those with small differences. Therefore, these effects should be controlled. The measurement is defined as follows.

\[
Y_i^p = |G_i^j - G_i^j|.
\]

\( Y_i^p \) will be higher when the difference in GDP per capita, namely, the difference in the economic levels, is larger.
between countries $i$ and $j$.

The second candidate is bilateral trade intensity. Since country $i$ exogenously increases the imports of specific goods from country $j$, country $j$ is expected to increase the production of that particular good. This may affect the structural similarity between these two economies. The definitions of bilateral trade proxies used here are the same as those used in Frankel and Rose (1998) and Kose and Yi (2006).

\[
T_{ij}^x = \frac{x_{ij} + m_{ij} + x_{ji} + m_{ji}}{x_i + x_j + m_i + m_j},
\]

(13)

where $x_{ij}$ and $m_{ij}$ denote the exports from country $i$ to country $j$ and the imports of country $i$ from country $j$, respectively. $x_i$ and $m_i$ represent the total exports and imports of country $i$. All the data are taken from the Direction of Trade Statistics (DOTS) CD-ROM and are in US dollars. A higher $T_{ij}^x$ indicates greater bilateral trade between countries $i$ and $j$. The adoption of alternative measures $(x_{ij} + x_{ji})/(x_i + x_j)$ and $(m_{ij} + m_{ji})/(m_i + m_j)$ does not change the results.

4 Methodology and Result

This section introduces the methodology of our empirical analyses and presents the results of this research. It also investigates the longer term effects of financial integration on structural similarity and reconsiders the policy implications.

4.1 Methodology

In order to obtain the time-series implications, many literatures including Glick and Rose (2002), Shin and Wang (2004), Shin and Sohn (2006), and Calderon, Chong and Stein (2007) estimate the FE model by using the panel data set. The methodology employed in this paper is based on these works. FE estimations are equivalent to pooled ordinary least squares (OLS) regressions using de-meaned variables, i.e., changes from their average points or time-series variations of variables. As a result of this, the FE method provides us with the exact answer to the right policy question, namely, the effect of the development of financial markets on the specialization and international structural similarity. By using the FE method, the following models will be estimated.

\[
P_i = \alpha_i + \alpha_1 O_i + \alpha_2 G_i + \varepsilon_i,
\]

(14)

\[
S_{ij} = \beta_0 + \beta_1 \phi_{ij} + \beta_2 Y_{ij} + \beta_3 T_{ij} + \xi_{ij},
\]

(15)

where $\alpha_i$ and $\beta_i$ are the parameters of interest and $\varepsilon_i$ and $\xi_{ij}$ are the disturbances. Equation (14) and (15) are estimated to test our first and second hypotheses, respectively. Based on the first hypothesis that financial development motivates a country to specialize on the basis of its comparative advantage, we expect $\alpha_i$ to be positively estimated, while the second hypothesis that bilateral financial integration reduces structural similarity

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4) The research objectives of all the work in the literature differ from those of this study. For example, Glick and Rose (2002) focus on the effects of the currency union on bilateral trade.
implies $\beta_i$ to be negatively estimated.

4.2 Main result

Table 3 and 4 present the main estimation results of Equation (14) and (15), respectively. The independent variables are presented in the first column of the tables. Each column, except for the first, shows the result with a different specification from the others. The specifications listed in (i) do not include the time dummies and time trend. The time dummies are included in (ii) and time trend in (iii). The standard deviations are given in parentheses. *, † and ‡ indicate significance at the 1%, 5%, and 10% levels, respectively. The estimated coefficients and the standard deviations are multiplied by 100.

Table 3 suggests that the financial openness measures $O_1$ and $O_2$ positively affect the specialization index in all the specifications while the coefficients on $G_t$ are not significantly estimated. This implies that financial development motivates countries to specialize, and thus, supports the first hypothesis. These results are almost

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Notes: The table contains the estimation results of Equation (14) using the annual panel data set for 17 sample countries for the period 1983–2003. Neither the time dummies nor time trend is employed in (i). The specifications in (ii) and (iii) adopt the time dummies and time trend, respectively. Each column, except for the first, shows the result with a different specification from the others. The standard deviations are given in parentheses. The estimated coefficients and the standard deviations are multiplied by 100. *, † and ‡ indicate significance at the 1%, 5%, and 10%, levels, respectively.
unchanged even if the time dummies or time trend are included as shown in (ii) and (iii) in Table 3. The value of the adjusted $R^2$ somewhat increases and the significance level of the effects of $O_{it}$ decreases when the time dummies are adopted in the estimation. However, the first hypothesis is still accepted with 10% level of significance even with this specification.

Table 4 shows that the bilateral financial integration measures $\phi_1$, $\phi_2$, and $\phi_3$ negatively affect structural

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<td>$\phi_3$</td>
<td>$-0.65^*$</td>
<td>$-0.63^*$</td>
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| Notes: The table contains the estimation results of Equation (15) using the annual panel data set for 136 sample country pairs for the period 1983–2003 except for the specifications with $\phi_1$—for 1997 and the period 2001–2003 in these cases. Neither the time dummies nor time trend is employed in (i). The specifications in (ii) and (iii) adopt the time dummies and time trend, respectively. Each column, except for the first, shows the result with a different specification from the others. The standard deviations are given in parentheses. The estimated coefficients and the standard deviations are multiplied by 100. * and ** indicate significance at the 1%, 5%, and 10% levels, respectively. |   |   |
| Table 4  |   |   |

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<td>Adj. R-sq</td>
<td>0.24</td>
<td>0.11</td>
<td>0.08</td>
</tr>
<tr>
<td>Obs.</td>
<td>465</td>
<td>2105</td>
<td>2856</td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
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</thead>
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</tr>
<tr>
<td>Obs.</td>
<td>465</td>
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</tr>
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</table>

The INTERNATIONAL ECONOMY No.13, 2009, 50-64
similarity in all the specifications, implying that progress in bilateral financial integration encourages the divergence of economic structures. This means that the second hypothesis of this research is supported empirically. These results remain almost unchanged even if the time dummies or time trend are included as shown in (ii) and (iii) in Table 4, except that the estimated coefficients on $\phi$s are somewhat smaller in (ii) and (iii) than in (i). The coefficients on $Y_{ij}$ are negatively estimated in all cases although the effects are insignificant in the specifications with $\phi_{ij}$. This implies, on the one hand, that the importance of the difference in GDP per capita in explaining the duration of structural similarity, and on the other hand, that the results are statistically less reliable in the specifications with $\phi_{ij}$ than in the other ones because $Y_{ij}$ can be correlated with $\phi_{ij}$. However, including $Y_{ij}$ does not affect the significance of the effects of $\phi$s. The adoption of the time dummies and time trend do not change the results.

In contrast to $\phi$s and $Y_{ij}$, the bilateral trade measure $T_{ij}$ is not significant in most cases. Further, its coefficients are negatively estimated in some cases and positively estimated in other cases. These results suggest, as Shin and Wang (2004) discuss, the necessity for dividing the total trade into two types: inter- and intra-industrial trade. Theoretically, inter-industrial trade may cause the economic structures of a pair of countries to diverge, whereas intra-industrial trade causes them to converge. In our analyses, these two types of trade are not identified and the opposite effects seem to be mixed. This is what leads to ambiguous estimation results. This point can be researched further in future.

### 4.3 Consideration for the relatively long-term effects

In this subsection, the relatively long-term effects are assessed using the frequency modified panel data sets\(^5\). This method is employed since the annual frequency is expected to be short to capture the evolutions of economic structures. It may be better to consider their changes by using frequency data of a longer duration than the annual frequency data. In order to construct the frequency modified panel data sets, the entire sample period is divided into three parts (the 1980s, 1990s, and 2000s). We can obtain $\phi^i$ only for 1997 and 2001–2003, and thus, the entire sample period is divided into two parts—the 1990s and 2000s—when $\phi^i$ is employed.

The divided data are reconstructed in two ways. The first is by simply applying the method described above using the data only in the first years of the sub-samples, that is, 1997 and 2001 for specifications with $\phi^i$ and 1983, 1990, and 2000 for those with $\phi^i$ or $\phi^i$. Table 5 presents the estimation results with this first assessment. In Table 5, the financial integration measures $\phi^i$, $\phi^i$, and $\phi^i$ negatively affect the structural similarity in all the cases, and these effects are always significant. This implies that financial integration lowers the structural similarity in even a term longer than the annual term. The significance levels of the estimated coefficients on $\phi$s are not substantially changed regardless of this assessment except for the result on $\phi^i$, the third column in (ii).

\(^5\) We consider this aspect only for the second hypothesis. This is because the variables for testing the first hypothesis are defined not for country pairs but for countries and the number of observations is not enough to use the method employed here.
The results on the two other variables are also similar to the results in the previous subsection; the effects of the difference in the real GDP per capita are negative in all cases but insignificant in specifications with $\phi_{ij}$, and the bilateral trade measure is not significantly estimated in all specifications. The results remain almost unchanged if we use the data only in the last years of the sub-samples.

Table 5 Estimation results of Equation (15) using the frequency modified data set (first years of the sub-samples)

The results on the two other variables are also similar to the results in the previous subsection; the effects of the difference in the real GDP per capita are negative in all cases but insignificant in specifications with $\phi_{ij}$, and the bilateral trade measure is not significantly estimated in all specifications. The results remain almost unchanged if we use the data only in the last years of the sub-samples.
As the second assessment, we average the data in each sub-sample and estimate equation (15) again. Table 6 presents the results. Further, with this assessment, the results are almost the same as the last two estimations. The significance levels of the coefficients on \( \phi_s \) remain to be the values over 10% although they generally decrease.

<table>
<thead>
<tr>
<th></th>
<th>(i) Baseline estimation</th>
<th></th>
<th>(ii) With time dummies</th>
<th></th>
<th>(iii) With trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \phi_1 )</td>
<td>(-14.22^{*})</td>
<td>(-13.64^{*})</td>
<td>(-9.56^{*})</td>
<td>(-9.18^{*})</td>
<td>(-9.18^{*})</td>
</tr>
<tr>
<td></td>
<td>(5.28)</td>
<td>(5.37)</td>
<td>(4.81)</td>
<td>(4.87)</td>
<td>(4.87)</td>
</tr>
<tr>
<td>( \phi_2 )</td>
<td>(-0.40^{*})</td>
<td>(-0.39^{*})</td>
<td>(-0.32^{*})</td>
<td>(-0.37^{*})</td>
<td>(-0.42^{*})</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.19)</td>
<td>(0.20)</td>
<td>(0.19)</td>
</tr>
<tr>
<td>( \phi_3 )</td>
<td>(-1.45^{*})</td>
<td>(-1.32^{*})</td>
<td>(-1.37^{*})</td>
<td>(-1.33^{*})</td>
<td>(-0.84^{*})</td>
</tr>
<tr>
<td></td>
<td>(0.24)</td>
<td>(0.25)</td>
<td>(0.36)</td>
<td>(0.36)</td>
<td>(0.33)</td>
</tr>
<tr>
<td>( Y )</td>
<td>(-1.93)</td>
<td>(-1.20)</td>
<td>(-1.29)</td>
<td>(-1.33)</td>
<td>(-2.35)</td>
</tr>
<tr>
<td></td>
<td>(2.43)</td>
<td>(0.98)</td>
<td>(2.17)</td>
<td>(1.03)</td>
<td>(3.30)</td>
</tr>
<tr>
<td>( T )</td>
<td>(-5.50)</td>
<td>(-0.06)</td>
<td>8.71</td>
<td>11.25</td>
<td>8.68</td>
</tr>
<tr>
<td></td>
<td>(49.34)</td>
<td>(0.93)</td>
<td>(44.42)</td>
<td>(17.23)</td>
<td>(17.31)</td>
</tr>
<tr>
<td>Adj. R-sq</td>
<td>0.07</td>
<td>0.13</td>
<td>0.26</td>
<td>0.14</td>
<td>0.26</td>
</tr>
<tr>
<td>Obs.</td>
<td>229</td>
<td>348</td>
<td>229</td>
<td>348</td>
<td>229</td>
</tr>
</tbody>
</table>

Notes: The table presents the estimation results of Equation (15) using the frequency modified panel data set as defined for the 136 sample country pairs for the period 1983–2003 in section 3, except for the specifications with \( \phi_{1t} \) for the period 1997 and 2001–2003 in these cases. Neither the time dummies nor time trend is employed in (i). The specifications in (ii) and (iii) adopt the time dummies and time trend, respectively. Each column, except for the first, shows the result with a different specification from the others. The standard deviations are given in parentheses. The estimated coefficients and the standard deviations are multiplied by 100. *, ′, and − indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 6 Estimation results of Equation (15) using the frequency modified data set (first years of the sub-samples)**
with this averaged data set. Thus, the main results are robust.

4.4 Policy implications

The introduction of the paper presented two interesting policy discussions related to this research. Firstly, the issue of whether financial development affects real economic structures is itself important. The countries that consider financial integration with other countries, new members of the EMU or East Asian countries, for instance, should be concerned about whether the integration processes affect their real economies. As theoretically implied in Section 2, financial integration is expected to motivate each country to specialize according to the comparative advantage and to accrue the benefits of efficient resource allocation. Assessing the significance of this effect is the direct policy implication of this research.

The second important topic related to this research is the discussion on OCA. In the OCA literature, business cycle synchronization has been emphasized as an important criterion for a currency union, because renouncing the monetary policy autonomy results in further costs for a pair of countries with poorly correlated business cycles. Thus, if business cycles were synchronized, countries would incur fewer costs in renouncing their own monetary policy autonomy. Since Frankel and Rose (1998)'s discovery of the positive relationship between bilateral trade and synchronization, researchers have been motivated to ascertain the important determinants of synchronization and to empirically investigate the impacts of factors including bilateral trade, structural similarity, and policy coordination. If a pair of countries has a similar industrial structure, their business cycles are expected to be correlated through symmetric industry specific shocks. Works including Imbs (1999) and Calderon, Chong and Stein (2007) empirically support this hypothesis. Given these positive correlations between structural similarity and business-cycle synchronization, financial integration can reduce the optimality condition for a currency union through diverging economic structures. This becomes problematic when a currency union follows financial integration as in the case of the euro, because we cannot assess the validity of the integration processes referring to business-cycle correlations before policymakers even begin the processes. This is the indirect but important policy implication of this research. The importance of focusing on the time-series effects is obvious, as suggested in the introduction.

5 Conclusion

This paper investigated the financial effects on real economic structures and discovered that financial development motivates specialization. Further, we find that economic structures diverge when the corresponding financial markets are integrated. Based on our empirical results, two policy issues related to this research are discussed. For a more meaningful debate on policy, we should consider the welfare impact of financial integration. As suggested by the model in Section 2, efficient resource allocation seems to be the key factor in the linkage between financial development and structures. An important topic concerns the assessment of how
large the gains from reallocation are. With regard to the OCA discussion, the total impact of financial integration on business cycles can also be considered. Financial integration can allow business cycles to be correlated by promoting the contagion effects. Thus, in reality, the overall impact of financial integration on synchronization is not clear. These can be addressed in future research.

References


