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The impact of intra-industry trade on business cycle synchronization in East Asia

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ABSTRACT

This paper empirically analyzes distinctions between intra- and inter-industry trade indices. The research indicates that the co-movements of business cycles are influenced more through the intra-industry trade channel than by the total volume of trade itself. As trade integration among Asian countries increased, business cycle synchronization among these countries was expected to expand through trade transmission. Inter-industry trade resulting in higher specialization will induce less synchronized business cycles, while intra-industry trade could lead to increased business cycle synchronization. Moreover, I find that increased business cycle synchronization, as one of the optimum currency area criteria, is overemphasized.

1. Introduction

The export-oriented growth path of East Asian economies highlights trade as a leading candidate of business cycle transmission. Could Asian emerging economies be decoupled from the European Union (EU) and the United States? How much does international trade transmission affect business cycle synchronization? Would greater trade flows between two countries cause greater business cycle synchronization? This paper analyzes these questions, utilizing standard approaches based mainly on the framework of Shin and Wang (2003). Data from eleven Asian countries, the Euro zone and the United States are used to discuss and determine trade integration and business cycle synchronization.

The discussion of business cycle co-movement originated with a series of correlation studies. The basic measure of co-movement between time series is a classical correlation, which is also commonly used in business cycle correlation research. At the same time, there is a longstanding concern regarding transmission channels through which business cycle fluctuations in one country are transmitted to other countries. The issue of business cycle synchronization is also relevant in the context of the possible formation of a currency union within East Asia, which has been revived in the wake of the Asian Crisis. A great deal of literature has been motivated by the implementation of optimum currency area (OCA)[1] criteria in the context of the pros and cons of regional monetary union or greater regional policy coordination (Willett, Permpoon, & Wihlborg, 2010). Based on the OCA argument of Mundell (1961), my empirical research begins by testing that countries with closer trade links tend to have more tightly correlated business cycles (Frankel & Rose, 1998).

As vertical specialization increases in East Asia, it is expected that the links in business cycles among East Asian countries will become much closer due to sector-specific shocks, although inter-industry trade and intra-industry trade lead business cycles across trading countries to move in opposite directions. We define East Asia to include nine emerging economies (China (Mainland), Hong

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[1] OCA: optimal currency area. According to optimal currency area criteria, trade openness, asymmetry of shocks, factor mobility, wage and price flexibility, financial market integration, product diversification, inflation rates, credibility, fiscal transfers, and political considerations are major criteria, in terms of the costs and benefits of joining a currency union.

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Kong, Taiwan, Singapore, South Korea, the Philippines, Thailand, Malaysia, Indonesia and, one industrial economy (Japan) and India (due to its impressive growth rate). The criteria for selecting this set were data availability and the uncertainty of these countries in other studies as major representatives of Asian emerging economies.

2. Theoretical norms

Theoretically, increased trade can lead business cycles across trading partners to shift in opposite directions (Shin & Wang, 2003). In terms of international trade and cross-country convergence, intra-industry trade, especially vertical intra-industry trade, is the major source contributing to the convergence of business cycles. Statistically, 80% of this convergence is due to vertical intra-industry trade and 20% is due to horizontal intra-industry trade (Luis & Maria, 2007). On one hand, intra-industry trade (within a sector) increases the synchronization of business cycles; on the other hand, cross-sector inter-industry trade results in higher specialization of production inducing less synchronization of business cycles. Furthermore, if sector-specific shocks are dominant, then the degree of the co-movement of output could rise or fall, depending on the nature of the trade (intra- or inter-industry trade).

3. Literature review of standard approaches

3.1. The Frankel and Rose model

Eichengreen (1992), Kenen (1969) and Krugman (1993) argue that as trade linkages increase, greater specialization of inter-industry trade occurs, resulting in less synchronization of business cycles. However, Frankel and Rose (1998) argue that if intra-industry trade is more pronounced than inter-industry trade, business cycles will become more positively correlated as trade become more integrated. They use thirty years of data for twenty industrialized countries and the following regression framework, to test whether countries with closer trade links tend to have more tightly correlated business cycles.

$$\mathrm{Corr}(v,s)_{i,j,t} = \alpha + \beta\ \mathrm{Trade}\ (w)_{i,j,t} + \varepsilon_{i,j,t} \tag{3-1}$$

Corr $(v,s)_{i,j,t}$ denotes the correlation between country i and country j over time span t for activity concept v (corresponding to real GDP, industrial production, employment or the unemployment rate) de-trended with method s (corresponding to fourth-differencing, quadratic de-trending, HP-filtering or HP-filtering on the seasonally adjusted residual).

Trade $(w)_{i,j,t}$ denotes the natural logarithm of the average bilateral trade intensity between country i and country j over time span t using trade intensity concept w (corresponding to total bilateral trade normalized by either total trade or GDP).

$$WT_{ijt} = (X_{ijt} + M_{ijt})/(X_{i,t} + X_{j,t} + M_{i,t} + M_{j,t}) \tag{3-2}$$

$$WY_{ijt} = (X_{ijt} + M_{ijt})/(Y_{i,t} + Y_{j,t}) \tag{3-3}$$

where X_{ijt} denotes total nominal exports from country i to country j during year t, M_{ijt} denotes the total nominal imports from country j to country i during year t, X and M denote total global exports and imports for the corresponding country and Y denotes the corresponding country's nominal GDP.

As pointed out by Frankel and Rose (1998), a simple ordinary least squares (OLS) regression would generate a biased estimation due to an endogeneity problem. Consequently, trading partners are likely to lose the ability to set policies independently of their neighbors and this resulting policy coordination could result in a spurious association between trade intensity and business cycle co-movements (Shin & Wang, 2003). To resolve this issue, instead of using OLS, Frankel and Rose use exogenous determinants of bilateral trade as instrumental variables motivated by a "gravity model" to identify the effect of bilateral trade patterns on income correlations.

3.2. The Shin and Wang model

Shin and Wang (2003) extended Frankel and Rose's seminal contribution, to further identify the channels through which increased trade affects business cycle co-movements by including a large set of explanatory variables such as monetary coordination measured by the correlations of M_2 growth rates and fiscal policy coordination measured by the correlations of government budget over GDP ratio, for twelve Asian countries. They call the four different channels affecting business cycle co-movements as: 1) inter-industry trade, 2) intra-industry trade (Vertical vs. Horizontal), 3) demand spillovers and 4) policy coordination channels.

$$\begin{aligned}\mathrm{Corr}\ (i,j)_t = {} & \alpha_0 + \alpha_1 * \mathrm{Trade\ Intensity}\ (i,j)_t + \alpha_2 * \mathrm{Intra-industry}\ (i,j)_t + \alpha_3 * \mathrm{Fiscal\ Policy\ Coordination}\ (i,j)_t \\ & + \alpha_4 * \mathrm{Monetary\ Policy\ Coordination}\ (i,j)_t + \varepsilon_{ijt}\end{aligned} \tag{3-4}$$

To quantify trade intensity, three measures are used:

$$WX_t(i,j) = X_{ijt}/(X_{it} + X_{jt}) \tag{3-5}$$

$$WM_t(i,j) = M_{ijt}/(M_{it} + M_{jt}) \tag{3-6}$$

$$WT_t(i,j) = (X_{ijt} + M_{ijt})/(X_{it} + M_{it} + X_{jt} + M_{jt}) \tag{3-7}$$