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Business Cycle Synchronization, Value Added Trade, Equity Market Linkages and Industrial Structure

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Abstract

This paper aims to provide a new theory of business cycle synchronization, in a framework that integrates value added trade, equity market linkages and industrial structure. Is there "China Effect" in the transmission of business cycle synchronization? The transmission of business cycle synchronization between China's economy and world economy will be mainly focused on, under globalization background and "New Normal", as China is gradually integrating into the world. Starting from macroeconomic data, through constructing multi-level dynamic factor model, the study combines the traditional economic cycle theory, the international economic cycle theory, the world economic cycle theory and its index system with latest new framework of business cycle model. Considering the characteristics of "New Normal" in China from macroeconomic level to industrial level and firm level, the external and internal impact on China's economy and world economy through international trade, international finance, industrial structure and international policy coordination will be one of the concern to do analysis and reveal the importance of the research on the new features of the world economic cycle fluctuations for the coordination of China's economy and the world economic development. Under the circumstance of sustainable growth in China and world economy, the study of international trade and international financial interdependence will be timely and promising. Accordingly, the research analysis will put forward policy recommendations for China's response to the new characteristics of world economic cycle fluctuations, which has important theoretical significance and practical application value. And at the same time, international economic policy cooperation is promoted greatly. This paper will also discuss China's economic relationship with other emerging Asian countries and with major industrial countries, since it would be interesting to investigate the direction and magnitude of growth spillovers and business cycle synchronization between China and other major players in the world economy for policy implications.

Key Words: Business cycle synchronization, Value added Trade, Industrial Structure, Equity Linkages, Policy implications

JEL Code: E32, F15, F42

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I. Introduction

International trade and international finance are the two major channels of business cycle transmission. Until now, little has been known about how they interact with each other. Recently, the importance of value added trade is increasing in business cycle synchronization. As the interdependence between China and the world economy is increasing, the macro economic variables between China and other economies have obvious synchronization in fluctuations, further driving the international relevance of related policies. China, as the center of the global value chain (GVC) and the world's second largest economy, plays an important role in promoting sustainable development of the global economy. The external and internal impact on China's economy and world economy through international trade, international finance, industrial structure and international policy coordination will be one of the concern to do analysis and reveal the importance of the research on the new features of the world economic cycle fluctuations for the coordination of China's economy and the world economic development.

Is there "China Effect" in the transmission of world business cycle synchronization, under globalization background and new normal economy? China's economy and the interaction with the world economy has been significantly strengthened and enter the stage of two-way feedback period. On the one hand, China is accepting the challenge of international rules so as to enhance the level of internationalization; on the other, China is influencing the world economy and increasing the share of Chinese elements, through the growing economic strength. In this sense, it is meaningful to study the business cycle synchronization and transmission mechanism between China and the world for reasonable policy implications.

Till now, the theoretical and empirical study of China's economy and world business cycle synchronization can be divided into the following three categories. The first one is about correlation analysis. The major concern of correlation analysis include the sustainability, volatility, the degree of correlations between China and the world economy, as well as the evolutionary path of business cycle synchronization and lead-lag relationships. The second category focuses on causal relationship. That is, economic fluctuations between China and the world is a one-way or two-way causality, whether there is a spurious correlation question and so on. The third category concerns the transmission mechanism of China's economy and the world business cycle. That is, through a transmission mechanism, how do China and the world economic fluctuations realize resonance, dynamic path, and the explanatory parts measured by the various decomposition of innovations in their respective economic fluctuations. Based on the previous studies, generally speaking, the major transmission channels cover international trade, international finance and policy cooperation. In the channel of international trade, inter-industry trade and intra-industry trade are classified, and intra-industry trade can be further divided into horizontal-commodity trade and vertical-fragmentation trade.

The outbreak of global financial crisis in 2008 made more and more scholars have realized that financial market integration and the incompleteness of financial market play important role in

the transmission of business cycle synchronization, at the same time, traditional static models are not able to catch the effects of lag variable, so the dynamic models develop gradually. Among them, the dynamic stochastic general equilibrium (DSGE) model is widely used by scholars. Faia (2007) introduces the variable describing the difference of financial market into a two-country DSGE model and find that the greater the difference of the financial market structure in two countries, the lower the business cycle synchronization is. Gourinchas et al. (2007) establish a two-country DSGE model and do systematic analysis of the role of "Valuation Effect" from bilateral asset holding across countries in the current account adjustment. Devereux and Sutherland (2010) use higher order method after introducing characteristics of bilateral asset holding into the two countries DSGE model, and consider adding financial friction in the model to explore the transmission channels of external shocks. Dong-zhou Mei et al. (2012, 2014) introduce intermediate goods trade in a standard DSGE model and discuss current account adjustment with the existence of intermediate goods trade and international business cycle synchronization, etc. The expansion of DSGE models are widely used in the academic study of business cycle synchronization. At the same time, to overcome the limitation of samples and measuring methods, such as bilateral correlation studies and etc., Kose et al. (2008) put forward multiple dynamic factor model based on the Bayesian analysis framework which has the advantage of fitting the multinational sample data at the same time, therefore quickly becoming the international mainstream econometric model of this field. Zi-hui Yang and Lei Tian (2013) apply the classical model to construct three levels of static factors to study China's economy and world business cycle synchronization.

In the empirical literature, there are many milestones. Frankel and Rose (1998) study the bilateral trade intensity and business cycle correlation of 20 developed countries and find that the closer trade ties between two countries, the higher the business cycle synchronization is. However, because this model is unable to separate common shocks from influencing factors, the result triggers controversy on the conclusion of articles. Calderon et al. expand sample size of Frankel-Rose (1998) model by adding developing countries and find that the positive relationship between trade intensity and business cycle synchronization, but the relationship in developed countries are stronger than that in developing countries. Kose and Yi (2006) explore the factors influencing international business cycle synchronization from the perspective of industrial structure similarity and discover that intra-industry trade is more likely to contribute the GDP synchronization than inter-industry trade, considering that different industrial structure in the two countries will make both parties respond in different cycles when facing the same industry shock. The research on the relationship between industrial structure and business cycle synchronization has become a relatively new research field. Some scholars (Imbs, 2004) argue that the higher degree of industrial structure similarity, the higher the business cycle synchronization is. However, other scholars (Cerqueira and Martins, 2009) do not support the conclusion of significant relationship between the similarity of industrial structure and business cycle synchronization. Di Giovanni (2010) uses trade data and industrial level data to analysis the influencing mechanism of

bilateral trade on business cycle synchronization. The conclusion of Giovanni (2010) indicates that the more important the vertical specialization in a certain section, the stronger effect of that section's corresponding industrial trade on business cycle synchronization is. Wu et al. (2009) do research on the impact of FDI on business cycle synchronization and find positive effect of FDI which is more powerful in explaining the changing patterns of business cycle synchronization than the similarity of industrial structure. Hui-fang Chen and Li-jun Cen (2010) develop relatively completed models and do analysis by taking FDI and industrial structure into consideration.

1997-1998 Asian crisis and 2008 global financial crisis make the business cycle synchronization between developing countries and developed countries increases, and at the same time, the impact of financial integration on business cycle synchronization catches great concern. Imbs (2004, 2006) develops system of simultaneous equations to find that the increasing degree of financial integration plays an important role in the transmission of business cycles. But Dees and N. Zorell (2012) conclude that there is no direct impact of financial integration on business cycle synchronization. The studies of Kim et al. (2012), Imbs (2006), and Moneta and Ruffer (2009) conclude that East Asian countries' economies become closer after Asian financial crisis, and the business cycle synchronization increases significantly, which creating a reasonable background for currency and exchange rate cooperation.

To sum up, the existing studies focusing on China and world business cycle synchronization are mainly from macro level and industrial level. Few of them do further in-depth research from relatively micro level, as possible as they can, to explore the effect from "regional heterogeneity " or " firm heterogeneity". In addition, most of the previous research on China and world business cycle synchronization take developed countries' research methodologies as reference and hard to avoid missing "Chinese characteristics".

The rest of the paper is organized as the following. Section II describes the data and models to explore the relationship between China's economy and world business cycle synchronization. Section III presents results to analyze transmission mechanism of China and world business cycle synchronization through different channels. Section IV concludes empirical implications.

II. Data and Models

In December 1978, China introduced the first economic reforms - reform and opening policy. After a period of economic and political instability, a new stage of the reform process was launched by Deng Xiaoping's Southern Tour in 1992. Since then, China has gradually moved towards a full-fledged market economy. The focus of this paper is on the post-1978 Chinese transition, a period characterized by stable and fast growth, a pronounced resource reallocation within the manufacturing sector and new normal economy with “One Belt And One Road” initiative.

First-order autocorrelations can be used to measure the persistence of the country's economy. and the standard deviation can be used to measure the fluctuation of business cycle. The higher the

value of first-order autocorrelation, the more persistent the economy is. Empirical data show that the persistence of China's economy is almost as well as that of United States, but lower than that of United Kingdom and Japan. For the stability of China's economy measured by the standard deviation, China's economy experienced big fluctuations and adjustment which will have negative effect on the stability of the economy on the whole period.

Table 1. 1st-order Auto-correlations and Standard Deviations of Different Economies

	Standard Deviations	1st-order Auto-correlations	Period
World	0.0132369	0.2176	1978-2014
China	0.0269717	0.5261	1978-2014
United States	0.0197957	0.3184	1978-2014
United Kingdom	0.0205748	0.4838	1978-2014
Australia	0.0155983	0.0867	1978-2014
France	0.0147369	0.4049	1978-2014
Germany	0.019926	0.1782	1978-2014
Italy	0.0207385	0.4903	1978-2014
Japan	0.0252167	0.4236	1978-2014
Hong Kong	0.0396768	0.2744	1978-2014
Singapore	0.0403895	0.1414	1978-2014
South Korea	0.0394009	0.2531	1978-2014
Thailand	0.0401012	0.5255	1978-2014
Philippines	0.0333992	0.5061	1978-2014
India	0.0282907	0.0699	1978-2014
Indonesia	0.037481	0.3105	1978-2014
Mexico	0.0369584	0.2458	1978-2014
Malaysia	0.0367179	0.1966	1978-2014
Euro area	0.0168047	0.3810	1978-2014
North America	0.0195358	0.3108	1978-2014
OECD members	0.0151701	0.3488	1978-2014
East Asia Pacific countries	0.0159881	0.2115	1978-2014

Data Source: World databank, World Development Indicators (WDI).

The measure of "instantaneous" business cycle synchronization is adopted throughout this paper, following the original idea of Morgan et al.(2004), in line with recent literature (for instance, Kalemi-Ozcan et al., 2013a, b; Abiad et al., 2013). The instantaneous quasi-correlation of real GDP growth rates of country *i* and *j* in year *t* can be calculated, using annual data — which is the available frequency for value added trade (Romain Duval et al., 2016).

$$QCORR_{ijt} = \frac{(g_{it}-g_i^*)(g_{jt}-g_j^*)}{\sigma_i^g \sigma_j^g} \quad (1)$$

where g_{it}, g_i^*, and σ_i^g denotes the output growth rate of country *i* in year *t*, the mean and standard deviation of output growth of country *i*, respectively, during the sample period. GDP

growth rate is calculated using measures of the log difference of real GDP and data are taken from IMF World Economic Outlook database. For robustness check, other forms of correlation measures will be used, such as Hodrick-Prescott Filtered correlation, Pearson correlation of growth rates and so on.

For bilateral trade intensity measure, based on the conventional definition in the literature, including Frankel and Rose (1998), the terms of value added trade are applied in the measure (Romain Duval et al., 2016).

$$T_{ijt}^{VA} = ln\left(\frac{DVA_t^{ij} + DVA_t^{ji}}{GDP_{it} + GDP_{jt}}\right) \quad (2)$$

where DVA_t^{ij} denotes the total domestic value added exported (both directly and indirectly) from country *i* to country *j* in year *t*. Similarly, for bilateral trade intensity in gross terms is calculated as the following:

$$T_{ijt}^{Gross} = ln\left(\frac{X_t^{ij} + X_t^{ji}}{GDP_{it} + GDP_{jt}}\right) \quad (3)$$

Intra-industry trade index between country *i* and country *j* in time period *T*. The measure derived form the well-known Grubel and Lloyd (1975) will be used as the following with two, three and four-digit level classification from the International Standard Industrial Classification (ISIC) for manufacturing industry.

$$IIT(i,j,T) = \frac{1}{|T|}\sum_{t\in T}\left[\frac{\sum_k(x_{ijt}^k + m_{ijt}^k) - \sum_k|x_{ijt}^k - m_{ijt}^k|}{\sum_k\left(x_{ijt}^k + m_{ijt}^k\right)}\right] \quad (4)$$

where x_{ijt}^k and m_{ijt}^k denote exports from country *i* to country *j* and imports from country *i* to country *j*, in industry *k* in year *t*, respectively.

Intra-industrial trade in value added sense, based on Grubel-Lloyd index of intra-industry trade, is computed through the following equation (Romain Duval et al., 2016):

$$IIT_{ijt}^{VA} = 1 - \frac{\sum_{h=1}^{n}\left|DVA_t^{ij,h} - DVA_t^{ji,h}\right|}{\sum_{h=1}^{n}\left(DVA_t^{ij,h} + DVA_t^{ji,h}\right)} \quad (5)$$

where $DVA_t^{ij,h}$ and $DVA_t^{ji,h}$ denote the total domestic value added exported from country *i* to country *j*, and from country *j* to country *i*, respectively, in industry *h* in year *t*.

$Fiscal\ Policy\ Correlations_{\ t}^{\ ij}$: measured by the correlation of de-trended ratio of general government final consumption expenditure to GDP ratio between country *i* and country *j* in year *t*, using $CORR\left[Govspending_{it}/GDP_{it}, Govspendi\ g_{\ jt}/GDP_{jt}\right]$, instead of using $CORR\left[(G_{it} - T_{it})/Y_{it}, (G_{jt} - T_{jt})/Y_{jt}\right]$ used by Shin and Wang's measure of Fiscal Policy Coordination, because it estimates the active part of changes in the fiscal variable which is what is relevant.

$Monetary\ Policy\ Correlations_t^{ij}$: measured by using the correlation coefficient of the broad money or M_2 annual growth rates across each pair of countries in year *t*. For Eurozone, the broad money annual growth rates are calculated by using simple average of its members (including Austria, Belgium, Cyprus, Finland, Greece, Germany, Italy, Ireland, Malta,

Netherlands, Portugal, Slovak Republic, Slovenia, and Spain). The estimated coefficients are expected to be positive, since countries with similar monetary policies will experience similar business cycles.

$Exchange\ Rate\ Movement_t^{ij}$: exchange rate movement between country *i* and country *j* in year *t*, measured by using *Standard Deviation* (NER_t^{ij}) / *Mean* ((NER_t^{ij}).

ε_{ij}^t: error term in year *t*.

Equity linkages measured by equity returns in China or in advanced countries, such as the United States and European economies. The representative equity indices for China, the United States and the European economies are Shanghai Se Comp, S & P 500 and MSCI-Europe (Developed Markets).

The models include static OLS and dynamic factor decomposition models, in a framework starting from three country model - China, the United States and the European economies. Then, the model including value added trade will be expand to annual data covering 43 countries over 1995-2014, standard errors are clustered at country-pair level in all models to allow for autocorrelation and arbitrary heteroskedasticity for each pair.

OLS estimates baseline econometric specification follows the most recent practice in the literature.

$$QCORR_t^{ij} = \alpha_{ij} + \alpha_t + f\left(TRADE_{t-1}^{ij}, FINANCE_{t-1}^{ij}, CONTROLS_{t-1}^{ij}\right) + \varepsilon_{ij}^t \qquad (6)$$

where $QCORR_t^{ij}$ denotes the instantaneous quasi-correlation which is defined between country-pair *ij* in year *t*. α_{ij} denotes time invariant variables for country-pair *ij*. TRADE, FINANCE and CONTROLS denote bilateral trade intensity integration, financial integration and other control variables in the previous year, respectively.

To employ a Bayesian Dynamic Latent Model, 11 countries within the Asian region were chosen, including the 10 major emerging economies in Asia: China (mainland), Taiwan, Hong Kong, Singapore, South Korea, India, Indonesia, Malaysia, the Philippines, and Thailand, and one industrialized economy: Japan. Two versions for advanced economies are considered: one version is that whether advanced economies, including Japan, affect Asian emerging economies, and the other is that whether the EU and the US affect Asian economies.

Similar to the work done by Kose et al. (2008), macroeconomic fluctuations were decomposed into domestic output, which is measured by the growth of GDP, domestic consumption, domestic investment, gross exports, and gross imports, separated into the following factors:

1. The global factor, which considers fluctuations that are common across all variables and countries;

2. Group-specific factors, which capture fluctuations that are common to all variables and all countries in a given group;

3. Country-specific factors, which are common across all variables in a given country;

4. Idiosyncratic factors specific to each time series, which are residual, not explained by other

factors.

In practice, each series was logged first, then taken first order difference and demeaned by Hodrick-Prescott filter or simple average (as in Otrok & Whiteman, 1998).

Observable variables are denoted by:

$$Y_{it}, \text{ for } i = 1, 2, 3,\ldots, M*N, t = 1, 2, 3,\ldots, T$$

$$Y_{it} = \alpha_i + b_i^{\text{World}} f_t^{\text{World}} + b_i^{\text{Region}} f_{rt}^{\text{Region}} + b_i^{\text{Country}} f_{it}^{\text{Country}} + \varepsilon_{it} \quad (7)$$

$$E\varepsilon_{it}\varepsilon_{j,t-s} = 0 \text{ for } i \neq j; r = 1, 2, 3 \text{ (3 regions); 28 countries}$$

$$\text{Var}(Y_{it}) = (b_i^{\text{World}})^2 \text{ Var}(f_t^{\text{World}}) + (b_i^{\text{Region}})^2 \text{ Var}(f_{rt}^{\text{Region}})$$

$$+ (b_i^{\text{Country}})^2 \text{ Var}(f_{it}^{\text{Country}}) + \text{Var}(\varepsilon_{it}) \quad (8)$$

where Y_{it} is a Q-dimensional vector of the covariance stationary time series at time t ($t = 1, 2, 3,\ldots, T$) for country i ($i = 1, 2, 3,\ldots, M*N$). M is the number of time series per country (e.g. if growth rate of output, consumption, and investment in a set of countries are a three-dimensional vector of Y_{it}, $M = 3$); N is the number of countries. And f_t^{World} denotes a world factor for all countries, f_{rt}^{Region} denotes region-specific factors or regional factors for each region and f_{it}^{Country} denotes country-specific factors for each country. To identify the regional factor of the US, two contingent countries, Canada and Mexico were added to the system. The results of Canada and Mexico are not reported, because they are not the focus here.

The fraction due to the region-specific factor, for example, would be:

$[(b_i^{\text{Region}})^2 \text{ Var}(f_{rt}^{\text{Region}})]/\text{Var}(Y_{it})$, which are similar to the case of Asian countries.

Since recent studies using dynamic factor models only focus on domestic macroeconomic variables representing the real side of the domestic economy, leaving out trade, exports, and imports are added in the Y_{it} vector to find the contributions each factor has on the fluctuations through trade transmission.

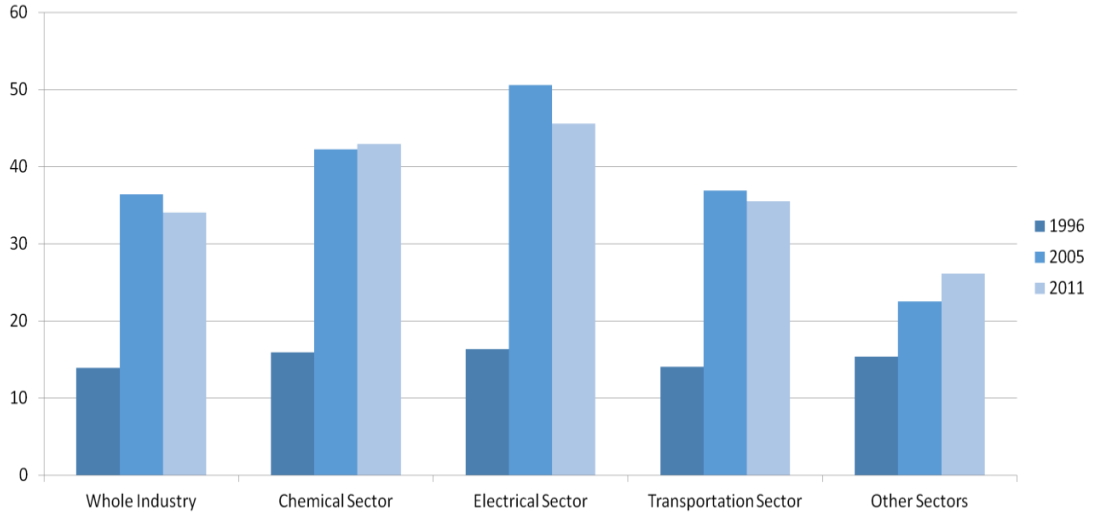
III. Results and Analysis

China's economy and the world economy have long term equilibrium relationship from Granger Causality test results. As the degree of openness increases, the interdependence of China's economy and world economy is increasing, especially after "China Effects" emerges under the background of new normal. "China Effect" could be reflected from three different dimensions. The first one is value added trade through global value chain, the second one is industrial structure which could be measured by intra-industry trade to some extent, and the third one is financial channel through equity market linkages.

Global value chain (GVC) has changed the traditional statistic method of global trade, and the appearance of value added trade has posed new challenges to the existing research on business cycle synchronization through international trade and international financial channels. Based on the data from the 2016 release of WIOD, China's foreign value added part of China's manufacturing exports increase from 1996 to 2005, but decreased slightly for the whole industry,

electrical sector and transportation sector, from 2005 to 2011. The value reaches a relatively high value in 2005 for the whole industry, electrical sector and transportation sector may result from the change of the exchange rate regime — China's Renminbi yuan appreciation. In July 21, the people's bank of China began to implement the exchange rate regime, based on market supply and demand. When Chinese yuan has appreciated 21% against the US dollar, however, China's trade surplus against the United States has increased significantly.

Chart 1. Foreign Value Added Part of China's Manufacturing Exports



Empirical results also imply that the Asian equity markets have more interdependencies with the advanced economy equity markets in the recent financial period than in before. The research on the transmission of business cycle synchronization through international trade, international finance, industrial structure and international policy coordination suggests that it is too soon to conclude that the Asian economies have decoupled from the advanced economies.

Since 2008 global financial crisis, how to form the benign economic linkages of business cycle synchronization through the participation level of the global value chain (GVC) in mutual transactions is a meaningful topic to be explored under the background of world economic integration. China, as the center of global value chain, the control of participation levels in global value chain (GVC) as well as equity markets could avoid negative effects of external shocks.

Generally speaking, the coefficients for intra-industry trade intensity in value added trade version stay positive and at the 1% significance level in most cases. For the trade intensity measures, in most cases, the coefficients of trade intensity remain positive and significant at the 1% significance level. Equity market returns linkages measured by the correlations of equity returns also have significantly positive impact on business cycle synchronization. The coefficients for the control variables—fiscal policy correlation measure, monetary policy correlation measure, and exchange rate movement measure–have, on the whole, the expected signs. The fiscal policy correlation measure consistently keeps a positive coefficient, and it is significant on average at the

5% significance level in the pooling regressions and the panel regressions with random effects. At the same time, the coefficient for the exchange rate movement keeps a negative sign, as expected, consistently and at the 5% significance level, indicating that the exchange rate stability (less variability) makes an important contribution to the business cycle synchronization. The coefficient for the monetary policy measure is not stably positive, although in most cases, it is positive. Negative coefficients for the monetary policy correlation measure appear in some cases, but they are never statistically significant and the sizes of the negative coefficients are relatively small.

For the magnitudes of coefficients, the exchange rate movement measure and the intra-industry trade measure calculated by using value added form IIT have coefficients which are greater than the coefficients for other variables. It means that, ceteris paribus, increased degrees of intra-industry trade and exchange rate stability carry more weight in explaining business cycle synchronization across different countries than other independent variables in the model. At the same time, business cycle synchronization, the dependent variable, is more sensitive to the change of the intra-industry trade index and to exchange rate stability than the change of other explanatory variables in the model. The size of the coefficient for the intra-industry trade index is usually three to six times the size of other variables except for exchange rate movement, while the size of the coefficient for exchange rate movement is usually five to ten times the size of other variables except for the intra-industry trade index.

The control variables—fiscal policy correlation measure, monetary policy correlation measure, and exchange rate movement measure—on the whole, have expected signs. The fiscal policy correlation measure consistently keeps a positive coefficient, and it is significant on average at the 5% significance level in the pooling regressions and the panel regressions with random effects. At the same time, the coefficient for the exchange rate movement consistently keeps a negative sign as expected, and it is significant at the 5% significance level, indicating that exchange rate stability (less variability) makes an important contribution to business cycle synchronization. The coefficient for the monetary policy measure is not stably positive although in most cases, it is positive. While negative coefficients for the monetary policy correlation measure appear in some cases, they are never statistically significant and the sizes of the negative coefficients are relatively small.

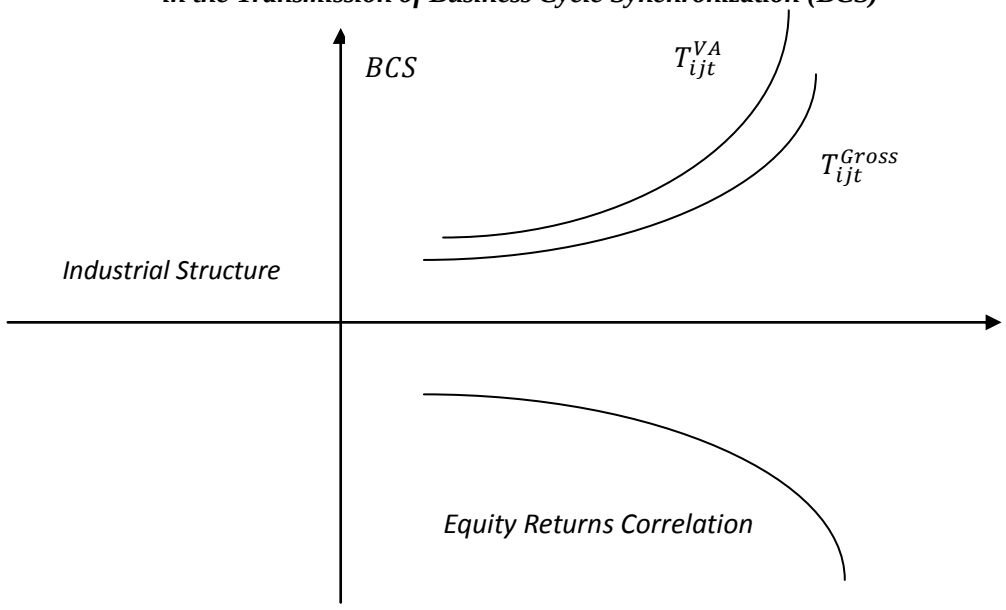
The above analysis shows that co-movements of business cycles are influenced more by the intra-industry trade channel than by the total volume of the trade itself. As for the coefficients for control variables—fiscal policy correlation measure, monetary policy correlation measure, and exchange rate movement measure—they, for the most part, have the expected signs. The coefficient for the monetary policy measure is not stably positive, although in most cases, it is positive. Although negative coefficients for the monetary policy correlation measure do appear in some cases, they are never statistically significant and the sizes of the negative coefficients are relatively small. For the comparison of the coefficients for the three policy correlation measures, the rank for the sizes and the significance level of the three coefficients is the exchange rate

movement > the fiscal policy correlation > the monetary policy correlation.

Table 2. Effects of Trade on Business Cycle Co-Movement among 11 Asian Countries & US & Eurozone (HP-filter Detrended & OLS Panel Regression: Fixed Effects)

	1	2	3	4	5	6
T_{ijt}^{Gross}	0.267*				0.089***	
	(1.26)				(3.42)	
T_{ijt}^{VA}		0.287***				0.068***
		(3.03)				(2.66)
Equity Returns Corr			0.205**		0.185**	0.225**
			(2.61)		(2.61)	(2.61)
IIT_{ijt}^{VA}				1.019***	1.051***	1.053***
				(3.17)	(3.09)	(3.03)
FP corr	0.142	0.140	0.142	0.165*	0.168*	0.168
	(1.42)	(1.38)	(1.40)	(1.74)	(1.74)	(1.71)
MP corr	0.183	0.174	0.171	0.112	0.131	0.126
	(1.50)	(1.41)	(1.38)	(0.96)	(1.10)	(1.05)
NER movement	-0.691	-0.670	-0.650	-0.444	-0.365	-0.369
	(-1.40)	(-1.35)	(-1.29)	(-0.96)	(-0.75)	(-0.75)
constant	0.346***	0.368***	0.338***	0.072	0.048	0.055
	(3.46)	(3.80)	(3.31)	(0.54)	(0.35)	(0.40)
# of observation	193	193	192	198	193	192
R^2_between	0.2404	0.2556	0.2726	0.0811	0.1123	0.1094
R^2_overall	0.1329	0.1323	0.1429	0.1281	0.1465	0.1429
Sigma_e	0.5525	0.5532	0.5546	0.5307	0.5326	0.5352
Sigma_u	0.3297	0.3267	0.3237	0.3576	0.3589	0.3593
rho	0.2626	0.2586	0.2542	0.3122	0.3122	0.3107

Figure 1. Trade Linkages, Industrial Structure and Equity Linkages in the Transmission of Business Cycle Synchronization (BCS)



Industrial Structure Measured by IIT_{ijt}^{VA} or Similarity in Industrial Structure could serve as a bridge to connect trade linkages and equity linkages in the transmission of business cycle synchronization.

IV. Conclusion

"China Effect" has emerged significantly through the transmission channel of value added trade, international finance and international economic cooperation. China will make more contributions to the world economy for sustainable global development, through international coordination of macroeconomic policies. Taking the advantage of global value chain reorganization could upgrade processing manufacturing industry, further expanding the international market. Although the effects of world on China and the effects of China's economy on the world are not symmetric, China is playing a more and more important role in the world economy.

The standard approach model confirms the important role of intra-industry trade, indicating that intra-industry trade has a positive and significant weight in explaining business cycle synchronization. The Asian equity markets have more interdependencies with the advanced economy equity markets in the recent financial period than in before. Compared with the world economy and other major economies in the world, China's business cycle has relatively strong persistence and large fluctuations, which lag behind the world economic cycles. However, China's economy and the world economy have long term equilibrium relationship from Granger Causality test results. Furthermore, world's economic growth has significant impact on China's gross exports and imports, while China's gross exports and imports have limited influence on world economic growth. In addition, FDI inflow also has significant impact on China's GDP growth, but there is around two year lag effect.

As the degree of openness increases, the interdependence of China's economy and world economy is increasing, especially after "China Effects" emerges under the background of new normal. China will make more and more contributions to the world economy for sustainable global development.

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