

Dynamic Correlation Analysis of Business Cycles of Selected Emerging Countries^{*}

Jarko Fidrmuc^I

Iikka Korhonen^{II}

Ivana Batorova^{III}

March 2008

Abstract

We compare the business cycles of China and India with those of selected OECD countries between 1992 and 2006. We find large differences for various frequencies of cyclical developments, which is consistent with the decoupling hypothesis of business cycles of these countries from development in the major OECD countries. More specifically, at business cycle frequencies correlations are typically negative. We find only a weak link between trade and dynamic correlations of economic comovements in emerging Asian countries and OECD. Finally, trade with these large Asian emerging markets lowers the degree of business cycle synchronization within the OECD area.

Keywords: Business cycles, synchronization, decoupling, trade, dynamic correlation.

JEL classification: E32, F15, F41.

^{*} The usual disclaimers apply. We appreciate the research assistance by Yin Xia. We benefited also from comments by Katharina Fidrmuc-Helmstedt, Gerhard Illing, Tomasz Kozluk, Michael Funke, Tuuli Koivu, Aaron Mehrotra Juraj Zeman, Pavol Brunovsky and seminar participants at the Comenius University Bratislava in May 2007, as well as Eiji Ogawa and seminar participants at the Hitotsubashi University Tokyo in December 2007, and Christian Richter and the participants of the INFER Workshop on “Characteristics of Business Cycles: Have they changed?” in Brussels, January 24-25, 2008.

^I Department of Economics and and Geschwister-Scholl-Institute for Political Science, University of Munich, Germany; CESifo; and Comenius University Bratislava, Faculty of Mathematics, Physics and Informatics, Slovakia, e-mail: jarko.fidrmuc@lrz.uni-muenchen.de and jarko.fidrmuc@fmph.uniba.sk.

^{II} Institute for Economies in Transition, Bank of Finland. Postal address: PO Box 160, 00101 Helsinki, Finland, email: iikka.korhonen@bof.fi.

^{III} Comenius University, Faculty of Mathematics, Physics and Informatics, Department of Applied Mathematics and Statistics, Bratislava, Slovakia, e-mail: ivana.batorova@gmail.com.

1 Introduction

Globalization has been one of the major events in the world economy in the last two decades. China and India played only a marginal role in the world economy before the 1990s. While China was a predominantly agrarian economy before 1980, it is now to a large extent a modern industrial economy with booming urban regions. Furthermore, high trade growth was supported by large investment flows (see Eichengreen and Tong, 2005, and Lane and Schmukler, 2007). Not surprisingly, growth in China has changed the distribution of economic activities across the world. Between 1980 and 2006, the share of Chinese GDP in the world economy increased from 1.7% to 5.5% (valued at market exchange rates, the share would be higher if purchasing power adjusted prices were used). Now, China is one of the most important exporting and importing nations worldwide. India seems to follow the development path of China more recently (see Winter and Yusuf, 2007, and Yusuf et al., 2007), although India concentrates more on services than on the manufacturing sector than China. Moreover, in 2006 India's share of the global output was only 1.9%.

New structure of the world economy has also important implications on business cycles around the world. The increasing weights of the emerging countries, especially the trade shares of the largest Asian countries (China and India), have led to higher global growth. Moreover, global economic prospects are less influenced by few large economies (especially the US and Germany) than before. This may make the countries less vulnerable to the demand shocks in a particular region, which is also referred to as decoupling of business cycles in the recent literature (see Kose et al., 2008).

In turn, business cycles have become also more globalized recently. The literature on business cycle synchronization stresses the importance of foreign trade and capital flows. Thus, the emergence of Asian giants (China and India) as large trading nations and targets for international investment is likely to have a significant impact on the business cycles of its partner countries. As far as the intensity of trade and financial relations with the emerging Asian giants is largely different between the countries, the exposure to globalization may possibly explain the recent differences in business cycle developments.

This may be especially important for European countries. On the one hand, we observed a joint EU cycle until the 1980s (see Artis and Zhang, 1997, Fatas, 1997), which may have disappeared despite previous expectations in the 1990s (see Artis, 2003). On the other hand, the exposure to globalization, which can be proxied by trade intensity with China and India, is very different between the EU countries. The UK, Germany, Finland and the

Netherlands are examples of countries linked intensively to South and Southeast Asia, while the remaining countries have rather a moderate intensity of economic relationships with this region.

Trade flows are generally seen as important factors of business cycles. However, their effects on international business cycles are ambiguous. On the one hand, Frankel and Rose (1998) find a robust positive relationship between trade intensity and correlation of business cycles between OECD countries. This reflects also high shares of intra-industry trade between these countries. On the other hand, globalization may result in an increased specialization patterns around the world. Krugman (1993) argues that this is likely to cause business cycle divergence between countries.

There is already a rich literature on trade between South Asian countries and the developed countries (see Bussiere et al., 2008). Other authors look also at the determinants of the business cycles in South East Asia. Among others, a special issue of *World Economy* was devoted to this issue (see de Grauwe and Zhang, 2006). However, there are only few papers about the synchronization of business cycles in developed countries and in emerging economies. The exceptions from this (see Hughes Hallett and Richter, 2008, and Kose et al., 2008) concentrate on the description of stylized facts of business cycles in various regions. This paper extends this discussion with the analysis of factors of business cycle convergence and divergence between OECD countries and the two largest emerging economies in Asia (Asian giants).

The main results of our paper are as follows. First, we show that business cycles in China and India are very different from those of OECD countries, which favors the decoupling hypothesis. Second, trade flows between OECD countries and China have had so far low effects on the comovements in both Asian emerging economies and OECD countries, although surprisingly they have increased the comovements at the short-run frequencies (especially in China). This stands in a contradiction to the positive relationship between trade and business cycle similarities between OECD countries documented well in the earlier literature and confirmed in our paper for the OECD countries. Finally, we show that trade and financial flows have lowered the degree of business cycle synchronization between OECD countries.

The paper is structured as follows. The next section presents a literature survey on determinants of international business cycles with special focus on emerging economies. Section 3 introduces the concept of dynamic correlations between emerging Asia and OECD and discusses the stylized facts and similarities of business cycles in both regions. Section 4

analyses the determinants of dynamic correlation of business cycles in Asian giants and in developed countries. Section 5 investigates the impact of China on the degree of business cycles synchronization between OECD countries and the last section concludes.

2 Determinants of Business Cycle Synchronization

Economic development is determined both by domestic (for example aggregate demand shocks and budgetary policy) and international factors (external demand and international prices for traded goods). In open economies, the latter are playing an increasingly important role and often determine also domestic policies, which try to insulate the economy from adverse external economic shocks. Originally, Frankel and Rose (1998) showed that trade, and more generally economic integration among the countries, can result in increased synchronization of individual business cycles since trade links serve as a channel for the transmission of shocks across countries. In line with these considerations, Kenen (2000) shows in a Keynesian model that the correlation between two countries' output changes increases with the intensity of trade links. In turn, Kose and Yi (2006) analyze this issue in an international real business cycle model and conclude that, although the model suggests a positive relation between trade and output co-movement, quantitatively only small effects are obtained.

However, this hypothesis of positive relationship between trade business cycles was not generally accepted. For example, Krugman (1993) points out that, as countries become more integrated, they increasingly specialize. That is, the importance of asymmetric or sector-specific shocks increases in the process of economic integration. This pattern may be more appropriate for the explanation of business cycles in China.

In the empirical literature, the role of trade links has been studied extensively in this context. Despite theoretical ambiguities, several authors have demonstrated that countries trading more intensively, exhibit also a higher degree of output co-movement (see e.g. Frankel and Rose, 1998, and Baxter and Kouparitsas, 2005). However, it is not trade relations per se which may induce business cycle synchronization. Indeed, Frankel and Rose's hypothesis underlines that bilateral trade is mainly intra-industry trade, although this indicator does not directly enter their analysis. Basically, the idea is that specialization increases the exposure to sector specific shocks and these shocks are transmitted via intra-industry trade. Fontagne (1999) discusses the relation between intra-industry trade and the symmetry of

shocks in a monetary union. Fidrmuc (2004) and Artis et al. (2008) show that intra-industry trade is a better indicator for business cycle asymmetries than simple trade intensities.

As far as China and India specialize vertically, this channel may possibly be less relevant for their business cycles. Actually, the specialization forces discussed by Krugman (1993) can dominate, which can cause divergence of business cycles between the emerging Asian giants and their trading partners.

So far, literature on business cycle correlation has concentrated mainly on developed economies. However, a number of studies have looked at business cycle correlation in Eastern Asia. For example, Sato and Zhang (2006) find common business cycles for the East Asian region. Moreover, Shin and Sohn (2006) find that trade integration (but much less financial integration) enhances the comovements of output in East Asia.¹ Kumakura (2005) finds that the share of electronic products in foreign trade increases business cycle correlation for the countries around the Pacific. Also Shin and Wang (2004) find that trade is a significant determinant of business cycle correlation for East Asian countries. So far, very few papers have looked at the correlation of business cycles between China and other emerging Asian economies and those of the OECD countries. Hughes Hallett and Richter (2008) analyses the declining importance of the USA in Asia. Kose et al. (2008) finds that there has been a convergence of business cycles within the groups of OECD countries and emerging markets (including also non-Asian countries) but a decoupling of business cycles between these two groups.

3 Dynamic Correlation Analysis of Business Cycles in the Asian Giants

The correlation analysis is the most basic approach which has been applied in literature to study the degrees of synchronization between economic variables. The most common measure of co-movement between time series is the classical correlation, which is also commonly used in literature on business cycle correlation. Unfortunately the classical correlation is associated with two main drawbacks: First, it does not allow for a separation of idiosyncratic components and common co-movements. Second, it is basically a static analysis that fails to capture any dynamics in the co-movement. An alternative measure of synchronization in the case of business cycles is the dynamic correlation, which was proposed by Croux et al. (2001).

¹ Kočenda and Hanousek (1998) document a high degree of convergence and integration of the Eastern Asian capital markets.

Let x and y be zero-mean real stochastic processes. Let $S_x(\lambda)$ and $S_y(\lambda)$ be the spectral density functions of x and y and $C_{xy}(\lambda)$ be the co-spectrum, $-\pi \leq \lambda \leq \pi$. So the dynamic correlation, $\rho(\lambda)$, equals to

$$\rho_{xy}(\lambda) = \frac{C_{xy}(\lambda)}{\sqrt{S_x(\lambda)S_y(\lambda)}} \quad (1)$$

Similarly to standard correlation coefficient, the dynamic correlation is defined between -1 and 1.

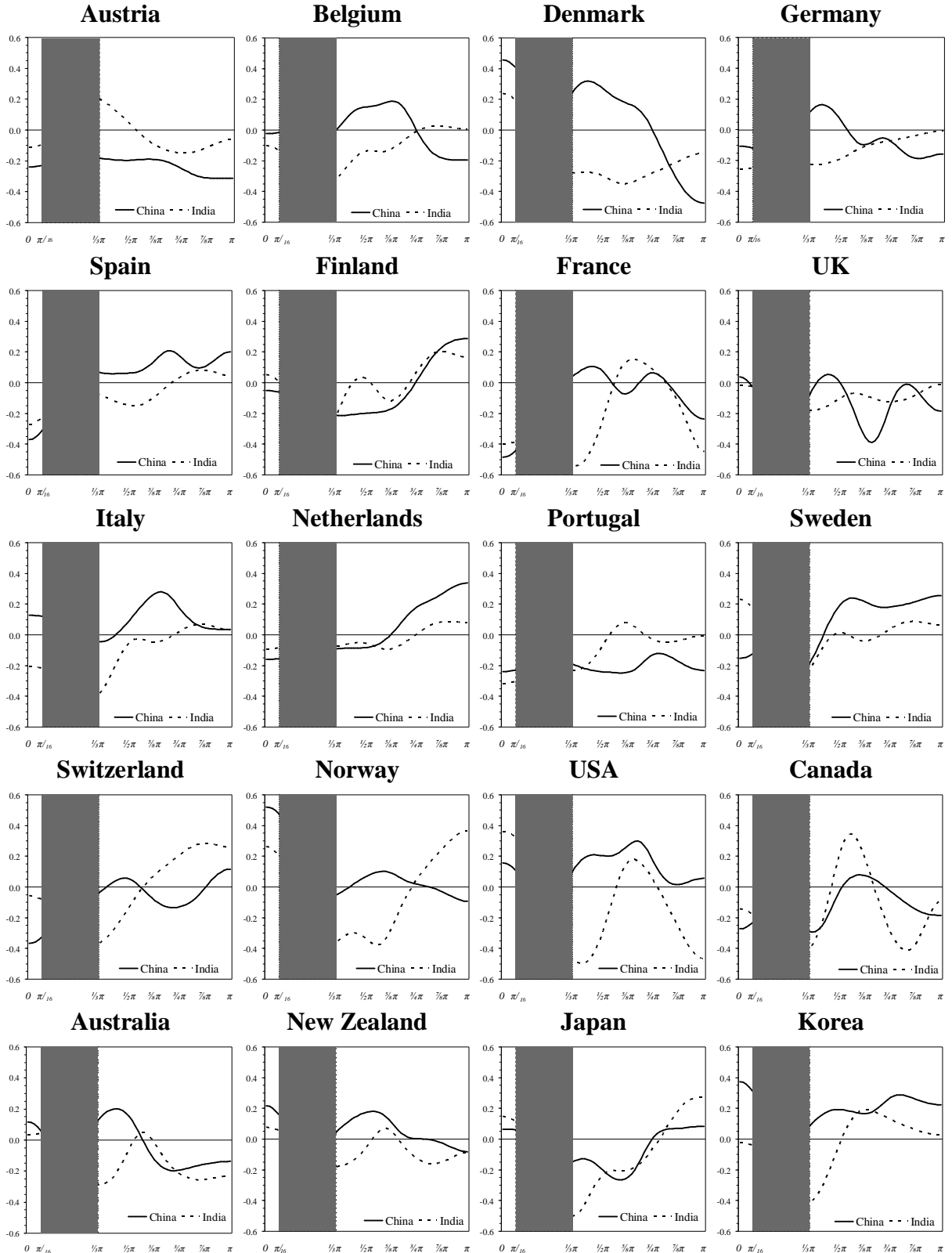
We use quarterly GDP data according to International Financial Statistics of the IMF. For developed countries, the time series start in the 1970s or 1980s. For India, we use IMF data between 1993 and 2006. If seasonal adjustment is required, we use the U.S. Census Bureau's X12 ARIMA procedure, which was performed for the whole available period.

However, it is more difficult to find appropriate quarterly data for China in international sources. Therefore, we use national quarterly data in current prices, which was deflated by the CPI. However, we have to keep in mind that these time series have been subject to a major revision recently. So far, only annual data are available according to the new methodology.² As before, we adjusted this time series by the same procedure as for other countries. Furthermore, the time series start in 1992. This restricts our analysis to the period between 1992 and 2006.

Figure 1 presents dynamic correlations of business cycles in both Asian emerging economies and in selected developed economies between 1992 and 2006. As usual in literature, we differ between three components of the aggregate correlation. First, the long-run movements (over 8 years) correspond to the low frequency band below $\pi/16$. Second, the traditional business cycles (that is, cycles with a period between 1.5 and 8 years) belong to the medium part of the figure (marked as a shadow area) between $\pi/16$ and $\pi/3$. Finally, the short-run movements are defined by frequencies over $\pi/3$. Although it is usual to neglect these developments in literature, we will look at them here because the short-run dependences of economic development may be more important in the case of China and India.

² The impact of the revision on correlations should be moderate if the dynamic properties of the time series remained the same.

Figure 1: Dynamic Correlations of China and India with Selected Countries, 1992-2006



Note: Business cycle frequencies are marked by the shadow area.

We can see that business cycles in Asian emerging economies and selected developed economies vary significantly over the frequencies. In turn, the pattern is remarkably similar for China and India, which contrasts to the pattern of dynamic correlations between developed economies. In particular, the OECD countries show usually high dynamic correlations for the business cycle frequencies and long-term comovements (see Croux et al, 2001).

In general, the pattern of dynamic correlations with the OECD countries is remarkably similar for China and India (see especially the results for the Netherlands, Finland, and Japan). However, dynamic correlations are usually slightly lower for India than for China for the whole interval of frequencies.

Only few countries show comparably high positive correlation of the long-run cycles with China and India. These countries include especially the non-European OECD countries (USA, Korea, Australia, and Japan). To a lesser degree, we can see also small positive correlations of the long-run development in Denmark, Norway, and perhaps the UK. In general, the non-European OECD countries trade more intensively with China than the remaining countries of our sample, which may go towards explaining the extent of business cycle correlation. For India no clear pattern of trade could be discerned.

We can see a more homogenous picture for the traditional business cycle frequencies (between $\pi/16 \approx 0.2$ and $\pi/3 \approx 1$). In general, negative correlations of business cycles in both China and India and business cycles of the OECD countries dominate, which confirms the decoupling hypothesis for both countries. Our results are also similar to the earlier findings by Shin and Sohn (2006) and Sato and Zhang (2006). As before, also the non-European OECD countries show a positive correlation at the lower range of the interval (close to eight years).

Finally, we can see also large differences between various short-run frequencies. In general, the dynamic correlations tend to increase at the right end of the spectrum (see Figure 1), but it reaches positive values usually only in China. This would correspond to strong business linkages between suppliers from China and final producers in the developed countries. Among the European countries short-term correlation appears to be high for Finland, Netherlands and Sweden. For China, the short-run correlations are high also for the USA and Korea, but only marginally positive for Japan. All these countries can be characterized as having highly intensive relationships to China over a longer period. Short-run correlation with the Indian business cycle is positive for Finland, Norway and Switzerland, even though their trade with India is quite low. Therefore, the result may be a statistical artifact, or some other factors are affecting the degree of business cycle correlation.

4 Factors Explaining the Pattern of Dynamic Correlations

In addition of stylized facts of the previous section, we briefly assess trade intensity as a potential determinant of business cycle synchronization between the Asian emerging economies and the OECD countries. In particular, we test whether the extent of foreign trade between a country and the emerging Asian giants influences dynamic correlations at the individual frequencies. The more intensive a country has trade links with the emerging Asian countries, the stronger should be the synchronization of the comovements (especially of business cycles) with the region. Furthermore, the degree of synchronization may be different for different frequencies, because e.g. different economic policies may cause divergence between the business cycles. We use foreign trade data from the IMF's Direction of Trade statistics to calculate the average shares of China and India in exports and imports of the OECD countries between 1995 and 2006. This period captures the rapid growth of China's foreign trade.

In the previous section we calculated the dynamic correlation between the Chinese and Indian GDP growth and growth in 20 OECD countries. As we saw earlier, correlations differ greatly between the OECD countries. Therefore, we estimate the set of following estimations for the dynamic correlation at all frequencies λ ,

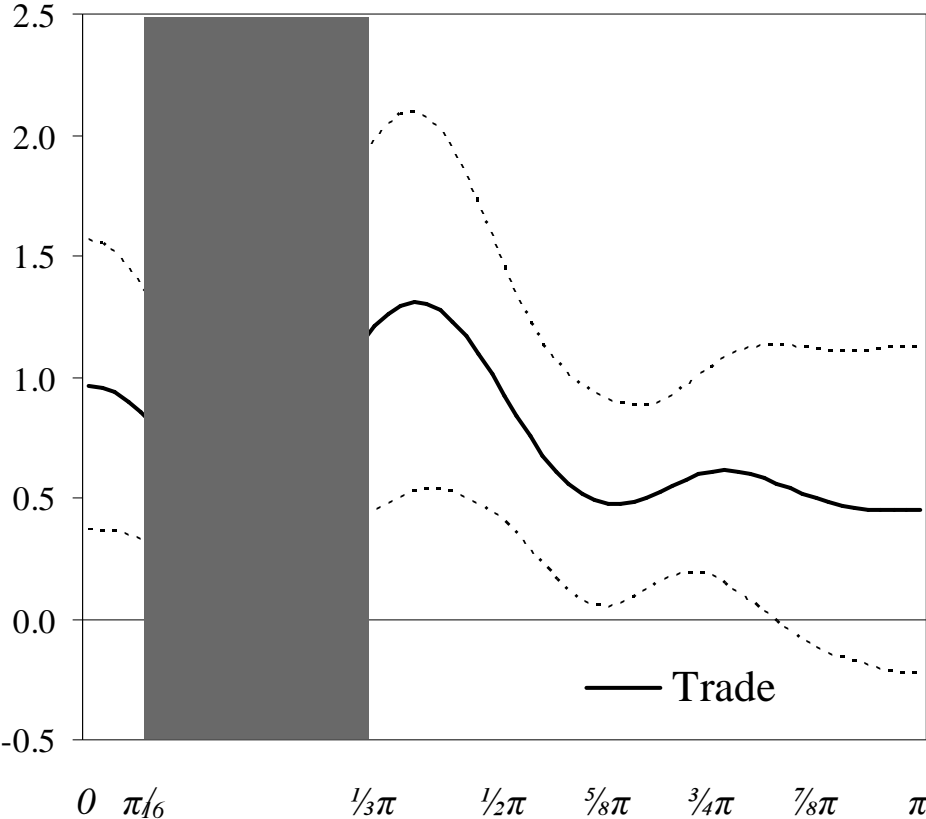
$$\rho_j(\lambda) = \beta_1(\lambda) + \beta_2(\lambda)\log(x_j) + \varepsilon_j(\lambda) \quad (4)$$

Trade intensity is the single explanatory variable, which is denoted by x . It is defined as the ratio of bilateral trade (average of exports and imports) recorded between the OECD country j and the China or India to GDP of the analyzed OECD countries. This indicator shows the importance of both Asian countries from the perspective of the OECD countries. We have 20 observations for all country pairs with China and India, giving 40 observations for each frequency. We present the parameter β_2 for the explanatory variables and the individual frequencies in Figure 2.

Although the results have to be taken very cautiously, the findings confirm largely the stylized facts of the previous section. Integration between the OECD countries and the Asian giants tends to have low but significant effects on dynamic correlation of GDP at the business cycle frequencies. In turn, trade intensity has a positive effect on the correlation of GDP movements at the short-run frequencies (see Figure 2), although it becomes insignificant at the right-hand side of the spectrum. This result stands in a contrast to positive relationship found usually for the OECD countries in the earlier literature following Frankel and Rose (1998), which we also confirmed for dynamic correlations of business cycles of OECD

countries (see the left block of Figure 3). In particular, trade intensity has the highest effects on dynamic correlation at the long-run frequencies for the OECD countries. Thus, we are able to identify some linkages between foreign trade and dynamic correlations. More extensive trade ties do increase business cycle correlation, although the effect seems to be felt mostly in the short-run business cycle frequencies.

Figure 2: Regression Results, Determinants of Dynamic Correlations of Business Cycles of OECD Countries with Business Cycle of the Asian Giants



Note: Confidence bands are constructed as 1.96 standard errors. Business cycle frequencies are marked by the shadow area. For better comparison, explanatory variables have been rescaled to yield coefficients of the same size.

5 Globalization and Business Cycles of OECD Countries

The stylized facts of the previous sections show that the business cycles in China and in the OECD countries are largely not synchronized. Furthermore, the intensity of economic links with China differs largely between the OECD countries. This can influence the business cycles of the individual OECD countries as shown partially in the previous section. In

addition to increased synchronization of movements at particular frequencies, the synchronization between OECD countries may decline as a result of different exposure to the ‘globalization’ shock, which is proxied by the trade of the OECD countries with China and India. Alternatively, different specialization patterns achieved during the globalization period may lead also to increasing dissimilarities in business cycles of the OECD countries despite similar exposure to trade and financial integration with China and other emerging markets.

Therefore, we extend our analysis to the business cycles between the OECD countries. We follow Frankel and Rose (1997) and estimate the following specification for the individual frequencies,

$$\rho_{ij}(\lambda) = \gamma_1(\lambda) + \gamma_2(\lambda)b_{ij} + \delta(\lambda)x_i + \delta(\lambda)x_j + \omega_{ij}(\lambda) \quad (3)$$

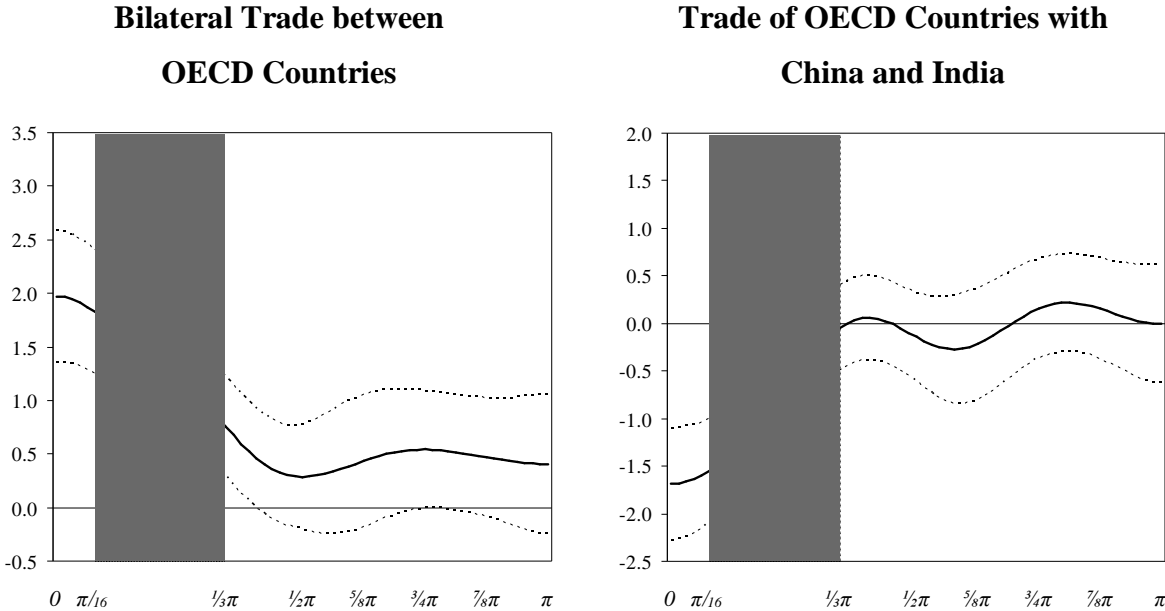
where ρ is the bilateral dynamic correlation at frequency λ and b_{ij} stands for trade to GDP ratio of OECD countries i and j . Furthermore, x represents the trade intensity (the average of exports and imports) with China or India used in the previous section, which is computed as total trade of, for example, an OECD country i with China and India and divided by GDP of countries i . The same definition is used for the exposure of globalization shock in country j . We restrict the coefficient for trade with China or India, δ , to be the same for both countries i and j , as the differences between them are caused by different ordering of the countries in the data matrix (note that we use only one half of the all possible combinations of n countries, because the indicators are the same (except for possible errors in trade statistics) for the country pair i and j as well as for the pair j and i).

Because estimating (3) by OLS may be inappropriate (see Imbs, 2004), we use two stage OLS. This reflects that bilateral trade flows might be influenced by exchange rate policies. Therefore, trade intensities have to be instrumented by exogenous determinants of bilateral trade and financial flows. Such instruments are provided by the well-known gravity model (see, for example, Bussiere et al., 2008) including the log of GDP and GDP per capita, log of distance between trading partners, a dummy for geographic adjacency, countries with a common language, and a dummy for the 15 earlier member states of the EU and the NAFTA.

The results are reported in Figure 3. We can see that the positive relationship between business cycle similarities and the degree of trade integration is fully confirmed for the business cycle frequencies as well as for the long-run frequencies in OECD countries. Somewhat surprisingly, the relationship is positive but no longer significant for the short-run frequencies.

In contradiction to trade integration between OECD countries, Figure 3 shows that the trade intensity with the Asian giants is negative and highly significant especially at the longer-term business cycles frequencies. This pattern is the same if we include China or India in separate regressions, although it seems to be stronger for China.³ This confirms our hypothesis that high intensity of trade and financial links to the Asian emerging economies has a negative effect on country’s synchronization with business cycles of other OECD countries. For the short-run frequencies, the estimated coefficients are insignificant and only in few cases they have positive signs.

Figure 3: Regression Results, Determinants of Business Cycle of OECD Countries



Note: Confidence bands are constructed as 1.96 standard errors. Business cycle frequencies are marked by the shadow area. For better comparison, explanatory variables have been rescaled to yield coefficients of the same size.

6 Conclusions

Globalization has been one of the major events in the world economy in the past two decades. During this gradual process, several emerging countries have gained in economic weight and started to influence economic developments also in other countries. This development has been dominated especially by the Chinese economic growth, supported by export expansion to and investment from developed countries. Within few years, China has become an important factor of growth of the global economy. More recently, this development has been

³ The detailed results are available upon request from authors.

followed by India and possibly also by some other smaller emerging economies. Increasingly, these countries could also influence the business cycles of their trading partners.

We show that the business cycles between the economic development in emerging Asian giants and in developed economies are largely different. Many transnational companies use emerging markets as a part of their production chains and this is especially true for the Asian economies. Despite of this, most developed countries show a negative correlation with China and India for the traditional business cycles (cycles with periods between 1.5 and 8 years), which is generally discussed as decoupling of business cycles. However, many countries show higher correlations of the short-run fluctuations.

It seems that countries, which have more intensive economic relationship with China and India, have also higher dynamic correlation with these economies. This seems to be especially true for the long-term developments. However, trade integration is playing less important role for the convergence of business cycles than documented for business cycles between the OECD countries. In sum, our first results confirm a special position of the emerging Asian giants in the business cycles of the world economy. Despite the increased trade links between the countries, both China and India behave rather differently from the rest of the world economy. This may correspond to the replacement of production from the OECD countries to the emerging Asian economies.

Finally, we show that countries engaged intensively in trade with the emerging Asia tend to have a lower degree of synchronization of business cycles with other OECD countries, although the effects are relatively small especially for the business cycle frequencies. This stands in a contrast to the effects of trade and financial integration between the OECD countries, which show a positive and strong relationship between the degree of synchronization and of business cycles and trade.

References

- Artis, M. J. (2003). *Is there a European Business Cycle?* Working Paper 1053, CESifo, Munich, <http://www.cesifo.de/DocCIDL/1053.pdf>.
- Artis, M. J., Fidrmuc, J. and J. Scharler (2008) 'The Transmission of Business Cycles: Implications for EMU Enlargement', *Economics of Transition*, forthcoming.
- Artis, M. J. and Zhang, W. (1997). 'International business cycles and the ERM: Is there a European business cycle?', *International Journal of Finance and Economics*, 2, 1099-1158.

- Baxter, M. and Kouparitsas, M. A. (2005). 'Determinants of business cycle comovement: a robust analysis', *Journal of Monetary Economics*, 52, 113-57.
- Bussiere, M., Fidrmuc, J. and Schnatz, B. (2008). 'EU enlargement and trade integration: Lessons from a gravity model', *Review of Development Economics*, forthcoming.
- Croux, C., Forni, M. and Reichlin, L. (2001). 'A measure of comovement for economic variables: Theory and empirics', *Review of Economics and Statistics*, 83, 232-241.
- De Grauwe, Paul and Z. Zhang (2006). 'Introduction: Monetary and economic integration in the East Asian region', *World Economy*, 29(12), 1643-1647.
- Eichengreen, B., and H. Tong (2005). Is China's FDI coming at the expense of other countries, Working Paper No. 11335, National Bureau of Economic Research, Cambridge, <http://www.nber.org/papers/w11335>.
- Fatas, A. (1997). 'EMU: Countries or regions?', *European Economic Review*, 41, 753-60.
- Fidrmuc, J. (2004). 'The endogeneity of the optimum currency area criteria, intra-industry trade, and EMU enlargement', *Contemporary Economic Policy*, 22, 1-12.
- Frankel, J. A. and Rose, A. K. (1998). 'The endogeneity of the optimum currency area criteria', *Economic Journal*, 108, 1009-25.
- Fontagne, L. (1999). 'Endogenous symmetry of shocks in a monetary union', *Open Economies Review*, 10, 263-87.
- Hughes Hallett, A. and Richter, C. (2008) 'Measuring Spillover and Convergence Effects in the Asia-Pacific Region: Is the US No Longer the Economy of First Resort?' Mimeo, Loughborough University.
- Imbs, J. (2004). 'Trade, finance, specialization, and synchronization', *Review of Economics and Statistics*, 86, 723-34.
- Kenen, P. B. (2000). 'Currency areas, policy domains, and the institutionalization of fixed exchange rates', Discussion Paper No. 467, London School of Economics, Centre for Economic Performance, London, <http://cep.lse.ac.uk/pubs/download/dp0467.pdf>.
- Kočenda, E., Hanousek J., (1998). 'Integration of Emerging Equity Markets: Major Asian Players', *Korean Economic Review*, 14(1), 99-114.
- Kose, M. A., and Yi, K.-M. (2006). 'Can the standard international business cycle model explain the relation between trade and comovement?', *Journal of International Economics*, 68(2), 267-295.
- Kose, M.A., Otrok, C. and Prasad E. (2008). 'Global Business Cycles: Convergence or Decoupling?' Mimeo. IMF, Washington.

- Krugman, P. R. (1993). 'Lessons of Massachusetts for EMU', in Torres, F. and Giavazzi, F. (eds) *Adjustment and Growth in the European Monetary Union*, Cambridge: Cambridge University Press and CEPR, 241-261.
- Kumakura, M. (2005). 'Trade and Business Cycle Correlations in Asia-Pacific', Institute of Developing Economies Discussion Paper No. 44.
- Lane, P. and L. S. Schmukler (2007). 'International Financial Integration of China and India.' In Winter, L.A., and S. Yusuf (Eds), *Dancing with Giants*. Worldbank, Washington, 101-132.
- Sato, K. and Z. Zhang (2006). 'Real output co-movements in East Asia: Any evidence for a monetary union?', *World Economy*, 29(12), 1671-1689.
- Shin, K. and Y. Wang (2004). 'Trade integration and business cycle co-movements: the case of Korea with other Asian countries', *Japan and the World Economy*, 16, 213-230.
- Shin, K. and C.-H. Sohn (2006). 'Trade and financial integration in East Asia: Effects on co-movements', *World Economy*, 29(12), 1649-1669.
- Winter, L.A., and S. Yusuf (2007). 'Introduction: Dancing with Giants.' In Winter, L.A., and S. Yusuf (Eds), *Dancing with Giants*. Worldbank, Washington, 1-34.
- Yusuf, S., Nabeshima, K. and D.H. Perkins (2007). 'China and India Reshape Global Industrial Geography.' In Winter, L.A., and S. Yusuf (Eds), *Dancing with Giants*. Worldbank, Washington, 35-66.