



Accounting for the economic relationship between Japan and the Asian Tigers[☆]



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ARTICLE INFO

Article history:

Received 11 June 2015

Revised 25 May 2016

Accepted 2 June 2016

Available online 11 June 2016

JEL Classification:

E13.;E32

F41

Keywords:

International business cycles

Business cycle accounting

Productivity

ABSTRACT

This paper applies the business cycle accounting method of Chari, Kehoe and McGrattan (2007) to a two-country, two-good model based on Backus, Kehoe and Kydland (1994) to investigate the economic relationship between Japan and the Asian Tigers from 1980Q1 to 2008Q2. We find that the main driver of long-run shifts and short-run fluctuations in output in each economy is domestic production efficiency. Furthermore, the recent increase in the cross-country business cycle correlation between the two can be attributed to an increase in the cross-country correlation of production efficiencies.

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1. Introduction

Asia's economic landscape has significantly changed since the 1980s. The deepening economic linkages among Asian countries, which refer to the rapid increase in trade and financial linkages among them, have been widely documented. Because of such growing economic ties, these Asian nations, so-called the Asian Tigers, have become the major economic counterparts of the only advanced country in the region, Japan. This development has stimulated scholarly debate about the changes in the cyclical properties of the Asian economy and the changes in economic impact of the Asian Tigers on Japan.

Theoretical predictions about the role of emerging trade and financial integration in business cycle comovements have been ambiguous, which raises an essential empirical question (e.g., Kose et al., 2012). Empirical studies on the degree of cross-country output

synchronization of Asian countries have produced mixed findings.¹ The diverse conclusions appear to stem from differences in econometric methods, country coverage, sample periods, and macroeconomic aggregates.

Our primary focus of this paper is the time-varying effects of Asian Tigers as a unified economic region of Asia, i.e., Korea, Taiwan and Hong Kong, on the Japanese economy.² At the same time, thanks to the two-country model employed in this paper, we can examine the opposite effects, i.e., the time-varying effects of Japan on the Asian region. Unlike the previous empirical studies, we apply the business cycle accounting method of Chari et al., (2007) to a two-country, two-good dynamic stochastic general equilibrium (DSGE) model of Backus et al., (1994). We find that domestic efficiency wedges in each economy are the main drivers of both long-term shifts and short-term fluctuations of output, which are consistent with the current literature on international business cycles.

Business cycle accounting views distortions in markets as wedges in equilibrium conditions derived from a general equilibrium model, and computes the wedges using time series data

[☆] The authors thank Jagjit Chadha, Kazumasa Iwata, M. Ayhan Kose, Tsutomu Miyagawa, Kenji Miyazaki, Andrea Raffo and participants at the ESRI International Conference, Eastern Economic Association Annual Conference, and the Asian Meeting of the Econometric Society for helpful comments. Any remaining errors are our responsibility. Hirata has received financial support for this research under Japan Society for the Promotion of Science Grant-in-Aid for Scientific Research (C) 15K03468. Also Financial support from the Japan Securities Scholarship Foundation is greatly acknowledged during the revision process.

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¹ The survey of empirical literature on business cycle comovements in Asia appears in Section 3.

² Throughout this paper we refer to the Asian Tigers as Korea+Taiwan+Hong Kong and treat them as one country. We omit Singapore, the fourth "Tiger", from our analysis, since crucial data are unavailable, such as Singapore's quarterly total hours worked. Additionally, Singapore's economy is quite small compared to Korea and Taiwan so it does not significantly affect the Asian Tiger's aggregate behavior.

Table 1
Basic Statistics of Japan and The Asian Tigers in 2008Q2.

	Japan	Tigers
Population (Thousands)	110,473	64,188
Population Growth Rate (1980–2008)	0.75%	1.74%
Output per Capita (1990 PPP \$)	6673	6921
Output per Capita Growth Rate (1980–2008)	1.76%	4.41%
Consumption Share of Output	0.501	0.465
Investment Share of Output	0.301	0.285
Government Share of Output	0.162	0.075
Labor Input	0.228	0.261

of the economy of interest. Then it simulates the model using the computed wedges to investigate their economic impact. This method has been used to analyze output fluctuations in Japan and the Asian Tigers separately by employing the closed-economy or the small open-economy models in the literature.³ However, our study is the first to extend this method to open-economy business cycle models of two economies that trade intermediate goods and contingent claims with each other. By employing the business cycle accounting method, we compute the time-series paths of economic disturbances for Japan and the Asian Tigers and investigate their impact on the long-term shifts and the short-term business cycle patterns for these economies as well as their correlation. We then link the model prediction to actual historical events that occurred in the two economies.

Our sample period is from 1980Q1 to 2008Q2, which encompasses a strong, deep, and continually growing mutual economic interdependence between Japan and the Asian Tigers. This period corresponds to the emergence of regional cycles within Asia. Hirata et al., (2013) claim the importance of identifying its sources. This period further includes the important economic events such as the 1997–1998 Asian crisis, the Japanese financial crisis in the late 1990s, and the global IT bubble burst in the early 2000s.

The advantage of our approach is three-fold. First, the 28-year data period allows us to investigate the long-term catch-up period of the Asian Tigers and the medium-term cycles of the Japanese economy simultaneously. Second, by employing quarterly production and expenditure data, we can investigate higher frequency short-term fluctuations by detrending the business cycle accounting results with the Hodrick-Prescott (HP) filter. Third, by applying business cycle accounting to an open economy model, we can investigate the effects of the long-term catch-up of the Asian Tigers on the Japanese economy as well as the short-term business cycle comovement of the two economies.

The remainder of the paper is organized as follows. In section 2, we review the data for Japan and the Asian Tigers – Korea, Taiwan and Hong Kong. In section 3, we briefly survey key studies on business cycle synchronization among Asian countries. In section 4, we describe the two-country, two-good business cycle accounting model. In section 5, we describe our quantitative method and present our results. Section 6 concludes the paper.

2. Facts

Table 1 presents basic economic statistics for Japan and the Asian Tigers for 2008Q2.⁴ In terms of population, the three Asian

³ Kobayashi and Inaba (2006) apply the method to Japan and find that disturbances in production efficiency and the labor market are primarily attributable to the “lost decade.” Otsu and Pyo (2009) conduct BCA on Japan and Korea separately. Otsu (2010a) applies BCA to a small open-economy model for the Asian crisis and shows that production efficiency and labor market disturbances are drivers of Korea’s 1998 output drop.

⁴ Labor Input is defined as employment \times average weekly hours worked per worker normalized by adult population and maximum hours available per week, which is set at 14×7 . See Appendix A for details on the data.

Table 2
Direction of Trade in 2007.

Japan Exports to			Imports from		
1	U.S.	20.1%	1	China	20.6%
2	China	15.3%	2	U.S.	11.4%
3	Korea	7.6%	3	Saudi Arabia	5.7%
4	Taiwan	6.3%	6	Korea	4.4%
5	Hong Kong	5.4%	8	Taiwan	3.2%
			-	Hong Kong	0.2%
Asian Tigers					
Exports to			Imports from		
1	China	35.0%	1	China	28.8%
2	U.S.	14.1%	2	Japan	15.3%
3	Japan	6.5%	3	U.S.	9.0%
4	Singapore	3.2%	4	Singapore	4.0%
5	Germany	3.0%	5	Saudi Arabia	3.5%

Tigers’ population combined is roughly two-thirds that of Japan. Nonetheless, the PPP adjusted per capita real output in 2008Q2 is roughly the same.⁵ However, the annual per capita output growth rate from 1980Q1 to 2008Q2 for the Tigers is much higher (4.41%) than that of Japan (1.76%).

Table 2 shows the strong international trade linkages of Japan and the Asian Tigers in 2007. For Japan, Korea, Taiwan and Hong Kong are the third, fourth and fifth largest export destinations following China and the U.S. The exports from Japan to the Asian Tigers sum up to 19.3% of Japanese total exports which, is only slightly less than that to China. The Japan’s imports from the Tigers comprise 7.8% of its total imports, not a considerable amount, but the Tigers are Japan’s third largest source of imports, following China and the U.S. As for the Tigers, 15.3% of its total imports comes from Japan, which is second only to China. Finally, Japan is the third largest export destination for the Tigers following China and the U.S.

Fig. 1(a) presents the log of per capita output of Japan and the Asian Tigers detrended by 0.44% quarterly linear trend, which is the average growth rate of Japanese per capita output. We consider this the universal growth rate along a balanced growth path for the two. For convenience, we normalize both countries by setting the values of each variable at the terminal period to zero. Japan grew faster than the trend during the late 1980s, known as the “bubble economy” period, and its growth slowed considerably during the 1990s, known as the “lost decade”. Overall, the Asian Tigers grew much faster than the trend throughout the entire period, and experienced a gradual slowdown in recent years. As we will see later, this long run convergence is driven by both capital accumulation and productivity growth.

The business cycle correlations between Japan and the Asian Tigers appear to have increased over the sample period. Fig. 1(b) presents the HP-filtered fluctuations of output in each country. A structural-break test indicates a break in the business cycle correlation in 1996Q1. The correlation for 1980Q1 to 1995Q4 is -0.23 while that for 1996Q1 to 2008Q2 is 0.73. This fact indicates that business cycle dynamics of the two have been changing and exploring the sources of fluctuations is important. Another interesting fact is that the cross-country consumption correlation from 1996Q1 to 2008Q2 is 0.19. The fact that the cross-country correlation of output is greater than that of consumption represents the well-known “quantity anomaly” in international macroeconomics (Backus et al., 1992), suggesting that some force prevents international consumption risk sharing.

⁵ We compare per capita output levels using the PPP adjusted GDP data from the Maddison Project data set from the Groningen Growth and Development Centre.

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