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Financial Cycles and Business Cycles in East Asian Emerging Economies: Features, Interactions, and Changes

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Abstract

The purposes of this paper are to analyze the financial cycles in East Asian emerging economies (South Korea, Hong Kong, Singapore, Taiwan, Thailand, Malaysia, and Indonesia) and examine synchronizations between the business and financial cycles therein. The main question posed by this paper is what strengthens the synchronization of business and financial cycles? Our hypothesis is that economies with more highly developed household credit see a higher degree of synchronization between financial and business cycles. Our findings, obtained in terms of a concordance index between cycles after identifying financial and business cycles, are that the patterns of changes in the degree of synchronization vary across economies and that the degree of synchronization between output cycles and credit, housing-price, or equity-price cycles has increased in the 2000s at a rate exceeding that in the 1980s and 1990s for economies with more highly developed household credits, for example, South Korea, Hong Kong, and Malaysia.

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1. Introduction

Recent global financial crises have led researchers and policymakers to pay greater attention to the linkage between financial activities and real activities. Financial crises have often coincided with booms and busts in credit markets, and/or asset markets (IMF, 2000), ever since financial markets became more liberalized in the early 1980s.[1] When financial market imperfections exist, intense fluctuations in asset prices can play significant roles in business cycles. In developed and emerging economies alike, we have often witnessed economic recessions being accompanied by a significant fall in asset prices, especially following several periods of asset-price boom. Indeed, some well-known cases are the savings and loans crisis in the United States in the 1980s, the crash of the bubble market in Japan in the 1990s, and the crash of the dot-com bubble in the United States in 2000.

Some emerging economies also experienced the Asian economic crisis in the 1990s. Before that crisis in 1997–1998, the financial system in East Asia had two prominent features: bank-centered financial intermediation and corporate-focused lending (Mohanty and Turner, 2010). However, these financial intermediation features have since changed. The investment decline of the corporate sector was prolonged following the crisis; the corporate sector decreased its bank borrowing and often shifted from external finance to internal finance. Mohanty and Turner (2010) find that while the corporate sector has moved away from bank credit, the bank sector has expanded its provision of credit to the household sector. Indeed, in South Korea, Malaysia, and Indonesia, the share of credit going to the household sector has increased from about 25 percent of all credit in the 1990s to about 50 percent in 2005 (Mohanty and Turner, 2010). Similar changes have been seen in other emerging Asian economies. How have changes in the patterns of financial intermediation affected interaction between financial and business cycles? Household credit has mainly been used in housing and consumer loans; under such conditions, housing assets have become major components of household assets.

The purposes of this study are to analyze financial cycles and to examine synchronizations between business cycles and financial cycles in seven East Asian emerging economies over the last three decades.[2] The following are the main questions posed by this study: What have been the basic features of financial cycles in emerging Asian economies over the last three decades? Have the financial cycles changed over time? How strong are the links between financial and business cycles in emerging Asian economies? Have the links between business and financial cycles changed over

[1] Although financial markets were highly regulated from the Great Depression until the 1980s, a deregulation of financial markets began in the early 1980s in many developed and emerging economies. As deregulation, globalization, and innovation in the financial markets have progressed over the last three decades, financial crises have become more frequent.

[2] The sample economies are South Korea, Hong Kong, Singapore, Taiwan, Thailand, Malaysia, and Indonesia; the Philippines was not examined owing to a lack of data availability for housing price. Also, our sample does not include China and India because housing-price fluctuations within each of these two economies vary considerably on account of the vastness of the economies.

time—and if so, why and how? This study focuses on cycles in the housing, equity, and credit markets, that is, housing-price, equity-price, and credit cycles. We detect cycles using quarterly series over the 1981Q1–2011Q2 period. Our hypothesis vis-à-vis our main question is that emerging Asian economies with more strongly developed household credit provisioning may have strengthened synchronization between the financial and business cycles in the 2000s, following the Asian crisis. To examine the degree of synchronization, we use concordance statistic proposed by Harding and Pagan (2002), which is useful in determining the degree of synchronization between cycles.

Many studies examine intense contraction phases in financial or business cycles or the situations before and after financial crises. This study focuses on both contraction phases and expansion phases in financial and business cycles. Understanding of financial cycles and synchronization between business and financial cycles is still limited. Claessens, Kose, and Terrones (2011b) analyze financial cycles and the interactions between financial and business cycles in a large sample that includes both developed and emerging economies. Although the current study's interests are similar to those of Claessens et al. (2011b), it differs from Claessens et al. in two respects: the first pertains to the sample economies, and the second, to the methodology used to identify business and financial cycles. This study focuses on emerging economies in East Asia; because our sample economies have grown greatly over the last three decades, we employ not a classical cycle, but a growth cycle, which is identified in terms of deviations from trends.[3]

This paper is organized as follows. In the next section, we review the literature related to business and financial cycles and determine the linkage between financial and real economies. In the third section, we introduce our methodology for identifying cycles and examining interactions across cycles. In the fourth and fifth sections, we present the features of business and financial cycles, and examine the interaction between business and financial cycles. Finally, in the concluding section, we discuss the limitation of this study.

2. Related literature: financial cycle and financial–real economy linkage

2-1. Financial cycle

A financial cycle is generally defined as a pattern of movement in a series that represents the state of a financial market. Many studies focus on the equity market, housing market, or credit market. Claessens, Kose, and Terrones (2011a) analyze financial cycles in 21 advanced OECD countries over the 1960–2007 period, wherein cycles in housing price, equity price, and credit series are detected by methods widely employed with respect to the business cycle. They find the following basic features of financial cycles. In terms of the length of cycles, financial upturns tend to be longer than downturns: financial downturns last about four to six quarters on average, while financial upturns vary across

[3] Claessens et al. (2011a, 2011b) employ a classical cycle approach to identify business and financial cycles. A classical cycle approach is based on the series level.

markets. Upturns are the longest in equity prices, lasting seven quarters on average; the shortest are in credit, lasting four quarters, although upturns in equity prices have become shorter over time. In terms of strength, downturns in equity prices have been much stronger than those in housing prices or credit; the strength of the upturns has generally matched that of the downturns. In terms of synchronization, credit and housing cycles have been highly synchronized within countries, while equity and housing cycles have become more synchronized across counties.

Are there any differences in the features of financial cycles between developed and emerging economies? Claessens et al. (2011b) present the financial cycles of equity prices, housing prices, and credit in 23 emerging economies, including Asian emerging economies, and those of 21 advanced countries. They find differences in the features of financial cycles between these two sets of economies. Downturns are not necessary longer, but they are much sharper in emerging economies than in advanced economies. Equity upturns are much longer in advanced economies than in emerging economies, while credit upturns are much longer in emerging economies.[4] Equity prices in advanced economies and credit in emerging economies both seem to have upward trends.

2-2. Empirical literature: synchronization between business and financial cycles

How can the degree of synchronization between two cycles be measured? Harding and Pagan (2006) propose a concordance index for measuring the degree of synchronization between two cycles. In that concordance index, one examines the ratio of periods in which two series coincide in the same phases of cycles, across all sample periods. Some studies that focus on the synchronization of cycles often use the index (e.g., Avouyi-Dovi and Matheron, 2005; Avouyi-Dovi, Kierzenkowski, and Lubochinsky, 2006; Cotis and Coppel, 2005; Claessens, Kose, and Terrones, 2011b). Avouyi-Dovi and Matheron (2005) examine the links between business and stock market cycles among developed economies, based on the sample period of 1978Q1–2002Q3; they use two approaches to measure co-movements between them. They find a strong dependent link between them, but only in the United States—that is, no link is found in France, Germany, the United Kingdom, or Italy.

Recent studies have focused on interactions between housing price and business cycles in developed economies (IMF, 2006; IMF, 2008; IMF, 2011; Bracke, 2011). The International Monetary Fund (IMF) (2008) suggests that innovations in housing finance systems in advanced economies have strengthened the role of the housing sector in the business cycle, by virtue of housing wealth effects and financial accelerator effects. Bracke (2011) analyzes the duration of housing-price cycles in the last 40 years among OECD countries, including South Korea. He detects housing-price cycles by

[4] According to Claessens et al. (2011b), the durations of upturns and downturns within cycles are as follows. For developed economies, the durations of upturns and downturns are 14.2 and 8.4 quarters in housing-price cycles, 21.9 and 6.6 quarters in equity-price cycles, and 8.0 and 5.5 quarters in credit cycles. Likewise, for emerging economies, the durations are 8.2 and 7.9 quarters in housing-price cycles, 12.3 and 5.9 quarters in equity-price cycles, and 12.6 and 6.6 quarters in credit cycles.

using a classical cycle approach that is based on the level of the housing-price series. He finds that, on average, upturns last longer than downturns, but the difference disappears once one excludes the most recent housing upturn.

The studies that analyze emerging economies thus are still small in number. Phang (2002) examines the links between housing prices and aggregate consumption in the case of Singapore. He concludes that the results of recent studies of OECD countries—in which housing wealth change was found to have a positive effect on aggregate consumption—cannot be generalized to Singapore. Claessens et al. (2011b) investigate interactions between business and financial cycles and detect business and financial cycles in 21 advanced and 23 emerging economies over the period of 1960Q1–2007Q4. As mentioned, they employ three measures—namely, credit, house price, and equity price—as financial cycles. In calculating the concordance index between business and three different financial cycles, they find that in developed economies, the business cycle tends to exhibit a high degree of synchronization with cycles in credit and housing price. Moreover, they also find that in emerging economies, the business cycle tends to synchronize not only with the credit cycle but also with the equity-price cycle. However, the statistical significance values of these concordance indices are weak, given the same trends within the series.

This main concern of the current study closely resembles that of Claessens et al. (2011b). However, the former differs from the latter in some aspects; the main difference is in their methods for detecting cycles. The current study employs a growth cycle approach used in the business cycle literature, while taking into account that some series in emerging economies have an upward trend. In particular, upward trends in output and in credit have seemed to be strong in East Asian emerging economies over the last three decades. When both cycles have an upward trend, the concordance index between these cycles can tend to be high, although the statistical significance therein is weak.

3. Methodology

3-1. Definition of “business cycle”

A business cycle is defined as a pattern of movement in a series representing aggregate economic activity. There are two approaches to identifying a business cycle. One defines the cycle directly by analyzing the series level; this is referred to as the “classical approach.” The other defines the cycle by analyzing deviations from trends; it is referred as the “growth approach.” Which approach is preferable? Which is the optimal approach depends on the characteristics of the time series, or the purpose of analysis.

The current study uses the growth approach to identify business cycles. The economies this study examines have experienced rapid economic growth over the last three decades. We are interested in the cyclical movements of real activities, not in trends. This study focuses on quarterly real gross domestic product (GDP) as a series representing aggregate output activity; it also decomposes real

GDP series into a cyclical component and a structural component, via a Hodrick–Prescott (HP) filter. Then, we detect the turning points—that is, the peaks and troughs—in the cyclical component series. The peaks are the periods with local high points in the cyclical component series, while the troughs are those with local low points.

The BB algorithm—so called because it was set out by Bry and Boschan (1971)—is a well-known algorithm for detecting peaks and troughs in monthly observations. The BBQ algorithm—a quarterly version of the BB algorithm, suggested by Harding and Pagan (2002)—is also used, with some censoring rules. We use the BBQ algorithm to detect peaks and troughs in the quarterly cyclical component series of real GDP. At first, the local peaks (troughs) are identified as occurring at time t whenever $\{y_t > (<) y_{t\pm k}\}$, k = 1,…, K, where K is set to 2. Secondly, if two peaks (troughs) are within three quarters in a series, the larger of the two is selected as a peak (trough). The second step implies that a phase must last at least three quarters.[5]

3-2. Definition of "financial cycle"

A financial cycle is generally defined as a pattern of movement in a series that represents the state of a financial market. Like Claessens et al. (2011a, 2011b), we focus on three financial markets: the housing market, equity market, and credit market. We assume that the state of the housing, equity, and credit markets are represented by housing prices, equity prices, and credit series, respectively. These three financial series differ in dimension: the two asset-price series constitute a price dimension, while credit is a stock dimension. Price series tend to fluctuate more frequently than stock series. Moreover, credit in Asian emerging economies seems to have an upward trend. We use the classical approach for identifying the two asset-price cycles, and the growth approach for identifying the credit cycle. We take the cyclical component of credit via a HP filter, while we identify financial cycles using the BBQ algorithm.

3-3. Features and synchronization of cycles

Two phases are identified in the cycles. The expansion phase is identified as the periods from the trough to the next peak in the series, while the contraction phase is identified as the periods from the peak to the next trough in the series. The main features of the cycles are their duration, amplitude, and the slope of cyclical phases. The duration of an expansion phase is the number of quarters within the expansion phase in a series; likewise, the duration of a contraction phase is the number of quarters within the contraction phase. The amplitude of an expansion phase is the rate of change of the level of an observation from a trough to the next peak; likewise, the amplitude of a contraction phase is the rate of change of the level of an observation from a peak to the next trough.

[5] The BB algorithm for monthly observations requires that a phase must last at least six months.

Finally, the slope of any phase is the amplitude of a given phase divided by the duration of that phase.

To measure the degree of synchronization between cycles, this study uses the concordance index set out by Harding and Pagan (2006), according to whom the concordance index between cycles in series x_t and series y_t—that is, CI_{xy}—is defined as the following calculation:

$$CI_{xy} = \frac{1}{T}\{\sum_{t=1}^{T} S_{xt}S_{yt} + \sum_{t=1}^{T}(1 - S_{xt})(1 - S_{yt})\}, \quad (1)$$

where S_{xt} represents the cycle phase of series x at time t, S_{yt} represents the cycle phase of series y at time t, and T is the sample size. S_{it} takes a value of 1 if the business cycle phase of series i at time t is in an expansion phase, whereas S_{it} takes a value of 0 if it is in a contraction phase. CI_{xy} takes a value of 1 if the two series, x and y, are always in the same phases, and a value of 0 if they are always in the opposite phases. That CI_{xy} is equal to 0.5 implies a lack of synchronization between the two cycles.

A problem with the value of CI_{xy} can be seen when both S_{xt} and S_{yt} take values close to 1 or 0 in most sample periods. That both S_{xt} and S_{yt} take values close to 1 in most sample periods means that both x and y have a strong upward trend over the sample period. For example, when both S_{xt} and S_{yt} take the value of 1 in all sample periods, CI_{xy} has a maximum value of 1. To preclude these trend problems, Harding and Pagan (2006) recommend testing for the significance of the concordance index. It is useful to rewrite this index thus:

$$\begin{aligned} CI_{xy} &= 1 + \frac{2}{T}\sum_{t=1}^{T} S_{xt}S_{yt} - \mu_{Sx} - \mu_{Sy} \\ &= 1 + 2\ \rho_S\sigma_x\sigma_y + 2\mu_{Sx}\ \mu_{Sy} - \mu_{Sx} - \mu_{Sy,} \end{aligned}$$

where μ_{Sx} and μ_{Sy} are the means of S_{xt} and S_{yt}, respectively; σ_x and σ_y present standard deviations of S_{xt} and S_{yt}, respectively; and ρ_S is a correlation coefficient between S_{xt} and S_{yt}. $\rho_S\sigma_x\sigma_y$ suggests a covariance between S_{xt} and S_{yt}. To obtain the correlation coefficient ρ_S, the following linear relationship is estimated via the ordinary least squares method, augmented by the heteroskedasticity and autocorrelation consistent (HAC) procedure, taking into account that the serial correlations in the residual under the null hypothesis $\rho_S = 0$ (Avouyi-Dovi and Matheron, 2005):

$$\sigma_y^{-1} S_{yt} = c + \rho_S\ \sigma_x^{-1} S_{xt} + u_t$$

3-4. Data

We identify business and financial cycles for emerging economies in East Asia over the 1981Q1–2011Q2 period. We focus on the seven economies of South Korea, Hong Kong, Singapore, Taiwan, Thailand, Malaysia, and Indonesia, taking into account data availability. To identify a business cycle, we use the quarterly real GDP series, derived from IFS and Abeysinghe and Rajaguru

(2004). Quarterly GDP series from the 1980s are not available for Thailand, Malaysia, and Indonesia; however, we obtained the disaggregated quarterly real GDP series estimated in Abeysinghe and Rajaguru (2004), to use in their place.[6] Quarterly real GDP series are seasonally adjusted by Census X12, and transformed into natural logarithms. The series for the business cycle extend over the 1981Q1–2011Q2 period for all sample economies.

Housing prices, equity prices, and credit cycles are identified as comprising financial cycles. To identify these cycles, we focus on housing prices, equity prices, and credit. The housing-price series correspond to the indices of residential houses or land prices, as obtained from the CEIC database. The CEIC database reports various price indices of property in terms of sources, property type, area covered, and so on. We use a more sophisticated index for any given economy. The equity price series comprise share-price indices, from the IFS or the CEIC database. The credit series are aggregate claims on the private sector by deposit money banks, and these data are also from the IFS. These three series are deflated by consumer price index, seasonally adjusted by Census X12, and transformed into natural logarithms. The share price and credit series cover the 1981Q1–2011Q2 period for all economies, excluding the share-price series for Singapore (1985Q1–present) and Indonesia (1983Q2–present), and the credit series for Hong Kong (1994Q1–present). The housing-price series cover the 1981Q1–2011Q2 period only for Hong Kong and Singapore, due to data-availability issues. The starting dates of the housing series are 1986Q1 for Korea, 1991Q1 for Thailand, 1991Q3 for Taiwan, 1994Q4 for Indonesia, and 1998Q4 for Malaysia.

4. Basic features of cycles

4-1. Business cycles

Figure 1 shows the fluctuations of the cyclical component of real GDP and the expansion phases in the business cycles for each economy. In Figure 1, the periods of an expansion phase are shaded; in contrast, the periods of a contraction phase are not shaded. Some economies are often found in the same phases in business cycles, at the same periods. Many economies are in a contraction phase for 2008–2009, in the early 2000s, and in 1998; these contraction phases might reflect the Lehman Brothers shock, the crash of the dot-com bubble, and the Asian economic crisis, respectively. The business cycles that we identify seem to fit with well-known economic boom-and-bust events. In the 1980s and 1990s, the periods within a contraction phase tended to vary across economies.

Table 1 shows the basic features of the expansion and contraction phases in the business cycles. The figures pertaining to number, duration, amplitude, and slope refer to sample means, and they refer to the frequency, length, strength/depth, and violence of each phase, respectively. We

[6] Abeysinghe and Rajaguru (2004) provide quarterly real GDP estimates from 1975Q1 for the ASEAN 4 group, and from 1978Q1 for China. They disaggregate annual GDP into quarterly figures, using the related series to predict the quarterly GDP, such as exports, imports, money stock, and so on.

identify 81 expansion phases and 80 contraction phases in 7 emerging economies in East Asia over the 1981Q1–2011Q2 period. The expansion and contraction phases in the business cycles occur more frequently in the 2000s than in the 1980s or 1990s. The number of expansion (contraction) phases is 30 (32) in the 2000s, 28 (24) in the 1990s, and 23 (24) in the 1980s. Both business-cycle phases have occurred more frequently over time.

Expansion and contraction phases last about seven and five quarters on average, respectively, with the former generally lasting longer than the latter. This tendency is consistent with the findings of Bracke (2011) and Claessens et al. (2011b). The durations of both phases seem to tend to be stable over time. Do the two crises in the 1990s and 2000s affect the means of duration of each phase? The contraction phases in the Asian and global crises last 6.3 and 5.1 quarters, respectively. Intense contractions that accompany crises are a little longer than no-crisis contractions. Likewise, the expansion phases followed by contractions in the Asian and global crises are 10.1 and 8.1 quarters, respectively. Expansions followed by intense contractions that accompany crises are much longer than other expansions. The durations of the expansion phases in the 1990s and in the 2000s—excluding the intense expansion phases followed by crises—are 6.0 quarters and 5.9 quarters on average, respectively, and tend to be stable over time. An expansion phase lasting more than two years tends to be an intense expansion phase, followed by an intense contraction.

On average, real GDP increases by about 13 percent in an expansion phase; in contrast, it increases by about 1 percent in a contraction phase. The strength of a contraction phase is much smaller than that of an expansion phase; even in a contraction phase, real GDP increases, thus reflecting the strong growth trend of real GDP in our sample economies. The strength and violence of an expansion phase have become smaller over time; on the other hand, those of a contraction phase have become deeper and more violent over time. There is less difference in slope between the expansion phases that are followed by crises, and other expansion phases. However, the amplitude and slope in the contraction phase accompanying a crisis are deeper and more violent than those in other contraction phases.

4-2. Financial cycles

Figure 2 shows the fluctuations of financial series and the phases of expansion and contraction in financial cycles for each financial market in the seven emerging economies under examination. In Figure 2, the periods of an expansion phase in the financial cycles are shaded, while the periods of a contraction phase are not shaded. For housing-price cycles (HPI), many economies are in an expansion phase in the second half of the 2000s—except for South Korea and Indonesia—although all are in a contraction phase in 2008–2009. In the first half of the 2000s, the features vary across economies. The expansion phases are more dominant in South Korea, Taiwan, and Indonesia, while the contraction phases are more dominant in Hong Kong and Singapore. In the

1990s, while the contraction phases are more dominant in South Korea, Taiwan, and Indonesia, the expansion phases are more dominant in Hong Kong and Thailand in the first half of the 1990s. In the 1980s, the only economies for which housing-price series are available are South Korea, Hong Kong, and Singapore; in these economies, expansion phases are more dominant in the second half of the 1980s.

For equity-price cycles (SPI), there are many features common to all the economies. Many economies are in contraction phases in 2008–2009, 2000–2003, 1997–1999, 1990–1991, and 1983–1985; the exception is the Hong Kong economy, which is in an expansion phase in 1990–1993 and 1983–1987. For credit cycles (CREDIT), there are some common features across the examined economies in the 1980s and 1990s. Most economies—except for Hong Kong and South Korea—are in contraction phases in 1990–1993 and 1982–1987. In the 2000s, features vary across economies.

Table 2 shows the basic features of expansion and contraction phases in financial cycles. The upper panel of Table 2 contains the features of housing-price cycles, while the middle and lower panels contain the features of equity-price cycles and credit cycles, respectively. Although the cycles comprise the 1981Q1–2011Q2 sample period in seven emerging economies in East Asia, some cycles are over a shorter sample period, depending on data availability.[7] The number of expansion and contraction phases are 48 and 45 in the housing-price cycles, 60 and 58 in the equity-price cycles, and 64 and 62 in the credit cycles. The housing-price cycles contain fewer phases than the other cycles, because for many economies, the sample period of the housing price series is shorter than that of the other series.

The expansion and contraction phases in both the housing-price and credit cycles last about seven quarters, although the durations of the expansion phases in both housing-price and credit cycles tend to match those of their contraction phases. The expansion phases in equity-price cycles, on the other hand, tend to be longer than their contraction phases. Over the 1990s and 2000s, the contraction phases of the financial cycles have become shorter, although the expansion phases of financial cycles tend to be stable. For only the credit cycle, both phases have become shorter. There are differences between the features of the two economic crisis periods and those of other, typical periods. The expansion phases of the financial cycles prior to economic crisis periods tend to be longer than those of other expansion phases, for all financial markets. Moreover, there are differences between the features of the Asian crisis periods and the global crisis periods. The durations of the intense contraction phases of the Asian and global crises are 10.0 and 4.5 quarters for the housing-price cycles, 9.6 and 5.6 for the equity-price cycles, and 11.3 and 5.8 quarters in the credit cycles, respectively. On the other hand, the durations of intense expansion phases followed by intense contraction phases in the

[7] The economies under examination that have later starting dates are South Korea (1986Q1), Taiwan (1991Q3), Thailand (1991Q1), Malaysia (1998Q4), and Indonesia (1994Q1) for housing-price cycles; Singapore (1985Q1) and Indonesia (1983Q2) for equity-price cycles; and Hong Kong (1994Q1) for credit cycles.

Asian and global crises are 8.0 and 10.7 quarters for the housing-price cycles, 8.3 and 11.4 for the equity-price cycles, and 11.4 and 8.0 quarters for the credit cycles, respectively. The durations of the contraction phases of the financial cycle in the Asian crisis periods are longer than those in the global crisis periods; in contrast, the expansion phases of the two asset-price cycles prior to the global crisis periods are longer.

Equity-price cycles are more pronounced than housing-price and credit cycles. The phases of equity cycles are stronger or deeper than those of the other cycles. In expansion phases, housing price and credit each increase by 15–30 percent, on average; in contrast, equity price increases by 63 percent, on average. The features in terms of amplitude and slope vary between NIE 4 economies and ASEAN 3 economies. Vis-à-vis both expansion and contraction in cycles: they are not necessarily longer, but they are sharper in ASEAN economies than in NIE economies, excluding housing-price cycles.

To summarize, the main features of financial cycles over the last three decades for emerging economies in East Asia are as follows. 1) The expansion and contraction phases of both housing-price and credit cycles last about seven quarters, on average. 2) The expansion phases of equity-price cycles tend to be longer than the contraction phases in their cycles, lasting nine and six quarters, respectively. 3) The contraction phases of financial cycles and the expansion phases of credit cycles have become shorter during the 1990s and 2000s. Once one excludes expansion phases preceding crisis periods, the expansion phases become shorter over time.

5. Interactions between business and financial cycles

This section analyzes synchronization between business and financial cycles. Fluctuations in financial variables influence business cycles through some channels. Asset-price fluctuations may affect real economies through wealth effects on consumption and the Tobin's q effects on investment. Bank credit plays an important role in driving consumption and investment decision-making, by intermediating between the surplus and deficit sectors of an economy. Moreover, the use of housing as collateral may strengthen the effects of fluctuations in housing prices on consumption through changes in borrowing capacity, which is referred to as the financial accelerator effect.[8]

This section addresses the following questions: What is the nature of the links between the financial and business cycles in emerging Asian economies over the last three decades? Have the links between the business and financial cycles changed over time—and if so, why and how?

To answer these questions, we calculate the degree of synchronization between the business

[8] Table 4 shows the phases of the business cycle and fluctuations in the three financial series for each economy. The fluctuations in the housing-price series are smaller than those in the other financial series for all economies, excluding Hong Kong and Singapore. The three financial series seem to correlate in Hong Kong and Singapore. In addition, during the global crisis period of 2008–2009, most economies are in contraction phases with declines in equity prices; Hong Kong and Singapore has declines in housing prices and credit. We can see the similar features with the Asian crisis period of 1997–1998.

and financial cycles in each economy. Table 3 shows the concordance index, proposed by Harding and Pagan (2006), for each economy. The index takes the value of 1 if two cycles are perfectly synchronized, and takes the value of 0 if two cycles are countercyclical. Moreover, the index takes the value of 0.5 if there is no the link at all between the cycles.

The concordance indices over the full-sample period are roughly greater than 0.50 for all economies, excluding Indonesia. In many economies, cycles in output and equity price have tended to be highly synchronized during the last three decades. In particular, in NIE 4 economies and Thailand, cycles in output and equity price tend to be in the same phase about 70 percent of the time. For South Korea, Hong Kong, and Singapore, business cycles are significantly synchronized with both equity-price and housing-price cycles. The concordance index for cycles in output and credit is less than 0.60 and not significant, with the exception of Hong Kong.

These findings are consistent with those of previous studies. Claessens et al. (2011b) find that emerging economies feature a degree of synchronization between output and equity-price cycles that is stronger than that seen in advanced countries; they also find that advanced countries display a higher degree of synchronization between output cycles and credit or housing-price cycles than emerging economies. As Claessens et al. (2011b) point out, these features may reflect the impact of external capital flows on these real economies, via the dynamics of equity prices in emerging economies.

Has the degree of synchronization changed over time? Table 3 also shows the concordance statistics for each economy examined, over the two subsamples—that is, before and after 2000. For South Korea, Hong Kong, and Malaysia, the concordance indices between business and financial cycles have become larger in the 2000s than in the 1980s or 1990s. In particular, the indices between business and housing-price or equity-price cycles are high and significant in 2000s, exceeding 0.70; moreover, the indices between business and housing-price cycles exceed 0.75 in the 2000s. In contrast, for the other four economies, the indices have become smaller in the 2000s. However, the indices between business and each of the two asset-price cycles remain at around 0.6 in the 2000s; this is not significant—except in Indonesia, where the indices between the business and two asset-price cycles are much smaller in the 2000s.

Do these features of synchronization between business and financial cycles remain, even if one were to exclude the most recent crisis periods? Table 4 shows the concordance indices over the periods under examination, while excluding the Asian crisis and global crisis periods. Although the features in Table 3 do not roughly change, the indices between business and equity-price cycles become insignificant in the 2000s for South Korea, Singapore, and Malaysia. The contraction phase of the business cycle may often coincide with that of the equity-price cycle during the global crisis period. Once the global crisis period of 2008–2009 is excluded, the indices between business and credit or housing-price cycles are significantly high in 2000s for Thailand.

To summarize, the main features of synchronization between business and financial cycles over the last three decades among emerging economies in East Asia are as follows. 1) The degree of synchronization between output and equity-price cycles is both high and significant for many economies. 2) Patterns of change in the degree of synchronization vary across economies; for South Korea, Hong Kong, and Malaysia, the degree of synchronization between output cycles and credit, housing-price, or equity-price cycles has become higher in the 2000s than in the 1980s or 1990s.

These main findings are consistent with those of previous studies (Claessens et al., 2011b; Peltonen, Sousa, and Vansteenkiste, 2009). Peltonen, Sousa, and Vansteenkiste (2009) suggest that housing wealth effects on consumption have substantially increased in recent years among emerging Asian economies, while equity wealth effects on consumption have tended to be large over the last 20 years.

Why have patterns of synchronization between business and financial cycles changed over time? It is because financial intermediation in emerging Asian economies has changed since 2000. Following the Asian crisis of 1997–1998, there have been prolonged declines in investment by the corporate sector. The corporate sector has decreased its bank borrowing and, in many cases, has shifted from external finance to internal finance. Under such circumstances, the banking sector has shifted from corporate-focused lending to household-focused lending. Indeed, in South Korea, Malaysia, and Indonesia, the share of credit going to the household sector has increased from about 25 percent of all credit in the 1990s to about 50 percent in 2005 (Mohanty and Turner, 2010). A similar change has also been seen in other emerging Asian economies. The effects of asset-price or credit fluctuations on output can strengthen if members of the household sector purchase their homes or consume through bank borrowing, as seen in many developed economies. The results of recent studies of OECD countries suggest there are strong housing wealth effects or collateral enhancement effects on a real economy; the disintermediation of the corporate sector and household credit may have played important roles in changes in synchronization between business and financial cycles since 2000 in emerging Asian economies.

6. Conclusion

The purposes of this study are to analyze financial cycles in seven East Asian emerging economies over the last three decades and to examine the synchronizations between the business and financial cycles therein. This study focuses on cycles in housing, equity, and credit markets—namely, housing-price, equity-price, and credit cycles. We detect cycles using quarterly series over the 1981Q1–2011Q2 period. The current study addresses the following questions: What have been the basic features of financial cycles in emerging Asian economies over the last three decades? Have those financial cycles changed over time? What is the nature of the links between financial and business cycles among emerging Asian economies? Have the links between business and financial cycles

changed over time—and if so, why and how?

The results in terms of the basic features of the cycles are as follows. 1) The expansion and contraction phases of both housing-price and credit cycles last about seven quarters, on average. 2) The expansion phases of equity-price cycles tend to be longer than the contraction phases in their cycles, lasting nine and six quarters, respectively. 3) The contraction phases of financial cycles and the expansion phases of credit cycles have become shorter during the 1990s and 2000s. Once one excludes expansion phases preceding crisis periods, the expansion phases become shorter over time.

Further, the current study's findings in terms of synchronization between business and financial cycles are as follows. First, the degree of synchronization between output and equity-price cycles is both high and significant for many economies. Second, the patterns of change in the degree of synchronization vary across economies. For South Korea, Hong Kong, and Malaysia, the degree of synchronization between output cycles and credit, housing-price, or equity-price cycles has become higher in the 2000s than in the 1980s and 1990s.

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Table 1. Basic Features of Business Cycles

		Expansions (T-P)				Contractions (P-T)			
		Number	Duration	Amplitude	Slope	Number	Duration	Amplitude	Slope
Business Cycles									
Full 7	Full	81	6.7	12.5%	1.8%	80	5.3	1.3%	0.2%
	1980s	23	6.3	13.9%	2.1%	24	5.6	3.7%	0.6%
	1990s	28	7.1	12.9%	1.9%	24	5.6	0.9%	0.2%
	without crisis	*21*	*6.0*	*11.2%*	*1.9%*	*17*	*5.3*	*5.0%*	*0.8%*
	asian crisis	*7*	*10.1*	*18.2%*	*1.7%*	*7*	*6.3*	*-9.2%*	*-1.5%*
	2000s	30	6.6	10.8%	1.4%	32	4.8	-0.2%	0.0%
	ongoing	*5*	-	-	-	*2*	-	-	-
	without crisis	*18*	*5.9*	*10.6%*	*1.8%*	*23*	*4.7*	*1.3%*	*0.3%*
	global crisis	*7*	*8.1*	*11.3%*	*1.4%*	*7*	*5.1*	*-5.2%*	*-1.0%*
NIEs 4	1980s	11	6.9	17.8%	2.5%	13	5.6	3.4%	0.6%
	1990s	16	7.1	12.8%	1.8%	13	5.8	2.4%	0.3%
	2000s	17	6.1	11.3%	1.6%	18	5.0	-1.3%	-0.2%
ASEAN 3	1980s	12	5.7	10.4%	1.8%	11	5.6	4.1%	0.6%
	1990s	12	7.1	12.9%	1.9%	11	5.3	-0.9%	-0.1%
	2000s	13	7.1	10.2%	1.2%	14	4.6	1.2%	0.2%

Notes: The statistics for Duration, Amplitude, and Slope refer to sample means. The number is the number of phases that started during the given sample periods. The duration for expansions is the number of the qurters from trough to peak, while the duration for contractions is the number of quarters from peak to trough. The amlitude for expansions is the change rate of real GDP from trough to peak, the amlitude for contractions is the change rate of real GDP from peak to trough. The slope is the amplitude divided by the duration. The full sample covers 1981Q1 to 2011Q2.

Table 2. Basic Features of Financial Cycles

		Expansions (T-P)				Contractions (P-T)			
		Number	Duration	Amplitude	Slope	Number	Duration	Amplitude	Slope
Housing Price Cycles									
Full 7	Full	48	6.9	16.5%	2.0%	45	7.2	-13.2%	-1.6%
	1980s	7	7.7	21.7%	2.8%	7	5.0	-8.9%	-1.2%
	1990s	14	6.8	22.9%	2.9%	13	10.1	-29.1%	-3.2%
	without crisis	*9*	*6.1*	*18.1%*	*2.9%*	*8*	*10.1*	*-20.4%*	*-2.1%*
	asian crisis	*5*	*8.0*	*31.5%*	*2.9%*	*5*	*10.0*	*-43.1%*	*-4.8%*
	2000s	27	6.6	10.1%	1.1%	25	6.2	-6.0%	-0.9%
	ongoing	*7*	-	-	-	*0*	-	-	-
	without crisis	*14*	*4.9*	*6.7%*	*1.0%*	*19*	*6.8*	*-4.8%*	*-0.5%*
	global crisis	*6*	*10.7*	*17.9%*	*1.5%*	*6*	*4.5*	*-9.9%*	*-2.2%*
NIEs 4	1980s	7	7.7	21.7%	2.8%	7	5.0	-8.9%	-1.2%
	1990s	9	7.6	28.1%	3.0%	10	11.4	-30.3%	-3.0%
	2000s	12	10.0	20.8%	1.9%	10	5.9	-8.1%	-1.4%
ASEAN 3	1980s	-	-	-	-	-	-	-	-
	1990s	5	10.0	20.8%	1.9%	3	5.7	-25.3%	-3.7%
	2000s	15	4.3	2.9%	0.6%	15	6.5	-4.7%	-0.6%
Equity Price Cycles									
Full 7	Full	60	9.5	63.9%	6.7%	58	6.0	-46.7%	-7.3%
	1980s	14	12.9	96.9%	6.7%	13	5.7	-41.9%	-7.5%
	1990s	22	8.0	51.8%	7.2%	24	7.2	-56.5%	-7.2%
	without crisis	*15*	*7.8*	*60.2%*	*9.0%*	*17*	*6.2*	*-41.0%*	*-6.3%*
	asian crisis	*7*	*8.3*	*34.0%*	*3.2%*	*7*	*9.6*	*-94.3%*	*-9.4%*
	2000s	24	8.8	53.0%	6.3%	21	4.8	-37.9%	-7.4%
	ongoing	*6*	-	-	-	*1*	-	-	-
	without crisis	*11*	*7.2*	*46.4%*	*6.8%*	*13*	*4.4*	*-20.7%*	*-4.7%*
	global crisis	*7*	*11.4*	*63.3%*	*5.5%*	*7*	*5.6*	*-69.9%*	*-12.6%*
NIEs 4	1980s	8	13.5	103.2%	6.7%	9	6.0	-46.0%	-7.7%
	1990s	13	8.2	49.7%	6.9%	13	6.7	-38.0%	-5.2%
	2000s	13	9.2	56.0%	6.9%	10	6.9	-5.4%	-0.6%
ASEAN 3	1980s	6	12.2	88.4%	6.7%	4	5.0	-32.7%	-7.2%
	1990s	9	7.6	55.0%	7.6%	11	7.7	-78.5%	-9.5%
	2000s	11	8.4	49.2%	5.5%	9	4.6	-34.5%	-7.2%
Credit Cycles									
Full 7	Full	64	7.1	23.9%	3.1%	62	7.2	2.5%	0.3%
	1980s	21	6.3	27.6%	3.9%	20	6.4	9.3%	1.1%
	1990s	18	8.2	28.6%	3.3%	19	8.8	-1.9%	-0.2%
	without crisis	*11*	*6.1*	*19.5%*	*3.1%*	*12*	*7.3*	*12.4%*	*1.6%*
	asian crisis	*7*	*11.4*	*42.8%*	*3.6%*	*7*	*11.3*	*-26.3%*	*-3.3%*
	2000s	25	7.0	15.3%	1.9%	23	6.6	0.1%	-0.1%
	ongoing	*6*	-	-	-	*1*	-	-	-
	without crisis	*13*	*6.5*	*13.7%*	*1.7%*	*16*	*6.9*	*-0.4%*	*-0.2%*
	global crisis	*6*	*8.0*	*18.8%*	*2.4%*	*6*	*5.8*	*1.6%*	*0.0%*
NIEs 4	1980s	12	5.4	19.3%	3.3%	11	6.6	11.7%	1.7%
	1990s	11	6.7	18.5%	2.7%	12	8.2	6.5%	1.0%
	2000s	14	7.5	14.0%	1.6%	3	6.7	-0.5%	-0.2%
ASEAN 3	1980s	9	7.4	38.6%	4.7%	9	6.1	6.4%	0.4%
	1990s	7	10.4	44.4%	4.2%	7	9.9	-16.3%	-2.3%
	2000s	11	6.4	17.1%	2.3%	10	6.5	0.8%	0.0%

Notes: The statistics for Duration, Amplitude, and Slope refer to sample means. The number is the number of phases that started during the given sample periods. The duration for expansions is the number of the qurters from trough to peak, while the duration for contractions is the number of quarters from peak to trough. The amlitude for expansions is the change rate of each respective financial variable from trough to peak, while the amlitude for contractions is that from peak to trough. The slope is the amplitude divided by the duration. The full sample covers 1981Q1 to 2011Q2.

Table 3. The Concordance Indices

		Full: 1981-2011			1980s and 1990s: 1981-1999			2000s: 2000-2011		
		Credit-GDP	Housing Pirice-GDP	Equity Pirice-GDP	Credit-GDP	Housing Pirice-GDP	Equity Pirice-GDP	Credit-GDP	Housing Pirice-GDP	Equity Pirice-GDP
KOR	**Korea**	**0.525**	**0.618** *	**0.656** **	**0.487**	**0.500**	**0.632**	**0.587**	**0.761** ***	**0.696** *
		0.864	*0.038*	*0.016*	*0.834*	*0.426*	*0.116*	*0.604*	*0.003*	*0.045*
HKG	**Hong Kong**	**0.714** ***	**0.730** ***	**0.762** ***	**0.750** ***	**0.671** **	**0.711** ***	**0.696** *	**0.826** ***	**0.848** ***
		0.002	*0.000*	*0.000*	*0.010*	*0.022*	*0.000*	*0.046*	*0.000*	*0.000*
SGP	**Singapore**	**0.525**	**0.648** ***	**0.726** ***	**0.645** ***	**0.684** *	**0.767** ***	**0.326**	**0.587**	**0.674** +
		0.639	*0.008*	*0.000*	*0.008*	*0.038*	*0.001*	*0.103*	*0.257*	*0.052*
TWN	**Taiwan**	**0.557**	**0.623**	**0.664** ***	**0.539**	**0.676**	**0.671** ***	**0.587**	**0.571**	**0.652** ***
		0.290	*0.111*	*0.001*	*0.640*	*0.391*	*0.003*	*0.114*	*0.602*	*0.008*
			0.667 *			**0.750**			**0.652**	
			0.041			*0.190*			*0.184*	
THA	**Thailand**	**0.598**	**0.634** +	**0.648** **	**0.618**	**0.667** +	**0.645** *	**0.565**	**0.609**	**0.652**
		0.113	*0.100*	*0.011*	*0.128*	*0.092*	*0.033*	*0.351*	*0.326*	*0.253*
MYS	**Malaysia**	**0.582**	**0.745** ***	**0.590**	**0.526**	**0.600**	**0.526**	**0.674**	**0.761** ***	**0.696** **
		0.152	*0.004*	*0.202*	*0.670*	*0.293*	*0.855*	*0.067*	*0.005*	*0.026*
IDN	**Indonesia**	**0.590**	**0.443**	**0.549**	**0.539**	**0.458** **	**0.597**	**0.674**	**0.435**	**0.478**
		0.184	*0.384*	*0.523*	*0.657*	*0.027*	*0.248*	*0.105*	*0.716*	*0.410*

Notes: The statistics is the concordance index proposed by Harding and Pagan (2002). The figure in Italic type shows p-value. ***, **, *, + reports significance at 1%, 3%, 5%, 10%. The full sample for each economy covers the following periods. The full sample for credit cycle covers the period 1994Q1-2011Q2 in Hong Kong. The full sample for housing cycle covers the period 1986Q1-2011Q2 in Korea, 1991Q3-2011Q2 in Taiwan, 1991Q1-2011Q2 in Thailand, 1998Q4-2011Q2 in Malaysia, and 1994Q1-2011Q2 in Indonesia. The full sample for equity cycle covers the period 1985Q1-2011Q2 in Singapore, and 1983Q2-2011Q2 in Indonesia.

Table 4. The Concordance Indices without crisis periods

		Before Asian Crisis: 1981-1996			2000s before global crisis: 2000-2007		
		Credit-GDP	Housing Pirice-GDP	Equity Pirice-GDP	Credit-GDP	Housing Pirice-GDP	Equity Pirice-GDP
KOR	**Korea**	**0.438**	**0.386**	**0.609**	**0.750** *	**0.719** *	**0.656**
		0.459	*0.771*	*0.308*	*0.039*	*0.047*	*0.214*
HKG	**Hong Kong**	**0.750** *	**0.656** +	**0.688** ***	**0.594**	**0.750** ***	**0.875** ***
		0.059	*0.068*	*0.001*	*0.241*	*0.005*	*0.000*
SGP	**Singapore**	**0.703** ***	**0.688** +	**0.771** ***	**0.406**	**0.594**	**0.656**
		0.003	*0.064*	*0.000*	*0.484*	*0.299*	*0.145*
TWN	**Taiwan**	**0.547**	**0.591**	**0.672** ***	**0.500**	**0.594**	**0.688** ***
		0.610	*0.942*	*0.006*	*0.718*	*0.479*	*0.016*
						0.594	
						0.518	
THA	**Thailand**	**0.688** **	**0.708** *	**0.609**	**0.656** **	**0.719** *	**0.594**
		0.014	*0.033*	*0.130*	*0.029*	*0.036*	*0.870*
MYS	**Malaysia**	**0.516**		**0.516**	**0.625**	**0.688** +	**0.625**
		0.855		*0.981*	*0.273*	*0.078*	*0.250*
IDN	**Indonesia**	**0.547**		**0.582**	**0.688**	**0.500**	**0.469**
		0.596		*0.400*	*0.148*	*0.193*	*0.586*

Figure 1: Business Cycles for Asian emerging Economies

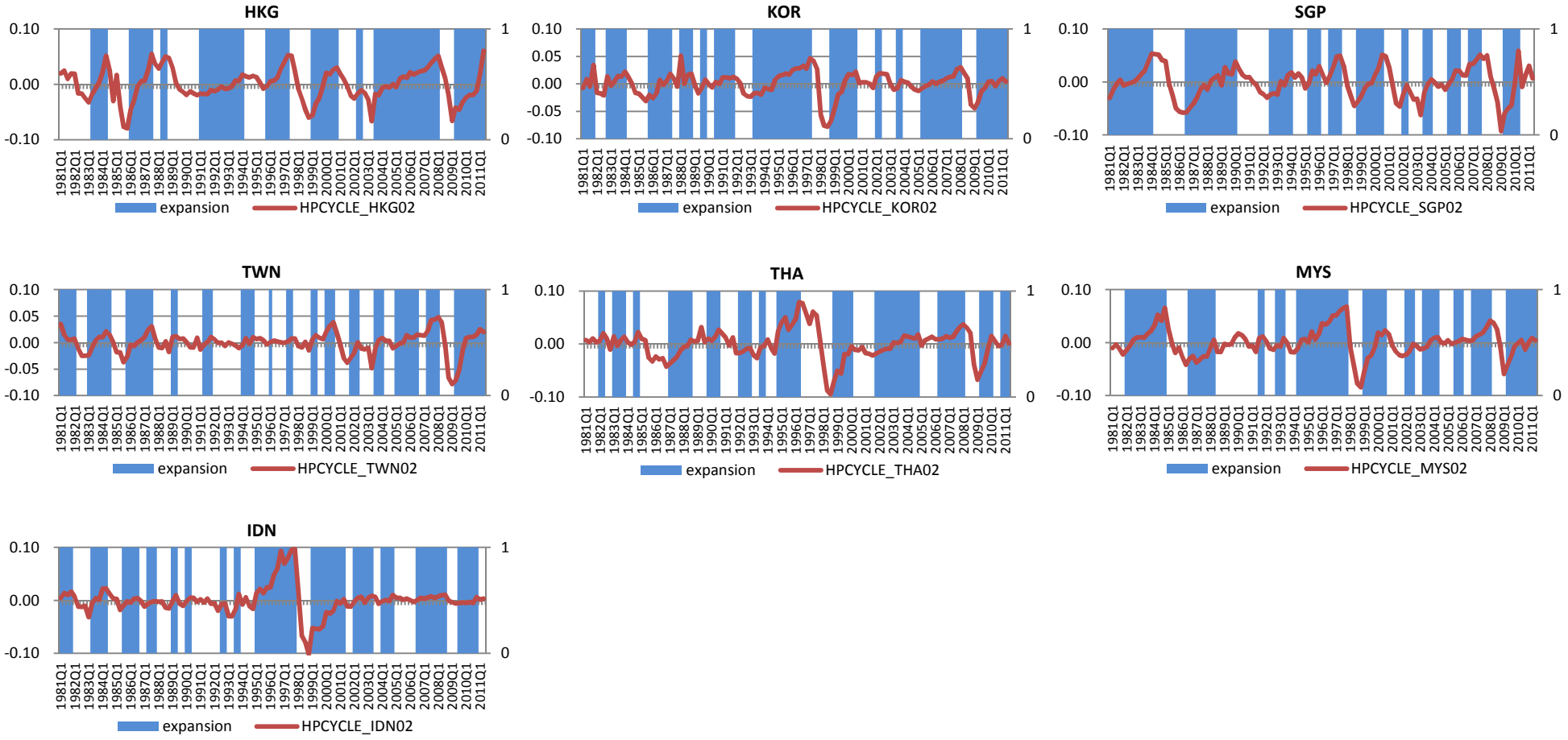
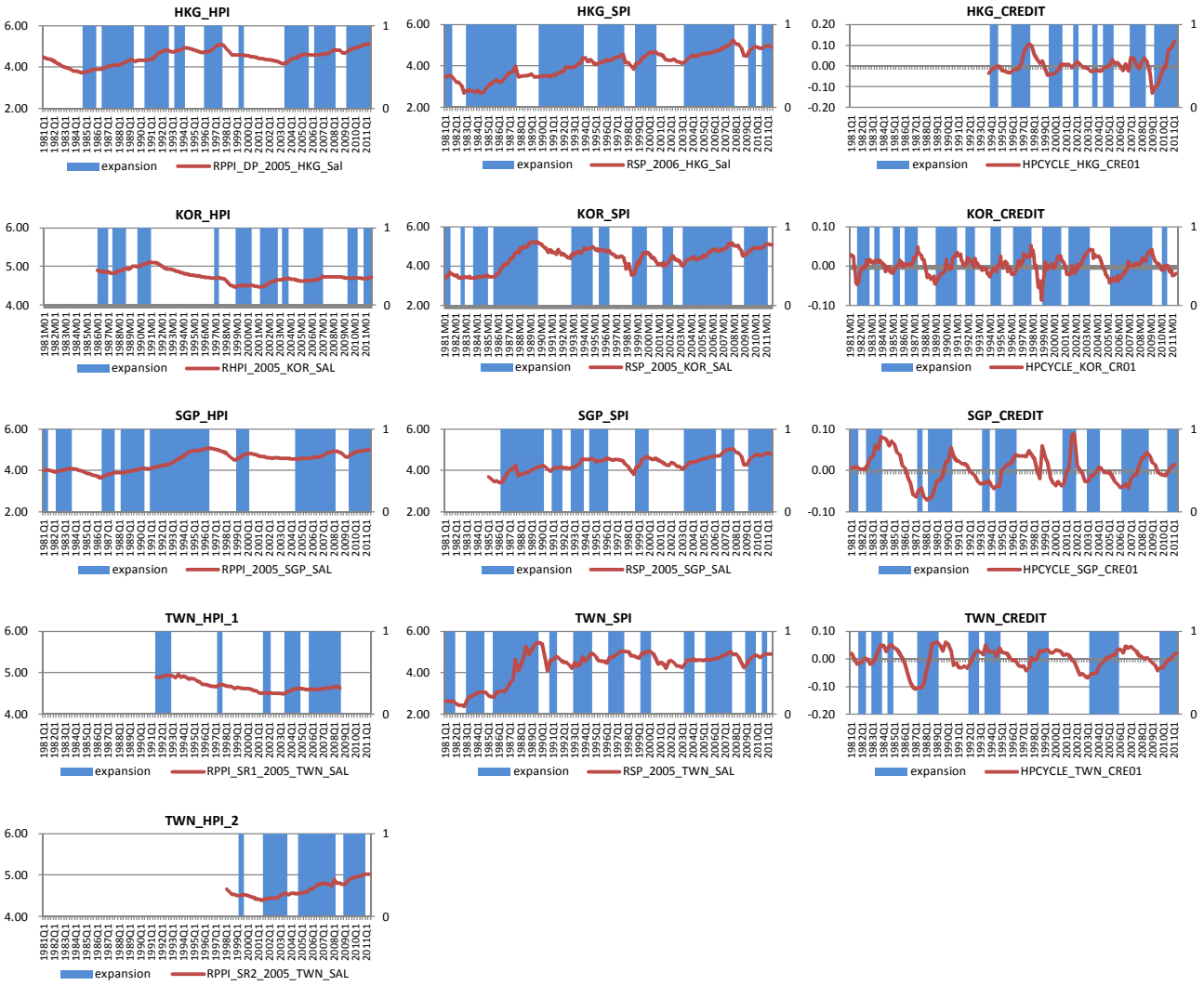
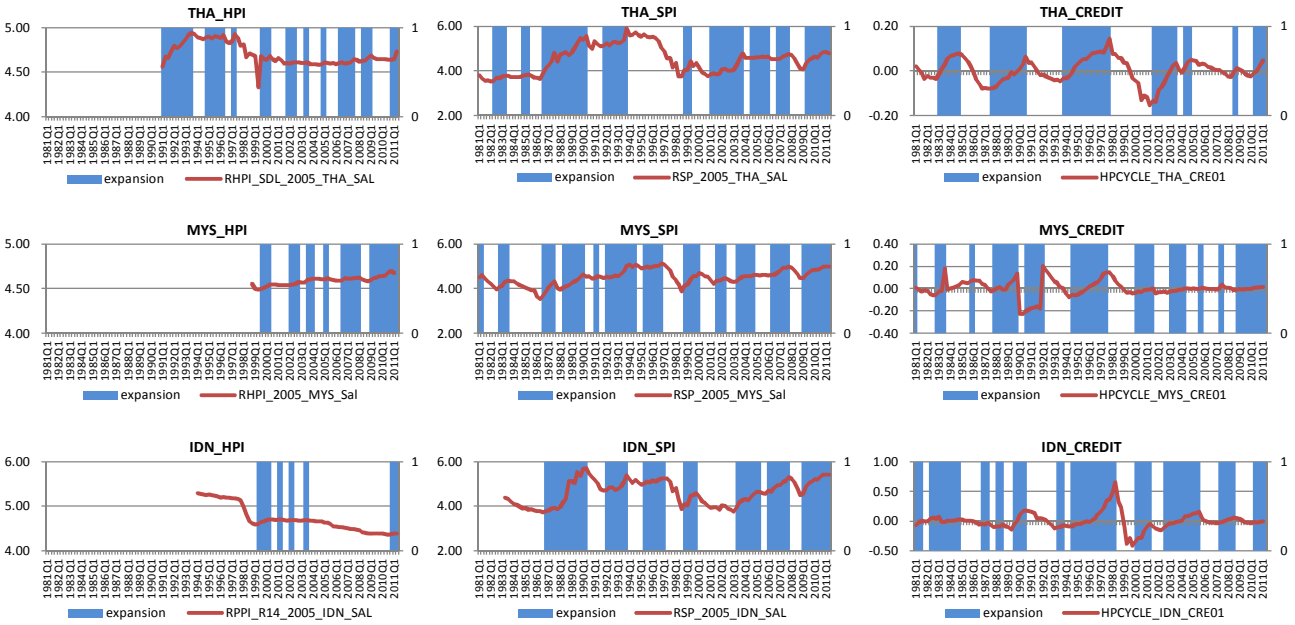


Figure 2: Financial Cycles for Asian NIEs Economies



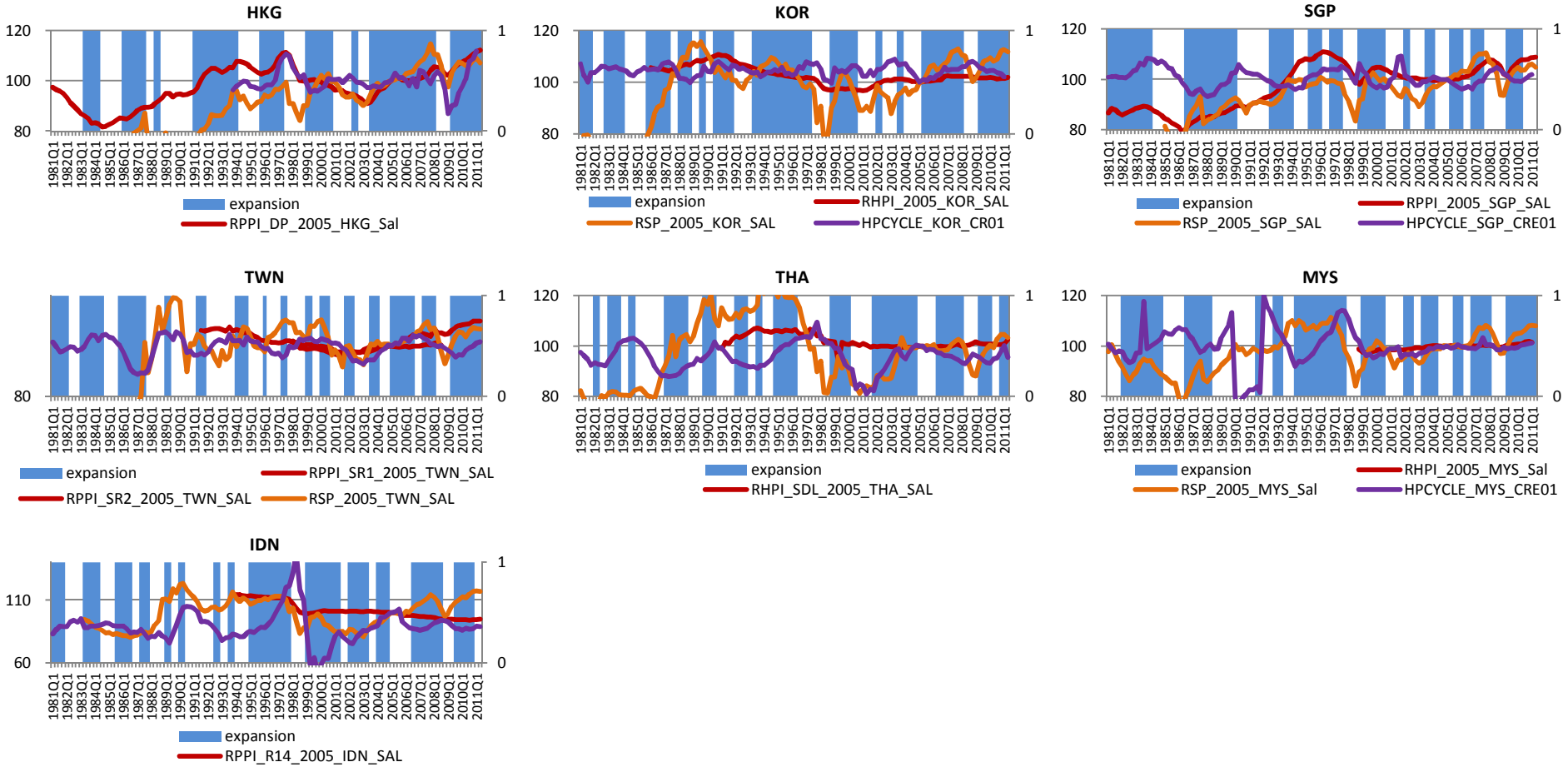
Notes:
Sources:

Figure 3: Financial Cycles for ASEAN Economies



Notes:
Sources:

Figure 4: Financial Market Fluctuations under Business Cycles for Asian Economies



Notes:

Sources:

Appendix 1 The periods of Turning Points: Troughs and Peaks

1-A Business Cycles

HKG		KOR		SGP		TWN	
Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks
1983Q1	1984Q2		1981Q4		1984Q1		1982Q1
1985Q4	1987Q3	1982Q3	1984Q1	1986Q2	1990Q1	1982Q4	1984Q3
1988Q1	1988Q3	1985Q3	1987Q2	1992Q2	1994Q1	1985Q3	1987Q3
1990Q4	1994Q1	1987Q4	1988Q4	1995Q1	1996Q1	1988Q4	1989Q2
1995Q3	1997Q2	1989Q2	1989Q4	1996Q3	1997Q3	1991Q1	1991Q4
1998Q4	2000Q4	1990Q2	1991Q4	1998Q3	2000Q3	1993Q4	1994Q4
2002Q1	2002Q3	1993Q1	1997Q2	2001Q4	2002Q2	1995Q4	1996Q2
2003Q2	2008Q1	1998Q3	2000Q3	2003Q2	2004Q1	1997Q1	1997Q3
2009Q1		2001Q4	2002Q2	2005Q1	2006Q1	1998Q4	1999Q2
		2003Q2	2003Q4	2006Q3	2007Q3	1999Q4	2000Q3
		2005Q1	2008Q1	2009Q1	2010Q2	2001Q3	2002Q2
		2009Q1				2003Q2	2004Q1
						2004Q4	2006Q3
						2007Q1	2008Q1
						2009Q1	

1-B Housing Price Cycles

HKG		KOR		SGP		TWN1	
Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks
1984Q3	1985Q4		1986Q4		1981Q2		1992Q4
1986Q2	1989Q2	1987Q2	1988Q3	1982Q1	1983Q3	1997Q1	1997Q3
1990Q2	1992Q3	1989Q3	1990Q4	1986Q2	1987Q3	2001Q2	2002Q1
1993Q1	1994Q1	1996Q4	1997Q2	1988Q1	1990Q2	2005Q3	
1995Q4	1997Q3	1998Q4	2000Q2	1990Q4	1996Q2		
1999Q1	1999Q3	2001Q1	2002Q3	1998Q4	2000Q1	TWN2	
2003Q2	2005Q3	2003Q1	2003Q4	2004Q2	2008Q1	Troughs	Peaks
2006Q1	2008Q1	2005Q1	2007Q1	2009Q2		1999Q1	1999Q3
2009Q1		2009Q2				2001Q2	2003Q3
						2004Q3	2008Q1
						2008Q4	

THA		MYS		IDN	
Troughs	Peaks	Troughs	Peaks	Troughs	Peaks
1981Q4	1982Q2	1981Q4	1984Q4		1982Q1
1982Q4	1983Q4	1986Q2	1988Q2	1982Q4	1984Q3
1984Q2	1984Q4	1991Q2	1991Q4	1985Q3	1987Q3
1986Q4	1988Q3	1992Q3	1993Q2	1988Q4	1989Q2
1989Q3	1990Q3	1994Q1	1997Q4	1991Q1	1991Q4
1991Q4	1992Q4	1998Q4	2000Q3	1993Q4	1994Q4
1993Q2	1993Q4	2001Q4	2002Q3	1995Q4	1996Q2
1994Q3	1996Q2	2003Q1	2004Q2	1997Q1	1997Q3
1998Q3	2000Q1	2005Q2	2006Q1	1998Q4	1999Q2
2001Q3	2004Q4	2006Q3	2008Q1	1999Q4	2000Q3
2006Q1	2008Q1	2009Q1		2001Q3	2002Q2
2009Q1	2010Q1			2003Q2	2004Q1
2010Q3				2004Q4	2006Q3
				2007Q1	2008Q1
				2009Q1	

THA		MYS		IDN	
Troughs	Peaks	Troughs	Peaks	Troughs	Peaks
	1993Q3	1999Q2	2000Q2	1999Q1	2000Q2
1994Q3	1996Q2	2001Q4	2002Q4	2000Q4	2001Q2
1996Q4	1997Q2	2003Q2	2004Q1	2001Q4	2002Q2
1999Q2	2000Q2	2004Q4	2005Q2	2003Q1	2003Q3
2001Q3	2002Q3	2006Q2	2008Q1	2010Q3	
2003Q1	2003Q3	2008Q4			
2004Q3	2005Q1				
2006Q1	2007Q3				
2008Q1	2009Q1				
2010Q3					

1-C Equity Price Cycles

HKG		KOR		SGP		TWN	
Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks
	1981Q3		1981Q3	1986Q1	1990Q1		1981Q4
1982Q4	1987Q3	1982Q2	1982Q4	1990Q4	1991Q4	1982Q4	1984Q3
1989Q3	1993Q4	1983Q3	1985Q1	1992Q3	1993Q4	1985Q2	1989Q3
1995Q1	1997Q3	1985Q3	1989Q3	1994Q2	1996Q1	1990Q3	1991Q2
1998Q3	2000Q3	1992Q4	1994Q4	1998Q3	1999Q4	1992Q4	1994Q3
2003Q1	2007Q4	1995Q2	1996Q2	2003Q1	2006Q1	1996Q1	1997Q3
2009Q1	2009Q4	1998Q2	1999Q4	2006Q3	2007Q4	1999Q1	2000Q1
2010Q2		2001Q2	2002Q2	2009Q1		2003Q1	2004Q1
		2003Q1	2007Q4			2005Q1	2007Q3
		2008Q4				2008Q4	2009Q4
						2010Q2	2010Q4

THA		MYS		IDN	
Troughs	Peaks	Troughs	Peaks	Troughs	Peaks
1982Q1	1983Q2		1981Q2	1986Q3	1990Q2
1984Q3	1985Q2	1982Q3	1987Q3	1991Q4	1993Q4
1986Q2	1990Q2	1988Q1	1990Q1	1995Q1	1997Q1
1991Q3	1993Q4	1990Q4	1991Q2	1998Q3	1999Q4
1998Q3	1999Q2	1991Q4	1994Q3	2003Q1	2005Q2
2000Q4	2003Q4	1995Q1	1996Q4	2005Q4	2007Q4
2004Q2	2006Q1	1998Q3	2000Q1	2008Q4	
2006Q3	2007Q4	2001Q2	2002Q2		
2009Q1		2003Q1	2004Q4		
		2006Q1	2007Q4		
		2008Q4			

1-C Credit Cycles

HKG		KOR		SGP		TWN	
Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks
	1994Q3	1981Q3	1982Q4		1981Q3	1981Q3	1982Q2
1995Q4	1997Q3	1983Q2	1983Q4	1982Q2	1983Q4	1982Q4	1983Q4
1999Q2	2000Q3	1984Q4	1985Q3	1987Q1	1987Q3	1984Q2	1984Q4
2001Q3	2002Q1	1986Q1	1987Q2	1988Q1	1990Q2	1987Q1	1989Q1
2003Q2	2003Q4	1989Q4	1990Q4	1993Q1	1993Q4	1991Q4	1992Q4
2004Q2	2005Q2	1991Q3	1992Q3	1994Q2	1996Q2	1993Q2	1994Q4
2006Q4	2008Q2	1994Q1	1995Q1	2000Q3	2001Q4	1997Q2	1999Q2
2009Q1		1996Q1	1997Q4	2002Q4	2004Q1	2003Q1	2005Q4
		1998Q4	2000Q3	2006Q1	2008Q3	2009Q3	
		2001Q2	2003Q2	2010Q2			
		2005Q1	2009Q1				
		2010Q1	2010Q3				

THA		MYS		IDN	
Troughs	Peaks	Troughs	Peaks	Troughs	Peaks
1982Q4	1984Q4		1981Q1		1981Q3
1987Q2	1990Q3	1982Q3	1983Q3	1982Q1	1984Q4
1993Q3	1997Q4	1985Q3	1986Q1	1986Q3	1987Q2
2001Q2	2003Q3	1987Q3	1989Q4	1987Q4	1988Q3
2004Q1	2004Q4	1990Q2	1992Q1	1989Q2	1990Q3
2008Q2	2008Q4	1994Q2	1997Q3	1993Q1	1993Q4
2010Q1		1999Q4	2001Q3	1994Q2	1998Q2
		2002Q4	2004Q2	1999Q4	2001Q2
		2005Q2	2005Q4	2002Q2	2005Q3
		2007Q1	2007Q3	2007Q1	2008Q3
		2008Q3		2010Q1	

Notes: The Shaded-dates are the peaks arround the regional and global crises, such as 1997 and 2008, and the previous troughs.