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Problems of DI Compilation for Rapidly Growing ASEAN Countries

Hiroshi Osada

Introduction

Measuring business cycles by DIs has a long history, and the technique of DI compilation is well established. It therefore may seem straightforward to apply this method to a developing economy which graduated from the stage of simple agricultural fluctuations after a certain period of industrialization and came to show business cycles in the ordinary sense. In reality, however, we have encountered various problems, both theoretical and technical, in the process of DI compilation for the ASEAN countries.

The problems accrue mainly from three factors which characterize these countries: (1) a strong growth trend, (2) an economic structure different from industrialized countries, and (3) relatively poor availability of statistical data. The first factor made it inevitable that we adopt the "growth cycle approach," and as a consequence the problem of proper trend estimation arose. The second factor involves the coexistence of primary and industrial sectors having roughly the same shares of GDP, heavy dependency of the economy on exports, and an economically large role played by the public sector. In addition, the rapid transition of the industrial structure makes it difficult to maintain the constancy of the DI components. The following sections clarify these issues and describe how they influenced the compilation of DIs. At the same time the sections will describe the characteristics of business cycles in the ASEAN countries and will point out features of the DI compiled by IDE. The final section provides a brief cross-country comparison of the pattern of business cycles as measured by IDE's DI and shows the clear synchronization of cycles among the ASEAN countries, the United States, and Japan in the 1980s.

Availability of Data

A diffusion index indicates the extent of diffusion of business expansion or contraction to various sectors of an economy. To do this, a DI needs to include not only variables for production sectors but also those for other sectors, such as for consumption, inventory, employment, money, and foreign trade. For the ASEAN countries, though the degree of difficulty varies from country to country, it is not easy to fulfill such requirements due to the relatively poor availability of data. For example, data for sectorial inventory, which is regarded as a main cause of short-term cycles, are not available. Other variables which are important but not available to a satisfactory degree are employment indicators, department-store sales or similar data to be used as a consumption indicator, and the placement of orders for construction and machinery. Because of this situation we had little choice but to depend mainly on production, price, foreign trade, and monetary statistics. To supplement the lack of suitable data, we worked at compiling proxy variables—for example, using consumer goods imports as a proxy for the consumption indicator. Because of such difficulties, the DIs com-

Table 3-1
Categories of Component Variables

	Indo- nesia	Ma- laysia	Philip- pines	Singa- pore	Thailand	Japan	U.S.A.
							(%)
I. Variables related to							
Primary sector	11	29	15	0	5	0	0
Manufacturing sector	63	25	33	36	35	28	8
Others	26	46	52	64	60	72	92
II. Variables related to							
Foreign trade	11	13	44	12	15	0	0
Balance of payment constraint	11	0	4	0	0	0	0
Public sector	4	4	4	0	5	3	0
Others	74	83	48	88	80	97	100

Sources: Compiled from the following materials:

1. ASEAN: Institute of Developing Economies, *Ajia no keiki dōkō shisū* (Diffusion index for Asia), March 1990.
2. Japan: Economic Planning Agency, *Keiki dōkō shisū* (Diffusion index), Dec. 1989.
3. G. Green, "Choosing Business Cycle Indicators with Attention to the Likelihood of Data Revisions." Paper presented at the 19th CIRET conference, Osaka, 1989.

Note: The figures show the shares of each group in the total number of leading, coincident, and lagging indicators.

piled by IDE are composed mainly of price, production, and foreign trade data for the primary and manufacturing sectors. Table 3-1 indicates this imbalance where the share of "variables related to others" for the ASEAN countries in category I is the lowest for Indonesia at 26 per cent and the highest for Thailand at 60 per cent. This is in clear contrast to the far higher figures for Japan and the United States. The high figure for Singapore at 64 per cent is due to the inclusion of more variables related to the tertiary sector, such as finance, trade, and tourism.

Other data problems are the lack of timeliness, insufficient length of data covering time series, and the lack of continuity in definitions and concepts. Timeliness or currency is of particular importance since the DI is expected to forecast business conditions in the short run.¹ Quite often in the ASEAN countries there is a lag of as much as half a year before production data are released, which, when choosing variables to be components of the DI, leads to the problem of making a trade-off between timeliness and the coverage of economic activity.

Strong Growth Trend

During the 1970s the ASEAN countries attained higher economic growth rate through industrialization than that of other developing countries. The average annual growth rates during 1965-80, shown in Table 3-2, confirm this fact when compared with the 5.7 per cent average growth rate for lower-middle-income countries as defined by the International Bank for Reconstruction and Development. Although the growth slowed down to some extent in the early half of the 1980s due to low worldwide economic growth, the ASEAN economies remained relatively robust, especially in comparison to the annual average growth rate of 2.1 per cent for the lower-middle-income countries during the 1980-87 period. The appreciation of the Japanese yen since late 1985, coupled with the sustained expansion of the U.S. economy, provided the region with a double economic stimulus: export growth and the increase of foreign direct investment.

The economic trend of the ASEAN countries has been in clear contrast to that of the OECD countries, where the average growth rate was 3.6 per cent in 1965-80 and 2.6 per cent in 1980-87. Because of this slow growth, the classical cycle approach can be readily used in developed countries to identify business cycles. But because of the strong growth trend of the ASEAN economies, it becomes necessary to apply the growth cycle approach. Most of the variables simply continue to increase if the trends in them are not eliminated.

The method of trend estimation has a crucial influence on identifying the

Table 3-2
Main Economic Indicators

	GDP Growth (Average)		Industrial Structure ^a				Export Depend- ency ^b	Export Share (1987)	
	1965-80	1980-87	Agriculture		Industry		1987	U.S.A.	Japan
			1980	1987	1980	1987			
Philippines	5.9	-0.5	23	25	33	31	22.9	36.2	17.2
Thailand	7.2	5.6	25	16	21	32	29.0	18.8	14.7
Malaysia	7.4	4.5	23	22	25	28	62.9	16.6	19.5
Singapore	10.1	5.4	1	1	38	38	143.8 ^c	24.5	9.0
Indonesia	8.0	3.6	25	26	18	20	26.0	20.2	43.8

Sources: 1. GDP growth, annual average: IBRD, *World Development Report*, 1989.
2. Industrial structure: Statistical yearbooks of each country.
3. Export share: IMF, *Direction of Trade*, 1988.

Notes: ^a "Industry" includes manufacturing, construction, and utility supply. Shares are given in nominal terms except for Malaysia.

^b Export dependency is given by export/GDP.

^c Inclusive of re-exports. Domestic exports comprise 93 per cent of GDP.

cycles of component variables. For this purpose we chose the Phase Average Trend method, which in principle estimates the trend separately for each business cycle.² Even though the method is specially designed to estimate the trend of business cycle indicators and seems to be the most suitable method, it nevertheless has a crucial defect: the trend in the latest period is vulnerable to the updating of data. This makes the figures of the DI in the latest period unstable to some extent.

Coexistence of Primary and Industrial Sectors

After two decades of industrialization, the industrial structures of the ASEAN countries have changed greatly. The traditional industrial structure dominated by such primary sectors as agriculture, forestry, fisheries, and mining has now shifted to a coexistence of the primary and industrial sectors. In recent years, as Table 3-2 shows, the share of GDP for the agricultural sector including forestry and fisheries is more or less the same as that of the industrial sector, which is composed of manufacturing, construction, and utility supply. In Thailand the ratio of agriculture to industry drastically changed from 25:21 in 1980 to 16:32 in 1987. The simultaneous increase of both those sectors' shares in Indonesia is attributed to the decline in the mining sector due to the drop in crude oil prices. In the other three countries, industry had the dominant share even in 1980.

Realizing what these industrial structures are like, it can be concluded that business cycles in the ASEAN countries (excluding Singapore) reflect the cycles of both the primary sector and the industrial sector. It should also be added that the petroleum and natural gas sector in Indonesia and in Malaysia to some extent is one of the important sources of business fluctuation. The fluctuation in oil prices has an impact on the economy not only through fluctuations in revenues from oil exports but also through the resultant fluctuations in government investment, which is heavily dependent on oil revenues.

The importance of the agricultural sector in the business cycles of the ASEAN countries raises a technical problem. Most agricultural products have their own harvesting periods, and their monthly production data do not really reflect the agricultural cycles. Moreover, if the production data of certain months show "zero" figures, the seasonal adjustment program (X-11) cannot be applied. The aggregated production value of main commodities is preferable, but it is not available on a monthly basis. Consequently, we are left with price and export data. The DI compiled by IDE for the ASEAN countries includes a considerable number of such variables.

Rapid Transition of the Industrial Structure

This issue is closely related to those in the preceding sections on strong growth trend and coexistence of primary and industrial sectors. The rapid economic growth in the ASEAN countries was accompanied by the rapid transition of the industrial structure. The Thai economy in the 1980s is a good example, as Table 3-2 shows. The share of the industrial sector increased from 21 per cent in 1980 to 32 per cent in 1987, and that of the agricultural sector decreased from 25 per cent to 16 per cent during the same period.

The change is more drastic at the micro-industry level. An industry which led the economy in the 1970s often declined in the 1980s, and new leading industries emerged. As Table 3-3 shows, in Thailand this phenomenon is well reflected in the changing composition of principal exports. The largest export commodity in 1978 was tropical products, followed by rice. In 1988 textile products became the largest, and prawns and precious stones increased their shares. Moreover, commodities classified under the "others" category increased their shares, reflecting the export expansion of various manufactured goods.

Under the conditions of such rapid transition of the industrial structure, it is difficult to choose component variables for the DI which are constantly significant and consistently leading, coincident or lagging all through the

Table 3-3
Principal Exports of Thailand

Commodity	1978	1988
	Million Baht (%)	Million Baht (%)
Rice	10,424 (12.5)	34,676 (8.6)
Rubber	8,030 (9.7)	27,189 (6.7)
Maize	4,275 (5.1)	3,828 (0.1)
Tapioca products	10,892 (13.1)	21,844 (5.4)
Prawns	1,500 (1.8)	9,698 (2.4)
Tin	7,229 (8.7)	2,229 (5.5)
Sugar	3,970 (4.8)	9,664 (2.4)
Integrated circuits	2,158 (2.6)	8,691 (2.2)
Textile products	6,866 (8.3)	58,627 (14.5)
Precious stones	1,707 (2.1)	13,958 (3.5)
Others	26,014 (31.3)	213,166 (48.7)
Total	83,065 (100.0)	403,570 (100.0)

Source: Bank of Thailand, *Quarterly Bulletin*, March 1981 and March 1990.

1970s and 1980s. In Indonesia, for example, textile production, which used to be a lagging indicator, changed to being a leading indicator after 1987 when export to foreign markets began to increase rapidly. This poses a real problem for maintaining constancy and accuracy.

Heavy Dependency on Exports

Another feature of the ASEAN economies is their high export dependency ratio. As Table 3-2 shows, Singapore's total exports (domestic exports and re-exports) were larger than its GDP in 1987. Malaysia's ratio is also high at 62.9 per cent. The ratios for the other three countries are also high in comparison with the figures for developed countries. The commodity composition of these countries (except Singapore) is characterized by the co-existence of primary commodities and manufactured goods. Also, the business cycles of each country are very much influenced by the fluctuation in international commodity prices as well as by the business cycles of their main importers, such as the United States and Japan. Moreover, in some countries in recent years, the share of manufactured exports has overwhelmed that of traditional primary commodity exports. These have strengthened the international diffusion of business cycles from both the United States and Japan to the region.

These factors were taken into consideration in the selection of variables. As category II of Table 3-1 shows, the DIs compiled by IDE for the

ASEAN countries include quite a number of foreign trade or balance of payment related variables.

Large Economic Role of Public Sectors

A common feature of developing countries is the large role played by governments and other public sectors in consumption, investment, and production. Fiscal and monetary policies also have a relatively large impact on the economy. This tendency is particularly strong in Indonesia and Malaysia, where the governments run quite a number of public entities and where the government budget revenues are dependent upon primary commodity exports, such as crude oil, natural gas, and tin. Therefore the IDE-compiled DIs include a few policy variables, as category II of Table 3-1 shows.

IDE-Compiled DIs and Synchronization of Business Cycles within ASEAN Countries, Japan, and the United States

IDE compiled DIs for the ASEAN countries while trying to cope as much as possible with all the issues mentioned in the previous sections. Figure 3-1 summarizes the business cycles identified by these DIs. The reference dates, or the dates of peaks and troughs, were determined after careful examination of the historical diffusion indices and the economic chronologies.

In each country the duration of one cycle is more or less the same as those in developed countries. While the duration of one cycle in Japan is 47 months on the average, for Indonesia it is 42.5 months, Malaysia 43.7 months, the Philippines 41 months, Singapore 43.6 months, and Thailand 40.3 months. In most of the countries the average length of the expansionary periods is longer than that of the contractionary periods. This applies to Indonesia and Malaysia all through the observation periods, but the contractionary period was longer in the Philippines and Thailand in the early half of the 1980s.

The latter half of the 1970s was characterized by a long expansion in all countries after the recovery from the first oil shock. A short setback in business conditions was observed in all the countries during this expansionary period, but it was not identified as a contraction in the case of Thailand because it was short and weak.

The early half of the 1980s was a long contractionary period. This was due in part to weak external demands, which was a reflection of low worldwide economic growth. Another important underlying factor was the de-

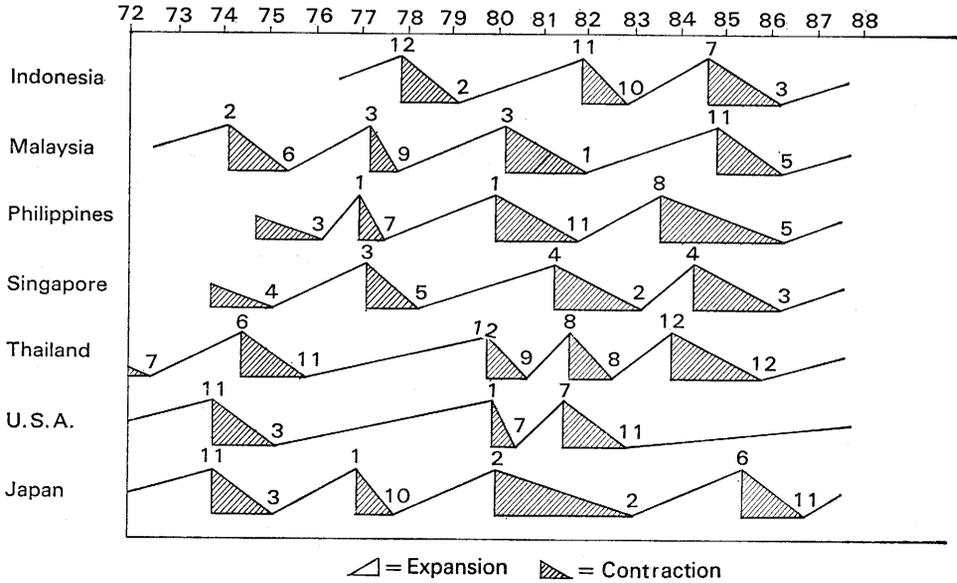


Fig. 3-1

Business Cycles of ASEAN Countries, the United States, and Japan

Source: Compiled from Institute of Developing Economies, *Ajia no keiki dōkō shisū* (Diffusion Index for Asia), March 1990.

Note: Numbers denote months.

terioration of international prices for primary commodities between 1980 and 1986. For Indonesia the decline in oil prices was a decisive factor in the long-run growth trend behind the business cycles. An interesting note is that the Indonesian currency was devalued each time at approximately the trough point of the business cycles.

The degree of international synchronization in business cycles can also be observed from Figure 3-1. The reference dates of the United States, determined by the Department of Commerce, and those of Japan, determined by the Economic Planning Agency, have been added for comparison. First it should be noted that the U.S. economy experienced a growth recession from the second quarter of 1984 through the end of 1985, although it is not officially recognized as a contractionary period by the Department of Commerce. With this in mind, the business cycles of the United States and Japan are quite similar in their timing, except for the short recovery of the U.S. economy from July 1980 through July 1981. The late recovery of the Japanese economy from its contraction could be attributed to the effects of the yen appreciation.

According to Figure 3-1, the business cycles of the ASEAN countries beautifully synchronized with those of the United States and Japan, especially in the 1980s, although there are minor differences in timing. The cycles of Thailand are more like those of the United States than of Japan. This is reasonable considering that Thailand's largest export market is the United States, as Table 3-2 shows. Of the ASEAN countries the Philippines is the most export-dependent on the United States, but this fact is not reflected in its cycles because the economy was seriously affected by the political confusion and resulting economic chaos of the mid-1980s. The cycles of Malaysia, whose largest export market is Japan, is almost synchronized with those of Japan all through the period. In summary, Figure 3-1 suggests that the international synchronization of business cycles or the one-way diffusion of cycles from the United States and Japan to the ASEAN countries is being strengthened.

Concluding Remarks

The problems of DI compilation for the ASEAN countries discussed above need further study. At the same time the present state of these problems is reflected as characteristics inherent in the IDE-compiled DIs.

There are other issues which were not touched upon in this chapter and which should be given attention. Among them is a comparison with developed countries regarding the diffusion of business cycles from leading sectors to other sectors of the economy. Diffusion is weak and slow in developing countries because the interindustrial relations among domestic economic sectors are not so strong. Another issue is the slower and weaker diffusion of cycles to rural regions due to the concentration of industrial sites in one or only a few urban areas.

Notes

- 1 Economic Planning Agency (EPA) of Japan publishes the DI for a certain month within three months time. For example, the DI for January is published the following March. Since the leading period of the EPA's leading DI is said to be three months, the DI is able to provide an indication of the on-the-spot business situation.
- 2 The Phase Average Trend method requires the identification of phases as a precondition. For this, the Bry-Boschan turning point selection method was applied. For details, see Part II of this volume.

Bibliography

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