Economic Preconditions for Monetary Integration

in East Asia

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Junichi Goto
Kobe University

Research Institute for Economics
and Business Administration
Kobe University
2-1, Rokkodai-cho
Nada-ku, Kobe 657-8501
Japan
(phone/fax) 81-70-803-7007
(e-mail) jgoto@rieb.kobe-u.ac.jp

ABSTRACT

Asian Financial Crisis gave a devastating impact on East Asian countries, which had been enjoying good economic performance. As a result, there emerged various initiatives for monetary cooperation in order to avoid the next crisis in the region. However, there are pros and cons on the regional financial integration and cooperation in Asia. Some argue that in order to avoid the next Asian Financial Crisis, Asian countries must closely united with each other, and others argues that regional attempts, whether financial cooperation or trading arrangement, may undermine the global efforts. In view of the above, the purpose of this paper is to examine whether East Asian countries (or subset of them) constitute a preferable grouping for monetary cooperation and integration. I examine the degree of interdependence of East Asia in terms of trade, labor and macroeconomic variables. The results of the examination suggest that economic preconditions for monetary integration are met, and there is indeed a case for financial integration and cooperation in East Asia.

I. *Introduction*

Asian Financial Crisis gave a devastating impact, at least temporarily, on East Asian countries, which had been enjoying good economic performance. As a result, there emerged various initiatives for monetary cooperation in order to avoid the next crisis in the region: the Manila Framework Group for macroeconomic and financial surveillance, the recent Chiang Mai Initiative of ASEAN+3 for financial cooperation and so on.

There are pros and cons on the regional financial integration and cooperation in Asia. Some argue that in order to avoid the next Asian Financial Crisis, Asian countries must unite together, closely cooperate with each other, and in order to achieve effective cooperation surveillance or peer review is necessary. On the other hand, it is sometimes argued that regional attempts, whether financial cooperation or trading arrangement, may undermine the global efforts. The difference of the opinion culminated when Japan announced the idea of Asian Monetary Fund (AMF). The United States, together with China, opposed the creation of AMF, arguing that it would undermine the effectiveness of the IMF, and killed the initiative.

In view of the above, the major purpose of this paper is to examine the economic rationale for taking a regional initiative for monetary cooperation in East Asia. In other words, I will examine whether East Asian countries (or subset of them) constitute a desirable grouping for monetary cooperation and integration. For that purpose, I will examine the degree of interdependence of East Asia in terms of trade and labor, because the closer the region unites together in terms of real variables such as trade and migration, the stronger is the case for financial cooperation. After that, I will examine macroeconomic preconditions for financial integration in East Asia, using the theory of optimal currency Area.

The paper is organized as follows. Section II discusses the different channels of economic interdependence in East Asia—international movements of goods and services (trade) and labor mobility (migration)—and tries to see if the degree of interdependence in East Asia is higher or lower than that in other regions (e.g., Europe), and if the region's economic interdependence has deepened in the 1990s in

comparison to those in the 1980s. Generally speaking, the interdependence in terms of trade in Asia is very strong, and international mobility of goods and labor has increased markedly in the 1990s, but the Asian financial crisis proved to be a major setback to the closer integration of the economies in East Asia. Section III investigates whether the macroeconomic linkages among the East Asian economies is strong and whether it has become tighter in the 1990s. Relying on the principal component analysis, I have found that the real disturbances of the subset of Asian countries, i.e., Indonesia, Korea, Malaysia, the Philippines, Singapore, and Thailand, are pretty much synchronized, and that the synchronization of those in the six countries with those in Japan has increased in the 1990s, and the synchronization with Europe shows similar trend with Japan, with lesser degree. On the other hand, the correlation with the U.S. has been negative both in the 1980s and in the 1990s. The finding suggests that there is indeed the case for financial integration and cooperation in East Asia, and that the pegging to a basket of major currencies (or even to the yen) is better than the pegging to the dollar. Section IV summarizes major findings of the paper, and provides some agenda for future research of the subject.

II. *Interdependence in East Asia in Trade and Migration*

1. Flow of goods – trade

In this section, I will examine various data of international flows of goods and labor in order to find out the degree of interdependence among East Asian countries. In what follows, the main focus of our analysis is placed on EA14 countries, i.e., ASEAN 10 plus China, Hong Kong, Korea, and Taiwan.

Figure 1 plots the share of the values of trade (export plus import) with EA14 countries in the values of total trade of various reporters. As shown in Figure 1, the share of trade with East Asia increased for all five reporters in the figure. Especially, the share for EA14, i.e., intra-regional trade in East Asia, increased dramatically from 25.3 percent in 1985 to 38.7 percent in 1999. However, the Asian Financial Crisis seems to have given a dampening effect to the trade with East Asia. For example, EA14's share in Japanese trade decreased from 39.8 percent in 1996 to 34.6 percent in

1998.

The increased importance of intra-regional trade in East Asia is also confirmed by Table 1. Table 1 summarizes 'trade dependency index' on EA14. As discussed in Goto and Hamada (1994), trade dependency index is defined as the amount of exports and imports of a country with a particular trading partner (EA14 here) as a percentage of the country's GDP. For example, the last entry in the last row (4.05) shows that the amount of US's trade with East Asia is 4.05 percent of GDP or the United States. They called it 'trade dependency index' because it shows the degree to which a country depend on trade with specific partner for economic activities. With few exceptions, trade dependency with East Asia has been dramatically increasing in each country in East Asia. For example, for ASEAN 5 countries, with the exception of Singapore, the index in the late 1990s is several times higher than that in 1980. However, it should be noted that trade dependency of Japan on EA14 does not show no remarkable increase, i.e., the index in 1999 (6.20) is slightly lower than that in 1980 (6.51).

However, one caveat may be necessary for assessing the interdependency of East Asia in terms of trade. For example, Frankel (1991) doubts the existence of growing trend in the inter-regional trade intensity. According to him, as for the level of trade intensity, the share (37.4 percent) of inter-regional trade by Asian nations in 1989 is smaller than that of EC (59.9 percent) and there is very little difference from that of the North America (36.0 percent). The reason for the increase in the share from 33 percent in 1980 to 37 percent in 1989 was merely due to the increase of the Asian share in the total trade volume in the world. He concludes, "it is likely that there has in fact been no movement toward intra-regional bias in the evolving pattern of trade." In order to assess the degree of interconnectedness in trade, let us compare East Asian nations with EU nations by the 'trade intensity index' that Yamazawa et al. (1991) develops extensively. The trade intensity index between country i and country j is defined as:

(1) $T_{i,j} = (T_{i,j} / T_i) / (T_{w,j} / T_w)$

where $T_{i,j}$ = trade volume of country i with country j,

T_i = the total trade volume of country i,

$T_{w,j}$ = trade volume of the world with country j,

and T_w = the total trade volume of the world.

Accordingly, the index is the ratio of the share of the trade with j'th country in the total trade of country i to the share of the j'th country's trade in the total world trade. The index is normalized by dividing by the relative share of the country in the total world trade so that the effect of the mere size of the country is to be eliminated. If the degree of trade interaction between country i and country j is equal to that between the world and country j, then the index is equal to unity. The higher the index is, the more closely are the two countries interrelated by trade.

Table 2 and Table 3 depict respectively the trade intensity indexes among Asian countries and among EU countries. As is easily seen, those indexes that adjust for the size effect of trading partners show in many cases higher values in East Asia than those in EU. For example, in EU those indexes exceed four only in seven cases, i.e., Austria-Germany, Denmark-Finland, Denmark-Sweden, Finland-Sweden, Greece-Italy, Ireland-UK, and Portugal-Spain, in East Asia they exceed four in twenty one cases, and simple average of trade intensity indices for East Asia and EU are 5.51 and 2.35, respectively. It should be also noted that Japan's trade intensity with East Asia is substantially higher than U.S.'s trade intensity with East Asia. As far as we can tell from the levels of trade intensity index, in spite of the slightly negative impression that Frankel (1991) provide, we may say that the degree of trade interdependence is quite strong among East Asian nations.

Let us now turn to the changes in the trade intensity indices in East Asia during the 1980s and 1990s. Table 4 is given for that purpose. Table 4 does not show any increasing trend of trade intensity index in East Asia. Some of the indices among Asian nations increased, but some decreased. As far as the trend is concerned, the trade intensity indexes confirm the argument of Frankel (1991). In short, though I found the level of the trade intensity among East Asian nations to be even higher than

in Europe, I could not necessarily detect a distinct increasing trend. This may reflect the fact that, while in Europe many programs toward market integration were realized during the 1980s and 1990s, in Asia the move toward a FTA became active only recently. Table 4 appears to indicate that trade intensity of East Asia with non-Asian countries is not so strong, too.

2. *Flow of labor – migration*

Let us briefly examine the recent situation of migration in East Asian countries. Although the data on migration in East Asia are sketchy, we can observe several facts. First, while the degree of labor market integration in East Asia is not as large as that in North America or in Europe, it has been rapidly increasing in the 1990s. The foreign population share in total East/Southeast Asian countries is only 1.2 percent, which is substantially lower than that in North America (8.6 percent) and that in Europe (5.0 percent). Some internationalized countries (areas) such as Hong Kong (40.0 percent) and Singapore (15.5 percent) are notable exceptions. Recently, however, the degree of labor market integration in Asia has been dramatically increasing, at least until the Asian Financial Crisis. According to the ILO (1998), intra-Asian migration has increased from one million in the beginning of 1980s to 6.5 million in 1997. Major host countries include Japan and the NIES such as Hong Kong, Singapore, and Taiwan, while Indonesia and the Philippines are major exporters of migrant workers. Korea, Malaysia, and Thailand are both exporters and importers of migrant workers, i.e., they are receiving some types of foreign workers and sending out other types of workers. The increasing trend of Asian migration can be observed from the data both in receiving and sending countries. Table 5 lists the number of registered foreigners in Japan, a typical receiving country, by sending countries. As the table shows, the number of registered foreign residents originating in Asia has increased by 48 percent from 734,476 in 1980 to 1,086,390 in 1997. Although the Asian share in the total number of registered foreign residents is decreased due to the dramatic increase in the foreign residents from North America, it is still as high as 73 percent in 1997. In addition to the legal residents, there are many illegal overstayers,

too.   According to the estimate by the Japanese Ministry of Justice, the number of illegal overstayers is 281,157 in 1997, almost all of which are from neighboring East Asian countries, such as Korea, the Philippines, China, and Thailand.

The increasing trend of intra-Asian migration can also be observed from the data reported by sending countries. Table 6, Table 7, and Table 8 show the number of emigration of workers by destination from Indonesia, the Philippines, and Thailand, respectively.   The number of deployed workers from these countries into Asian countries has doubled in a few years. The increase in Indonesian emigrant workers deployed in Asia is dramatic, i.e., it shows more than a five-fold increase in just two years (from 68,436 in 1995 to 375,383 in 1997). Asia and the Middle East are the two major destinations for these workers, and the importance of destinations in Asia is increasing. For example, as shown in Table 8, while the number of Filipino workers deployed in the Middle East has hardly increased in the 1990s, those deployed in Asian countries has doubled during the same period. For Indonesia and Thailand, the Asian share in the total number of deployed workers is as high as eighty percent.

The increasing trend of intra-Asian migration discussed above seems to be suspended, at least temporarily, by the Asian Financial Crisis started in July 1997.   In order to cope with the dramatic depreciation of their currencies and inflationary pressures, many countries were obliged to take deflationary monetary and fiscal policies. As a result, many countries, perhaps with the exception of Taiwan, have been suffering from negative economic growth and high unemployment. Due to the severe unemployment problem, there are some changes in government policies towards migration in both receiving and sending Asian countries.

Receiving countries, such as Korea, Malaysia, Singapore, and Thailand[1], took various measures to reduce the number of immigrant workers in order to save employment for native workers. For example, at the end of 1997, the governments of Malaysia and Thailand announced the plan to repatriate one million immigrant workers to save domestic jobs. In order to reduce the number of immigrant workers,

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[1] Thailand is both receiving and sending countries, and the Thai government took restrictive policies toward immigration and encouraged outflow of Thai workers in order to relieve the unemployment problem in the country.

especially illegal immigrants, various measures were taken by the governments of receiving countries in East Asia. First, the enforcement of immigration laws was strengthened in most countries. Second, amnesty programs taken by Korea and Malaysia, coupled with the threat of stiff punishment after the amnesty period, brought about a large number of exodus of illegal migrant workers. Third, in the hope of encouraging employers to shift from foreign workers to native workers, some countries, including Malaysia and Singapore, imposed fees (or increased existing fees) against migrant workers. Through various restrictive measures, a large number of migrant workers were forced out of many East Asian countries. As shown in Table 9, from 1997 to mid-1998, the number of migrant workers decreased sharply in Korea (43.8 % decline), Thailand (36.5 % decline), Malaysia (23.5 % decline), and Singapore (11.1 % decline) in less than a year. In addition to the decline in the number of migrant workers, worsening of working conditions has been reported.

While receiving countries took various restrictive measures to reduce immigration, sending countries, such as Indonesia, the Philippines, and Thailand, strengthened their efforts to increase emigration to mitigate unemployment problems in their countries. For example, in the beginning of 1998, Thailand announced the objective of sending out 210,000 Thai workers abroad. Similarly, the Filipino government suspended their policy to reduce outflow of unskilled workers, and, instead, encouraged the outflow of workers. Due to such efforts, the *total* number of emigration does not seem to have decreased at all after the Crisis, in spite of the decline in the emigrated workers destined to East Asia. Table 7 also lists the outflow of Filipino workers by destination in 1997 and 1998. As shown in the table, although the number of deployment (flow data) of Filipino workers in Asia decreased by 13,872 (or six percent decline), the deployment in all other regions increased. In other words, in spite of the substantially decreased job opportunities in East Asia, the total number of emigration from the Philippines actually *increased* from 1997 to 1998.

III.   *Macroeconomic Interdependence in East Asia*

1. *The Principal Component Analysis*

In the previous section, I have discussed the interdependence among East Asian economies in terms of trade, and labor migration. In what follows, I will investigate whether the macroeconomic variables of the East Asian economies have been closely related with one another and whether macroeconomic confluence has been strengthened or weakened in the region as a result of the Asian financial crisis. More specifically, I examine how synchronized and interdependent macroeconomic variables are in East Asia. To measure the degree of interdependence between a pair of countries, a natural approach would be to examine the correlation coefficient between them. To measure the degree of interdependence for a group of nations, however, pair-wise correlation coefficients may not be satisfactory and well-defined criterion need to be developed.

In this paper, as in Goto and Hamada (1994, 2001), I apply the analysis of the principal component to measure the degree of confluence in macroeconomic time series data in the East Asian countries. The principal components of a set of m variables (or a particular variable from m countries) are a set of m artificially constructed variables that are mutually orthogonal linear combinations of the original variables. The first component explains as much as possible the variance of the original variables, the second explains as much as possible the variance that is left unexplained by the first, and so forth. The first to the m-th components explain the entire variation of the original variables. I propose to measure the degree of confluence in variables mostly by the ratio of the variance explained by the first principal component to the total variance.

The rationale for this approach is as follows: If a set of variables are perfectly correlated, the first component explains all the variance. If they are mutually independent and have an identical variance, the first and any other components explain 1/m of the total variance. The higher the correlation of a set of variables is, the higher the ratio of the variance explained by the first principal component to the total variance. Thus, this ratio can be regarded as a multi-variable (or multi-country) version of correlation coefficient.

As is well known, this approach potentially has its own problems. The

principal components are not independent of the scaling of the variables; it is hard to interpret principal components in economic terms, even though the factor analysis that is closely related to the principal component method provides a way to interpret them. Despite these potential problems, I will apply the principal component method because it is a useful tool that effectively serves our objectives.

In this section, I apply the principal component analysis to seven key macroeconomic variables in the East Asian countries, i.e., changes in money supply, interest rates, inflation rates, changes in stock prices, changes in exchange rates, economic growth rates, and export activity in order to evaluate the degree of confluence of each of these variables within the region. I solve the characteristic equation of the correlation matrix of these macroeconomic variables. The principal components are normalized in such a way that they have zero mean and unitary variance. Applying the principal component analysis, I try to find whether the macroeconomic variables are more synchronized in the 1990s than in the 1980s. When monthly data are available, I will compare measures of confluence of each variable for three sets of situations, i.e., pre-crisis, mid-crisis, and post-crisis.

2. *Money Supply, Interest Rates, Inflation Rates, Stock Prices and Exchange Rates*

Money supply. Table 10 summarizes the proportion of the total variation in the rate of growth of money supply, for Indonesia, Korea, the Philippines (1980s vs. 1990s only), Singapore, and Thailand, that is accounted for by the first three principal components. For example, the table should read as follows: For the situation in the 1980s, the first principal component accounts for 44.6 percent of the total variation of money supply changes in East Asia, the second for 24.7 percent (or 69.3 percent cumulatively), and the third for an additional 19.9 percent (89.2 percent cumulatively). For the situation in the 1990s, the first principal component accounts for 56.9 percent of the total variation, the second for 25.9 percent (or 82.8 percent cumulatively), and the third for 10.6 percent (93.4 percent cumulatively). As mentioned above, I measure the degree of confluence in variables, i.e., money supply changes (or any other variable) of selected East Asian countries, largely by the ratio of the variance

explained by the first component to the total variance.

The table shows that the percentage of variation in East Asia's money supplies that is explained by the first principal component is larger in the 1990s than in the 1980s. Beyond the first principal component, the percentage of variation explained by the second and third components is also larger in the 1990s than in the 1980s. This confirms that confluence in money supply in East Asia has substantially increased in the 1990s.

The table also indicates that the percentage of variation that is explained by the first, second, and third principal components is the largest in the mid-crisis period, the second largest in the post-crisis, and the smallest in the pre-crisis period. This means that confluence in East Asia's money supplies has risen substantially from the pre-crisis to the post-crisis period, and declined somewhat in the post-crisis period. The net result is that the confluence has become greater after the Asian financial crisis.

It is also interesting to consider the contribution of each original variable to the principal components, by examining the "factor loading." The factor loading is the correlation coefficient between a principal component and the original variable. The sum of the squares of loading factor of a component equals its characteristic root.

Table 11 summarizes the factor loading for the first three principal components for five East Asian countries, i.e., Indonesia, Korea, Philippines, Singapore, and Thailand, where comparable monthly data are available. In order to find the affinity of each principal component to the Japanese money supply, the correlation coefficient between a principal component and the Japanese variable is calculated. The table indicates that the first principal component is positively correlated with all the original variables in the 1980s and that this ceases to be the case in the 1990s. So a comparison between the 1990s and 1980s does not yield intuitive results. A close look at loading factors, however, reveals that in the pre- and mid-crisis periods the first principal component of money supply changes in East Asia is negatively correlated with the original variable of some of these economies and of Japan while in the post-crisis period the correlations become all positive. This means that the money supply change

of all countries listed in the table becomes synchronized with each other after the Asian financial crisis.

Interest rates. As indicated in Table 12, confluence of interest rates, for Hong Kong SAR, Indonesia (pre-crisis, mid-crisis, and post-crisis only for these two economies), Korea, Malaysia, the Philippines, Singapore, and Thailand, demonstrates somewhat a different pattern from that of money supply changes. It shows that the percentage of variation that is explained by the first principal component is larger in the 1990s than in the 1980s, though the cumulative percentage of variation explained by the second and third components is smaller in the 1990s than in the 1980s. In addition, the percentage of variation explained by the first, second, and third principal components is always larger in the post-crisis period than in the mid- or pre-crisis period. Thus, the confluence in interest rates in East Asia has risen in the 1990s, and the rise is especially substantial in the post-crisis period.

Inflation rates. Table 13 presents the degree of confluence of the rate of change in consumer price indices, for Indonesia, Korea, the Philippines, Singapore, and Thailand. Different from changes in money supply and interest rates examined above, we observe that the percentage of variation explained by the first principal component is greater in the 1990s than in the 1980s, while the percentage of variation explained cumulatively by the second and third components is smaller in the 1990s. The degree of confluence in inflation rates among the East Asian economies declined as long as the first principal component is concerned, probably due to wider inflation fluctuations in the 1990s. The percentage of variation explained by the first principal component is smaller in the post-crisis period than in the pre-crisis period, though it is the largest in the post-crisis period if explained by the second and third components. Thus, the degree of confluence has declined in the 1990s and continued to decline after the crisis.

Stock prices. Table 14 summarizes the degree of confluence of the rate of change in leading stock price indicators for China (pre-crisis, mid-crisis, and post-crisis only), Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan POC, and Thailand. The table indicates that the percentage of

variance explained by any of the principal components is larger in the 1990s than in the 1980s; the percentage explained by the first component has dramatically increased from 45.9 percent in the 1980s to 61.2 percent in the 1990s. The percentage of variance explained by any of the principal components is larger in the post-crisis period than in the pre-crisis period. Thus, the degree of confluence in stock price changes in East Asia has substantially increased in the 1990s, and particularly after the Asian financial crisis.

Exchange rates. Confluence in the rate of change in exchange rates, for China, Hong Kong SAR, Indonesia, Korea, Malaysia (1980s vs. 1990s only), the Philippines, Singapore, and Thailand, demonstrates a different pattern. As shown in Table 15, the degree of confluence substantially increased in the 1990s, but the increased synchronization seems to have been somewhat reversed by the Asian financial crisis. This may be a natural result of a general move to more flexible exchange rate arrangements adopted in the region.

3. *Real GDP Growth Rates and Export Performance*

GDP growth rates. Table 16 compares the degree of confluence of real GDP growth rates for China, Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore, and Thailand in the 1990s and in the 1980s. Since monthly data are not available for the GDP growth rates, I cannot calculate the principal components before, during and after the Asian financial crisis.

The table shows that the percentage of variance explained by any of the principal components is larger in the 1990s than in the 1980s. Hence, fluctuations in real economic activity in East Asia have become more synchronized in the 1990s. Examination of factor loading for the first principal component supports this conclusion. In the 1980s, as shown in Table 17, two countries in particular, China and Korea, deviate from the general pattern, but in the 1990s all East Asian economies listed in the table have real GDP growth rates very much synchronized with each other. The table also demonstrates that in the 1990s the synchronization between East Asia's economic growth and Japanese growth has become stronger, while there is a negative

synchronization between East Asia's economic growth and US growth. That is, East Asia is much more synchronized with Japan in terms of economic fluctuations than with the United States.

  Export performance. Table 18 shows the first three principal components of the rate of growth in exports for China, Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore, and Thailand. It demonstrates that the degree of confluence in export performance in East Asia has risen in the 1990s, and also after the Asian financial crisis. But this rise is not very significant.

4. *IS Shocks*

  Finally, I identify IS shocks in East Asia by estimating investment functions, and then examine the degree of synchronization of IS shocks by applying the principal component analysis to the estimated shocks. I concentrate on disturbances on investment functions because the consumption function is much more stable.

  The following investment function is estimated for six countries in East Asia, namely, Indonesia, Korea, Malaysia, the Philippines, Singapore, and Thailand:

$$\ln Z_t = \alpha + \beta_1 \ln r_{t-1} + \beta_2 \ln Y_{t-1} + \beta_3 t + u_t$$

where $\ln Z_t$ = natural log of investment (in real terms) at time t,

     $\ln r_{t-1}$ = natural log of the interest rate at time t-1,

     $\ln Y_{t-1}$ = natural log of real GNP at time t-1,

     t = time trend,

     u_t = error term.

The estimation results are generally satisfactory for most countries, with expected signs of coefficients (i.e., $\beta_1 < 0$ and $\beta_2 > 0$), and with statistical significance. The estimated residuals are considered as a proxy for real disturbances, or IS shocks, in each country.

  Application of the principal component analysis to the estimated IS shocks yields the results summarized in Table 19. The table shows that the first principal component explains a little more than 50 percent of the total variation in East Asian IS

shocks both in the 1980s and the 1990s (51.1 percent and 51.2 percent respectively). This figure is lower than that for the EU (56.5 percent in the 1980s and 62.2 percent in the 1990s). The result implies that the economic shocks among EU countries have become more synchronized in the 1990s probably due to the political push toward economic integration such as the ERM arrangement under the EMS and the EC92 initiative. From a pure economic viewpoint, these six East Asian countries are almost as suitable for a currency union as the EU, most of the members of which have surrendered monetary policy autonomy by adopting a common currency, the euro.

It is also interesting to consider the contribution of each additional variable to the principal components. For that purpose, let us examine the "loading factor." As mentioned earlier, the loading factor is equivalent to the correlation coefficient between a principal component and the original variable. The sum of the squares of loading factors of a component equal its characteristic root.

Table 20 summarizes the loading factors for the first three principal components for the Asian IS shocks in the 1980s and 1990s. One can make two observations from the table. First, while Korea and Thailand were outliers in the East Asian group in the 1980s moving in the same direction as the United States, in the 1990s they have been subject to shocks common to other East Asian economies. Second, only Singapore is an outlier in the 1990s.

In order to find the affinity of each principal component to the three large economies, the table reports the correlation coefficients between a principal component with the Japanese, US, and EU variables. The correlation coefficient between the first principal component (P1) and the real disturbances in Japan, the United States, and Europe tells us three important facts. First, the IS shocks in East Asia have a strong negative correlation with the IS shock in the U.S. both in the 1980s (-0.627) and in the 1990s (-0.806). In other words, when the US faces a positive shock, the East Asian economies face a negative shock, and vise versa. Second, East Asia's IS shocks had no correlation with Japan's IS shock in the 1980s, but in the 1990s they have a strong positive correlation with Japan's IS shocks. Third, correlation with Europe shows similar trend with Japan, to a lesser degree.

IV. *Concluding Remarks*

This paper has investigated economic rationale for monetary cooperation and integration in East Asia. For that purpose, I have examined the degree of regional economic interdependence in terms of trade, labor, and macroeconomic shocks in East Asia.

First, I have examined real data on economic interdependence in East Asia to answer the questions: (a) whether the various political initiatives in the 1990s toward economic coordination have in fact produced closer economic integration in East Asia; and (b) whether the trend toward economic integration in the region is reversed after the Crisis. As examined above, answer to the first question is generally 'yes', i.e., interdependence among East Asia in terms of trade and migration have increased in the 1990. The answer to the second question is mixed. Namely, as far as the international movements of goods and labor are concerned, a temporary setback is observed after the crisis.

Second, relying on the principal component analysis, I have found that macroeconomic indicators of the subset of Asian countries, are pretty much synchronized, and that the synchronization with those in Japan has increased in the 1990s, and the synchronization with Europe shows similar trend with Japan, with lesser degree. On the other hand, the correlation with the U.S. has been negative both in the 1980s and in the 1990s. The finding suggests that there is indeed the case for financial integration and cooperation in East Asia, and that the pegging to a basket of major currencies (or even to the yen) is better than the pegging to the dollar.

All these findings suggest a strong case for monetary cooperation and integration among Asian countries. The next and probably more important question is how to realized closer cooperation in such a heterogeneous group in terms of the stage of economic development, economic system, language and so on.

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Figure 1: Share of East Asia in Trade
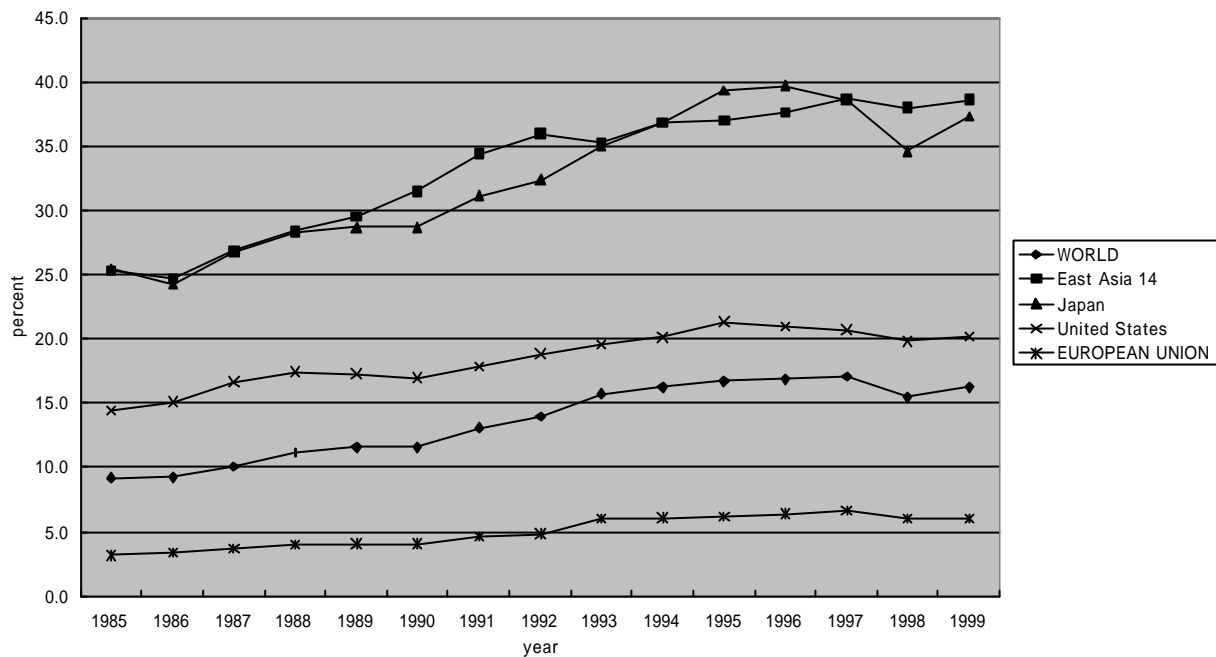
Table 1: Trade Dependency Index, East Asia 14 as Partner

Reporters	1980	1985	1990	1995	1996	1997	1998	1999
Brunei Darussalam	17.03	27.20	33.63	59.88	62.05	62.41	33.93	36.47
Myanmar	4.43	2.19	2.20	2.24	1.76	1.40	0.89	0.84
Cambodia			5.47	53.53	48.67	38.96	41.91	52.67
Indonesia	7.64	5.96	9.91	11.41	12.02	13.70	27.12	23.41
Lao P. D. Rep.		1.89	18.28	31.26	34.82	24.42	43.31	45.13
Malaysia	26.78	30.36	49.72	62.36	61.05	62.42	70.21	78.53
Philippines	6.92	8.55	11.03	16.73	15.93	22.59	29.11	29.99
Singapore	140.24	107.65	112.06	130.61	125.91	124.86	112.95	122.74
Thailand	11.62	11.31	15.76	21.80	20.36	24.01	26.06	29.71
Vietnam		0.98	23.03	37.98	45.79	43.46	38.00	38.76
Taiwan, China	12.81	10.77	14.71	24.14	23.50	24.96	23.75	25.55
Hong Kong	47.40	71.24	106.56	138.20	130.86	123.69	117.09	121.72
Korea	6.11	7.23	6.84	12.66	13.57	15.77	18.80	17.63
China	3.36	5.23	14.73	14.26	12.36	13.33	11.73	12.06
(average of the above)	25.85	22.35	30.28	44.08	43.47	42.57	42.49	45.37
Japan	6.51	5.84	5.05	5.97	6.58	7.00	6.12	6.20
United States	2.07	2.04	2.78	4.11	4.07	4.19	3.91	4.05

sources: IMF, Direction of Trade Statistics; World Bank database.

Table 2 : Trade Intensity Indices among East Asina Countries (1999)

	Brunei	Myanmar	Cambodia	Indonesia	Lao P. D. Re	Malaysia	Philippines	Singapore	Thailand	Vietnam	Taiwan	Hong Kong	Korea	China
Brunei Darussalam		0.18	0.01	4.34	0.00	6.68	0.35	8.24	8.75	0.11	0.17	0.37	3.46	0.15
Myanmar	0.18		0.30	7.19	0.00	6.37	0.45	7.71	0.00	0.00	1.98	1.01	2.67	4.66
Cambodia	0.01	0.30		2.27	1.23	1.17	0.18	9.33	14.44	84.22	2.72	2.27	1.25	1.24
Indonesia	4.34	7.19	2.27		0.28	2.61	1.55	5.58	2.85	4.62	2.07	0.92	3.39	1.77
Lao P. D. Rep.	0.00	0.00	1.23	0.28		0.11	0.02	2.37	50.92	21.33	0.44	0.39	0.59	1.09
Malaysia	6.68	6.37	1.17	2.61	0.11		2.82	11.18	3.47	2.09	2.21	1.19	1.82	0.83
Philippines	0.35	0.45	0.18	1.55	0.02	2.82		3.67	2.59	1.89	3.78	1.73	2.52	0.84
Singapore	8.24	7.71	9.33	5.58	2.37	11.18	3.67		4.90	4.61	2.12	2.03	1.71	1.20
Thailand	8.75	0.00	14.44	2.85	50.92	3.47	2.59	4.90		4.17	2.01	1.46	1.15	1.06
Vietnam	0.11	0.00	84.22	4.62	21.33	2.09	1.89	4.61	4.17		3.85	1.00	3.44	1.85
Taiwan, China	0.17	1.98	2.72	2.07	0.44	2.21	3.78	2.12	2.01	3.85		4.59	1.76	0.90
Hong Kong	0.37	1.01	2.27	0.92	0.39	1.19	1.73	2.03	1.46	1.00	4.59		1.61	9.12
Korea	3.46	2.67	1.25	3.39	0.59	1.82	2.52	1.71	1.15	3.44	1.76	1.61		2.67
China	0.15	4.66	1.24	1.77	1.09	0.83	0.84	1.20	1.06	1.85	0.90	9.12	2.67	
average	5.51													
(Japan)	4.67	1.33	0.33	3.27	0.63	2.25	2.95	1.82	3.02	2.54	2.92	1.56	2.49	2.52
(USA)	0.78	0.46	0.59	0.91	0.10	1.20	1.59	1.15	1.11	0.27	1.46	1.10	1.35	1.02

source: IMF, Direction of Trade Statistics.

Table 3 : Trade Intensity Indices among EU Members (1999)

	Austria	um-Luxem	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain	Sweden	UK
Austria		0.79	0.98	1.14	0.90	4.53	0.95	0.46	2.22	0.99	0.74	0.98	0.95	0.67
Belgium-L	0.79		0.93	0.95	2.90	2.03	1.08	1.31	1.24	3.66	1.37	1.44	1.39	1.75
Denmark	0.98	0.93		4.59	1.04	2.33	1.55	1.43	1.06	1.64	1.17	0.97	8.43	1.62
Finland	1.14	0.95	4.59		0.91	1.76	1.65	1.00	0.94	1.42	1.04	0.93	8.51	1.50
France	0.90	2.90	1.04	0.91		2.04	1.52	1.32	2.50	1.62	2.33	3.58	1.08	1.82
Germany	4.53	2.03	2.33	1.76	2.04		1.64	1.15	2.02	2.44	1.91	1.70	1.58	1.44
Greece	0.95	1.08	1.55	1.65	1.52	1.64		0.72	4.04	1.38	0.69	1.62	1.42	1.11
Ireland	0.46	1.31	1.43	1.00	1.32	1.15	0.72		0.85	1.36	0.61	1.06	1.12	5.17
Italy	2.22	1.24	1.06	0.94	2.50	2.02	4.04	0.85		1.17	1.79	2.51	0.95	1.24
Netherland	0.99	3.66	1.64	1.42	1.62	2.44	1.38	1.36	1.17		1.24	1.21	1.77	1.91
Portugal	0.74	1.37	1.17	1.04	2.33	1.91	0.69	0.61	1.79	1.24		10.19	1.14	1.54
Spain	0.98	1.44	0.97	0.93	3.58	1.70	1.62	1.06	2.51	1.21	10.19		1.23	1.51
Sweden	0.95	1.39	8.43	8.51	1.08	1.58	1.42	1.12	0.95	1.77	1.14	1.23		1.75
UK	0.67	1.75	1.62	1.50	1.82	1.44	1.11	5.17	1.24	1.91	1.54	1.51	1.75	
average	2.35													
(Japan)	0.22	0.34	0.44	0.45	0.30	0.48	0.47	0.57	0.33	0.54	0.28	0.27	0.42	0.54
(USA)	0.26	0.44	0.32	0.45	0.47	0.54	0.28	0.99	0.49	0.44	0.24	0.29	0.52	0.89

source: IMF, Direction of Trade Statistics.

Table 4 : Trade Intensity with East Asia 14

	1980	1985	1990	1995	1996	1997	1998	1999
Brunei Darussalam	1.86	2.42	2.68	2.34	2.46	2.34	1.57	2.08
Myanmar	4.55	3.52	3.59	2.88	2.51	1.86	1.50	1.34
Cambodia	0.00	3.95	6.05	4.03	2.80	4.09	2.57	2.80
Indonesia	2.39	2.01	2.06	1.71	1.98	2.04	2.17	2.09
Lao P. D. Rep.	0.00	7.02	6.21	3.42	4.62	1.06	0.38	1.29
Malaysia	4.12	3.89	3.56	2.59	2.76	2.65	2.39	2.36
Philippines	2.09	2.08	1.42	1.49	1.41	1.48	1.57	1.89
Singapore	5.82	4.15	3.52	3.32	3.33	3.26	2.96	2.99
Thailand	3.51	2.67	1.75	2.00	2.09	2.07	1.86	1.93
Vietnam	0.00	1.53	2.08	2.55	2.81	2.56	1.57	1.50
Hong Kong	3.18	4.30	3.83	3.18	3.23	3.15	3.11	2.95
Korea	1.73	1.27	1.42	2.22	2.40	2.39	2.13	2.14
Taiwan, China	2.47	1.77	2.36	2.60	2.58	2.53	2.32	2.39
China	4.36	4.19	4.79	2.61	2.43	2.60	2.36	2.18
(average of the above)	2.58	3.20	3.24	2.64	2.67	2.43	2.03	2.14
Japan	3.26	2.39	2.38	2.44	2.46	2.30	1.95	2.04
United States	1.40	1.17	1.15	1.09	1.06	0.99	0.86	0.87
France	0.20	0.32	0.29	0.36	0.34	0.37	0.31	0.23
Germany	0.35	0.36	0.32	0.42	0.42	0.38	0.30	0.29
Italy	0.23	0.30	0.30	0.37	0.41	0.36	0.24	0.24
United Kingdom	0.48	0.40	0.42	0.42	0.42	0.41	0.32	0.32

source: IMF, Direction of Trade Statistics.

Table 5:   Registered Foreigners in Japan, by Origin

(number)

	1970	1980	1990	1997
Asia	672.280	734.476	924.560	1.086.390
North America	1.290	2.719	71.495	284.691
South America	20.892	24.743	44.643	55.312
North Europe	11.902	15.897	25.563	38.200
Oceania	1.044	1.561	5.440	9.645
Africa	232	795	2.140	6.275
Total	707.640	780.191	1.073.841	1.480.513

(share. %)

	1970	1980	1990	1997
Asia	95.00	94.14	86.10	73.38
North America	0.18	0.35	6.66	19.23
South America	2.95	3.17	4.16	3.74
North Europe	1.68	2.04	2.38	2.58
Oceania	0.15	0.20	0.51	0.65
Africa	0.03	0.10	0.20	0.42
Total	100.00	100.00	100.00	100.00

Source: Japanese Ministry of Justice

Table 6. Indonesia: Workers Abroad, by Destination

Year	1995		1997	
Destination Countries	Number (1000)	Share (%)	Number I. (1000)	Share (%)
Asia Pacific	68.4	56.7	375.4	74.6
Brunei	0.8	0.7	2.4	0.5
Hong Kong SAR	4.2	3.5	2.0	0.4
Japan	1.4	1.2	3.2	0.6
Korea	6.7	5.6	8.4	1.7
Malaysia	29.7	24.6	317.7	63.2
Singapore	21.0	17.4	31.9	6.3
Taiwan POC	4.1	3.4	9.4	1.9
Other Asia Pacific	0.4	0.4	0.2	0.0
America	3.5	2.9	0.7	0.1
Europe	0.0	0.1	0.6	0.1
Middle East & Africa	47.5	39.4	116.8	23.2
Other	1.2	1.0	10.0	2.0
Total	120.6	100.0	503.0	100.0

Source: Scalabrini Migration Center.

Table 7. The Philippines: Overseas Workers, By Destination

Year	1990		1996		1997		1998	
Destination Countries/Regions	Number (1000)	Share (%)	Number (1000)	Share (%)	Number (1000)	Share (%)	Number (1000)	Share (%)
Asia	90.8	27.1	174.3	36.0	235.1	42.0	221.3	39.3
Hong Kong SAR	34.4	10.3	43.9	9.0	--	--	--	--
Japan	41.6	12.4	20.2	4.2	--	--	--	--
Malaysia	4.4	1.3	12.3	2.5	--	--	--	--
Singapore	4.7	1.4	15.1	3.1	--	--	--	--
Taiwan POC	0.1	0.0	65.5	13.5	--	--	--	--
Other Asia	5.6	1.7	17.4	3.6	--	--	--	--
Americas	9.6	2.9	8.4	1.7	7.1	1.3	8.2	1.5
Europe	6.9	2.0	11.4	2.4	12.6	2.3	15.7	2.8
Middle East	218.1	65.1	221.2	45.6	221.0	39.5	226.8	40.3
Other	9.6	2.9	69.3	14.3	79.9	14.3	84.9	15.1
Total	334.9	100.0	484.7	100.0	559.2	100.0	562.4	100.0

Source: Philippines Overseas Administration Office; Philippines Overseas Employment Administration.

Table 8. Thailand: Deployed Overseas Workers, by Destination

Year	1993		1996	
Destination Countries	Number (1000)	Share (%)	Number (1000)	Share (%)
Asia-5	94.1	82.4	148.8	80.3
Singapore	1.7	1.5	17.6	9.5
Brunei	14.4	12.6	20.7	11.2
Hong Kong SAR	5.4	4.7	4.3	2.3
Japan	5.7	5.0	10.1	5.5
Taiwan POC	66.9	58.6	96.1	51.8
Middle East	16.9	14.8	22.4	12.1
Other	3.1	2.7	14.2	7.6
Total	114.1	100.0	185.4	100.0

Source: Thai Government.

Table 9. Immigrant Workers and the Asian Financial Crisis

Year	1997	Mid-1998	Change	
Host Countries	Number (1000)	Share (%)	Number (1000)	Percent (%)
Hong Kong SAR	300	300	0	0.0
Japan	700	680	-20	-2.9
Korea	267	150	-117	-43.8
Malaysia	1,700	1,300	-400	-23.5
Singapore	450	400	-50	-11.1
Thailand	1,260	800	-460	-36.5
Total	4,677	3,630	-1,047	-22.4

Source: ILO (1999).

Table 10. Principal Component Analysis: Rates of Change in Money Supply

Principal Component	1990s vs. 1980s		Impact of the Financial Crisis		
	1980s	1990s	Pre-crisis	Mid-crisis	Post-crisis
P1	0.446	0.569	0.417	0.751	0.525
P2	0.693	0.828	0.688	0.905	0.864
P3	0.892	0.934	0.872	0.960	0.944

Table 11: Factor Loading: Rates of Change in Money Supply

Principal Component	1990s vs. 1980s		Impact of the Financial Crisis		
	1980s	1990s	Pre-crisis	Mid-crisis	Post-crisis
P1: Indonesia	0.453	0.706	0.710	0.959	0.494
Korea	0.602	-0.881	-0.688	-0.887	0.809
Philippines	--	--	0.207	-0.856	0.873
Singapore	0.859	-0.846	-0.473	-0.947	0.568
Thailand	0.692	-0.534	-0.916	-0.644	0.800
[Japan]	0.040	0.060	-0.480	-0.107	0.685
P2: Indonesia	0.854	0.627	0.439	0.087	0.835
Korea	-0.348	-0.015	0.607	0.185	-0.264
Philippines	--	--	0.873	-0.365	-0.249
Singapore	0.083	0.032	0.177	-0.250	-0.748
Thailand	-0.359	0.803	-0.010	0.729	0.554
[Japan]	-0.139	0.101	-0.118	0.134	-0.288
P3: Indonesia	0.068	0.092	0.347	0.056	0.045
Korea	0.701	-0.366	-0.128	-0.372	0.516
Philippines	--	--	-0.257	0.289	-0.332
Singapore	-0.094	0.521	0.838	-0.011	-0.105
Thailand	-0.539	-0.100	-0.125	0.228	-0.112
[Japan]	-0.177	-0.116	-0.334	0.605	-0.233

Table 12. Principal Component Analysis: Interest Rates

Principal Component	1990s vs. 1980s		Impact of the Financial Crisis		
	1980s	1990s	Pre-crisis	Mid-crisis	Post-crisis
P1	0.536	0.671	0.478	0.475	0.603
P 2	0.827	0.792	0.689	0.681	0.860
P 3	0.930	0.902	0.819	0.812	0.937

Table 13. Principal Component Analysis: Rates of Change in Consumer Prices

Principal Component	1990s vs. 1980s		Impact of the Financial Crisis		
	1980s	1990s	Pre-crisis	Mid-crisis	Post-crisis
P1	0.590	0.492	0.697	0.626	0.672
P 2	0.792	0.829	0.884	0.939	0.931
P 3	0.934	0.938	0.978	0.990	0.984

Table 14. Principal Component Analysis: rates of Change in Stock Prices

Principal Component	1990s vs. 1980s		Impact of the Financial Crisis		
	1980s	1990s	Pre-crisis	Mid-crisis	Post-crisis
P1	0.459	0.612	0.433	0.609	0.548
P 2	0.590	0.712	0.631	0.735	0.711
P 3	0.712	0.787	0.777	0.830	0.828

Table 15. Principal Component Analysis: Changes in Exchange Rates

Principal Component	1990s vs. 1980s		Impact of the Financial Crisis		
	1980s	1990s	Pre-crisis	Mid-crisis	Post-crisis
P1	0.260	0.517	0.403	0.547	0.365
P 2	0.401	0.648	0.600	0.741	0.602
P 3	0.533	0.775	0.749	0.881	0.752
P 4	0.660	0.849	0.883	0.931	0.862
P 5	0.771	0.903	0.949	0.967	0.931

Table 16. Principal Component Analysis: Real GDP Growth Rates

Principal	1990s vs. 1980s	
Component	1980s	1990s
P1	0.472	0.602
P 2	0.668	0.789
P 3	0.810	0.897

Note: Data used are annual data.

Table 17. Factor Loading: Real GDP Growth Rates

	1980s			1990s		
	P1	P 2	P 3	P1	P 2	P 3
China	0.727	0.147	0.406	0.316	0.673	0.651
Hong Kong SAR	-0.402	-0.114	0.859	0.949	0.059	0.231
Indonesia	-0.727	-0.530	0.256	0.982	-0.003	0.005
Korea	0.253	0.841	0.333	0.887	-0.226	-0.245
Malaysia	-0.872	0.112	-0.013	0.994	-0.010	0.009
Philippines	-0.772	0.231	-0.209	0.482	-0.554	0.126
Singapore	-0.914	0.109	0.079	0.025	0.796	-0.471
Thailand	-0.548	0.684	-0.095	0.921	0.209	-0.294
Japan	-0.107	0.358	-0.095	0.667	-0.346	-0.353
USA	0.172	0.298	0.537	-0.403	-0.227	0.428
EU						

Table 18. Principal Component Analysis: Rates of Change in Exports

Principal	1990s vs. 1980s		Impact of the Financial Crisis		
Component	1980s	1990s	Pre-crisis	Mid-crisis	Post-crisis
P1	0.406	0.455	0.520	0.547	0.554
P 2	0.573	0.604	0.730	0.691	0.728
P 3	0.706	0.729	0.848	0.811	0.829

Table 19. Principal Component Analysis of the Estimated IS Shocks

Principal Component	East Asia		European Union	
	1980s	1990s	1980s	1990s
P1	0.511	0.512	0.565	0.622
P 2	0.754	0.729	0.828	0.835
P 3	0.903	0.885	0.923	0.929
P 4	0.979	0.963	0.974	0.977
P 5	0.996	0.987	0.999	0.996
P 6	1.000	1.000	1.000	1.000

Notes: East Asia includes Indonesia, Korea, Malaysia, the Philippines, Singapore, and Thailand. The European Union includes Germany, France, Italy, the Netherlands, Spain, and the United Kingdom.
Source: Goto and Hamada (2001)

Table 20. Factor Loading for IS Shocks in East Asia

	1980s			1990s		
	P1	P 2	P 3	P 1	P 2	P 3
Indonesia	0.766	0.227	0.390	0.298	0.727	0.585
Korea	-0.363	-0.910	-0.043	0.852	-0.161	-0.408
Malaysia	0.944	-0.260	0.093	0.775	-0.498	0.277
Philippines	0.858	-0.006	0.204	0.830	-0.290	0.430
Singapore	0.681	-0.628	-0.269	-0.580	-0.594	0.246
Thailand	-0.503	-0.346	0.783	0.792	0.255	-0.322
Japan	0.097	-0.760	0.152	0.653	0.052	-0.105
USA	-0.627	0.379	0.014	-0.806	0.237	-0.138
EU	0.082	-0.724	0.321	0.369	0.539	-0.395

Source: Goto and Hamada (2001).