ECONOMIC INTEGRATION PERFORMANCE OF SELECTED EAST ASIAN AND PACIFIC COUNTRIES[1]

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ABSTRACT A composite index rates and ranks twelve East Asian and Pacific countries (Australia, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, New Zealand, The Philippines, Singapore, Taiwan, Thailand), and Canada and the United States for economic integration for two categories. The categories are the speed of integration derived from changes between the early 1980s and the early 1990s, and the initial level of integration derived from initial values in the 1980s. The indicators used are real trade as a share of GDP, Institutional Investor rating, FDI as a share of GDP, and manufacturing export as a share of GDP. For the speed of integration index, Singapore ranked first and Australia ranked last, while for the initial level of integration index, Singapore again ranked first but The Philippines ranked last.

1. INTRODUCTION

Global integration is understood to mean a process in which national cultures, national economies and national borders are dissolving (Hirst and Thompson, 1996). This concept grew out of the experience in recent years of ease of travel, ease of communication and falling cost of telephone communication, all making distance irrelevant. The prevalence and relatively inexpensive access to the information superhighway, electronic communication and the internet enable people almost everywhere to participate in common educational, cultural and artistic pursuits. Added to these are the availability of hundreds of choices of cable-TV channels and the introduction of products and new clothing fashions. What emerges is a perception of somewhat worldwide commonality of tastes in music, dress and even perhaps behaviour, all of which are consequences of the increase in international trade in recent decades.

The purpose of this article is to rate and rank 12 East Asian and Pacific countries and the United States and Canada according to their degree of integration using data on economic and institutional indicator variables obtained from The World Bank. The World Bank (1996a) classifies East Asian and Pacific countries by income as follows:

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Low Income
- Cambodia
- China ✓
- Lao PDR
- Mongolia
- Myanmar
- Vietnam

Lower-Middle Income
- Fiji
- Indonesia ✓
- Kiribati
- Korea, Dem. Rep.
- Marshall Islands
- Micronesia, Fed. States
- N. Mariana Islands
- Papua New-Guinea
- Philippines ✓
- Solomon Islands
- Thailand ✓
- Tonga
- Vanuatu
- Western Samoa

Upper-Middle Income
- American Samoa
- Malaysia ✓

High Income: OECD
- Australia ✓
- Japan ✓
- New Zealand ✓

High Income: Non-OECD
- Brunei
- French Polynesia
- Guam
- Hong Kong ✓
- Korea, Rep. ✓
- Macao
- New Caledonia
- Singapore ✓
- Taiwan ✓

The 12 East Asian and Pacific countries included in this study are marked (✓).

The United States and Canada were added because of their importance in trading with the 12 selected East Asian Countries. The aim is to provide evidence for convergence of performance for integration and to pick the least and the most integrated among them. East Asian countries constitute a neighbourhood because of close spatial association which, according to the World Bank (1993, p.2), "share some economic characteristics that set them apart from most other developing economies." They are also members of the Asian Pacific Economic Cooperation (APEC) which cooperates on issues relating to trade liberalisation, investment, macroeconomic stability and government policies. Therefore, it is of interest to compare them as a "club" for a key characteristic, namely the degree of integration as a group, to the rest of the world.

2. OPPORTUNITIES AND THREATS OF ECONOMIC INTEGRATION

On the virtue side of arguments, global economic integration is understood to be a process by which international trade and finance accelerate. The process enhances increased participation in the world economy providing such benefits as improved resource allocation, achievement of high standards of efficiency, advantages of international capital markets, wider options for consumers and exposure to new technologies. For example, Gavin and Hausmann (1996) point out that in perfectly integrated world financial markets, capital migrates to areas where the return is relatively high after adjusting for risk. Migration of capital to such areas, where capital is relatively scarce, would lead to convergence of capital-labour ratios. Furthermore, an integrated global financial market facilitates opportunities for inter-national diversification which is particularly important for small economies as they tend to possess less diversified resources than large economies.

While global economic integration is deemed beneficial, early on, as Malinvaud (1985) has warned, disruptions in the international economic environment may

foster instability. Pressures from instability can lead to protectionism, favoured by some businessmen because of acute foreign competition and by citizens fearing unemployment. Lal (1985) echoes the fear expressed by Malinvaud in pointing out the pressures for protectionist actions in Europe and North America which, along with more restrictions on imports of goods such as textiles, clothing, and steel, caused difficulties for many developing countries in meeting their indebtedness obligations in the 1980s.

As Burtless (1995) indicated upon reviewing the literature on international trade and earning inequality, even though the overwhelming majority of economists remain committed to the principle of free trade, sizeable losses in employment are suffered by less-skilled workers in the developed countries as a result of manufactured imports from developing countries. The beneficiaries are poor workers in developing countries. Haass and Litan (1998) confirm that job losses, increasing income inequality and stagnation of real wages created discontent in the United States which was blamed on globalisation.

Bhagwati (1998) warns against equating capital mobility with free trade, pointing out that capital flows are controlled by panics and manias which can cause considerable economic difficulty. Wood (1994) argues that the rise in earning inequality and high rates of joblessness in Western Europe and North America can be explained by the growth of manufacturing exports from the newly industrialising economies. Finally, Burtless *et al* (1998) observe that objections to globalisation are raised by environmentalists critical of low standards for protection of the environment and human right activists critical of child and prison inmate labour in some developing countries.

3. ECONOMIC INTEGRATION AND GLOBAL CONVERGENCE IN EAST ASIAN COUNTRIES

It is well known that many of the most successful developing countries in the era of globalisation of the last three decades have been countries located in East Asia. Although East Asia enjoyed some cultural and historical advantages which helped drive their success, other factors played key roles. Explanations of their success, besides high rates of savings and investment, invariably include an outward-oriented, market-based economic policy associated at the same time with policies which emphasise education, health care and reduction in income inequality among their people (World Bank, 1993). Thailand, Malaysia, Indonesia, Singapore, Hong Kong and The Philippines, for example, made large improvements in industrial and agricultural production, education, health, nutrition, consumption and exports. Consequently, per-capita incomes of some of these countries approached the levels of some advanced industrialised countries.

The remarkable growth of East Asian countries encountered some financial setbacks in late 1997. The experience resembles similar downturns in Chile during 1982-1983, and in Mexico during 1994-1995. Such setbacks are blamed (McKinnon and Pill, 1997) on unsustainable excessive foreign borrowing culminating in withdrawal of foreign funds and decline in asset values. But such

difficulties are brushed aside by Thurow (1998) as temporary and intrinsic to capitalism. Thurow provides many distant and relatively recent parallels in history to show that the economic instability in East Asia is not a unique incident. The explanations of East Asia's economic difficulties are many. In particular, Mayer (1998) and Kregel (1998) provide explanations based on Minsky (1972, 1975, 1982). The gist of Minsky's argument is "the economics of euphoria," which according to Mayer describes well the phenomenon known as the "Asian miracle." The euphoria is the willingness to take undesirable chances to finance investments. The suppliers of financial resources are caught in the same expectational climate as those that demand the resources. The ensuing structures of financial liabilities are tied up to cash flows from production. Financial instability takes place when third-party bystanders, because of turmoil in the financial market, suffer from abrupt withdrawal of financial resources.

Convergence, a widely used concept in economics, pertains primarily to poor economies catching up with richer economies in per capita income (Quah, 1996). According to Sala-i-Martin (1996) the classical approach to convergence attempted to answer such questions as whether poor economies would remain poor for long periods of time, or whether rich economies would remain rich in the foreseeable future, or whether income inequality across economies become larger or narrower over time. Tools devised to measure convergence for the classical approach rely on measures known as the absolute β-convergence which is based on regression methodology, and σ-convergence which is based on dispersion methodology.

Other competing hypotheses of convergence as pointed out by Galor (1996) are the conditional β-convergence and the club convergence. In the former case, countries with identical structural characteristics such as preferences, technologies, rates of population growth and government policies, converge to one another over time irrespective of their initial conditions. In the latter case, countries converge to one another provided that their initial conditions are the same.

In a broader sense, as Doyle (1997) and O'Leary (1997) have done, convergence means a process by which economic variables other than income for a group of countries display narrow dispersion (σ-convergence). For the case of East Asian countries in this study, the interest in convergence relates to variables such as free trade, transfer of technology, and access to foreign investment where collectively they may constitute economic integration.

4. THE CHOICE OF INDICATOR VARIABLES

A comparison of economic integration among a selected group of countries requires standards which can position the countries on a scale. Global economic integration is understood to mean the increase in economic transactions of residents of one country with residents of other countries. The World Bank (1998) recognising, as indicated earlier in this paper, whether integration is an opportunity or a danger or whether it is a strategic choice or inevitable consequence of

technological change, feels that it is important to assess countries for their global linkages to help shape development strategies.

The World Bank also recognises that such an assessment of integration depends on how it is measured. The World Bank contends that the main approaches to measurement rely on evaluation of barriers to integration or the outcomes of integration. Some useful indicators for the former are average tariffs, nontariff barriers, and capital controls. However, because of a variety of weaknesses of data relating to barriers, The World Bank prefers the outcomes of integration indicators. Here again, there are alternative indicators. Among these are indicators relating to trade such as import volume and export and import values, and others relating to finance such as FDI, portfolio investment, and bank and trade-related lending.

For this purpose, the staff of the World Bank (1996a) devised two indexes based on the outcome of integration: (1) the speed of integration index which was derived from changes between the early 1980s and the early 1990s, and (2) the initial level of integration index which was derived from initial values in the 1980s. The two indexes rate and rank some 115 countries which are at various levels of economic development for global economic integration (e.g. participation in the international markets for goods, services, capital and labour). The two indexes provide contrasting and complimentary information. Thus, while indexes based on changes (growth) according to Hall and Jones (1997), depict "transition dynamics," the index for the levels depicts the economic and institutional environment. The index for the speed of integration as suggested by the World Bank includes four indicator variables denoted by X_i, $i = 1,..,4$:

X_1: change in real trade as a share of GDP 1980-1983 to 1990-1993,

X_2: change in Institutional Investor rating 1983-1985 to 1993-1995,

X_3: change in FDI as a share of GDP 1980-1982 to 1990-1992, and

X_4: change in manufacturing export share 1981-1983 to 1991-1993,

while the index for the initial level of integration includes four indicator variables denoted by Y_i, $i = 1,..,4$:

Y_1: population-adjusted trade ratio, 1981-1983,

Y_2: Institutional Investor rating, 1981-1983,

Y_3: FDI as a share of purchasing power parity (PPP) GDP, 1981-1983, and

Y_4: manufacturing export share, 1981-1983.

The symbols X_i and Y_i used above are meant to distinguish between change indicator variables (X_i) and initial variables (Y_i).

The four indicator variables, which are trade as a share of GDP; institutional investor rating; FDI as a share of GDP; and manufacturing export share, were deemed by the World Bank as appropriate direct and indirect (proxy) measures for evaluating the outcome of global economic integration. Ratio of trade to GDP

provides a direct measure of competition and price allocation effects. According to Slaughter (1997), when countries exchange goods, factors and ideas, the drive to convergence accelerates.

Free trade in goods equalises prices; flows of factors lead to convergence of endowments and factor prices; and flows of technology can lead to convergence of factor prices also. Credit worthiness provides an indirect measure of access to international capital markets. A fall in worthiness for a country may reflect macroeconomic instability, excessive adverse terms of trade, political uncertainties and civil strife. Capital inflows and especially FDI have the potential for diffusing technology and skill. The inflows to East Asian countries according to the World Bank (1996b) were initially in the form of official lending, followed by commercial bank lending with government guarantees, and in recent years, private sources without government guarantees. Finally, the share of manufacturers in export is employed as an indirect measure for a country's capability to absorb technologies and to produce at world standards.

5. MEASUREMENT ISSUES

The use of separate indicators to assess economic integration among East Asian countries can be complemented by composite measures. Kolm (1977), Atkinson and Bourguignon (1982) and Ram (1982) have shown that composite indexes make comparisons easier. The composite index used by the World Bank to construct the speed and initial level of integration employs a common scaling device of the indicators by means of the transformation

$$z_i = (x_i - \bar{x}) / s \tag{1}$$

where x_I is actual observation, $\bar{x}_i$ is the mean and s is the standard deviation. The variable Z has a mean equal to zero and a standard deviation equal to one. An index "i" is obtained as the sum of the negative and positive deviations z_i (Smith, 1979). Therefore, values of the index itself may be negative, positive or zero. This aspect makes the index somewhat difficult to deal with arithmetically and conceptually. Also, it should be added that the point of reference is the mean of all 115 countries.

In order to construct an index which uses the same indicator variables of the World Bank but includes only the East Asian countries, an alternative device for constructing the index is proposed. The major differences between the World Bank index and the proposed index is that (1) the comparison among East Asian countries is made to a leader (hypothesised country) which constitutes the best scores of the variables. This aspect allows the perception of a convergence toward a goal and (2) the resulting index is a metric measure which allows statistical comparisons.

The device to construct the speed and initial level indexes for the East Asian countries is based on the concept of distance. Assume that one desires an index of

integration in order to rate and rank $n = 14$ countries according to $j = 4$ economic indicator variables as outlined in the introduction. To treat variables equally in the construction of the index, raw data are transformed into standard scores by letting

$$z_{ij} = (x_{ij} - \bar{x}_j + 3 s_j) / 6 s_j, i = 1,.... 14, \quad (2)$$

where $\bar{x}_j$ and s_j are the mean and the standard deviation of the observations of factor $j = 1,..,4$. The z_{ij} transforms an observation of country i for variable j into standardised units between zero and one.

The transformation

$$z_{ij} = (x_{ij} - \bar{x}_j + 3 s_j) / 6 s_j, \quad (3)$$

makes the data for each indicator variable fall usually between zero and one. However, d transformation of an outlier may take values outside the boundaries $<0, 1>$. To show that z_{ij} falls between zero and one, an appeal is made to the use of an approximation for a normal distribution. Thus, for a variable X with mean μ_X and standard deviation σ_X, then according to (Rohatgi, 1984, p. 424),

$$P(-3\sigma_X < X - \mu_X < 3\sigma_X) \simeq 1.$$

Adding $3\sigma_x$ to each side of the inequality, the result is

$$P(0 < X - \mu_X + 3\sigma_X < 6\sigma_X) \simeq 1.$$

Dividing each side by $6\sigma_X$,

$$P(0 < (X - \mu_X + 3\sigma_X) / 6\sigma_X < 1) \simeq 1.$$

Finally, replacing μ_X and σ_X by their sample estimates $\bar{x}_j$ and s_j gives for z_{ij} as defined above,

$$P(0 < z_{ij} < 1) \simeq 1.$$

The index is constructed as the $k = 4$-dimensional distance $d(z_{ij}, z_{0j})$ for observation z_{ij} from a reference point z_{0j} given by

$$d(z_{ij}, z_{oj}) = \left[\sum_{j=1}^{4} (z_{ij} - z_{oj})^2 \right]^{1/2}, i = 1,2,...,14. \quad (4)$$

The proposed distance index d of equation (4) is the familiar Euclidean distance between two points (Z_{ij}, Z_{0j}) in a four dimensional space satisfying the four axioms of metric space (Green and Heller, 1981). The reference points z_{0j} are the transformations by the equation of the best value in the distribution. Note that the smaller the index score of a country, the closer the country is to the reference point and, therefore, the higher is the rank of the country. Note that the point of reference is the best in the sample rather than the mean.

6. RATING AND RANKING SELECTED EAST ASIAN AND PACIFIC COUNTRIES

The reference four-dimensional point for the index of speed of integration in this study is drawn from the best values of the changes between the early 1980s and the early 1990s of the four variables in the composite index. Hong Kong had the highest change in real trade ratio (19.10); Korea had the highest change in the Institutional Investor rating (1.30); Singapore had the highest change in FDI as a share of GDP (0.367) while Thailand had the highest change in manufacturing export share (3.83). Therefore, the 4-dimensional reference point (the hypothesised country) is (19.10, 1.30, 0.367, 3.83), which is standardised by equation (2) into $(Z_{01}, Z_{02}, Z_{03}, Z_{04}) = (0.9810, 0.7956, 1.0297, 0.7661)$ in equation (4). For the index of initial level of integration, the best values were scored by Singapore for trade ratio, the United States for Institutional Investor rating, Singapore for FDI, and Japan for manufacturing export share resulting in a 4-dimensional point (295.6, 97.23, 8.80, 96.71) which is transformed in equation (4) to $(Z_{01}, Z_{02}, Z_{03}, Z_{04}) = (1.0554, 0.7413, 1.0465, 0.7199)$.

Table 1 provides summary information on the changes in the four indicator variables as well as the index. Among the 14 countries, Singapore is ranked first by the index with the minimum score of 0.408 and Australia ranked last with a score of 1.085. This is understandable because Australia is among the advanced economies; similarly, the United States ranked 12 and New Zealand ranked 13 and Japan ranked 11. The mean and the standard deviation of the 14 countries are = 0.863 and $s_d = 0.172$, respectively. Column 1 of Table 1 contains the percent change in real trade as share of GDP, Column 4 contains the change in Institutional Investor rating, Column 7 shows percentage change in FDI as a share of GDP, and Column 10 lists percent change in manufacturing export share. Highlighted also in Table 1 are the rankings of the countries for the four variables as well as the index shown in Columns (2), (5), (8), (11) and (14).

Also of interest is whether the observations on the specific countries for the indicators as well as the index differ significantly from their means. If the *t*-test rejects the hypothesis of equality with the mean, a "*" is placed next to the observation for a 10 percent (one sided) significance level or better. For the change in trade as a share of GDP (X_1), Hong Kong and Singapore, which ranked first and second, were the only two countries with positive and statistically significant *t*-values. For X_2 (change in Institutional Investor rating), Korea, Thailand and Taiwan, with the respective ranks 1, 2 and 3, scored positive and significant *t*-values while Australia, ranked 14th, had a negative significance.

Table 1. Speed of Integration Index and Related Indicators for Selected East Asian and Pacific Countries

	X_1			X_2			X_3			X_4			Index		
Country	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Australia	1.02	10	-0.47	-1.62	14	-1.88*	-0.026	13	-0.64	1.24	7	-0.20	1.085	14	1.29
Canada	1.81	7	-0.32	-0.42	10	-0.38	0.094	2	0.53	1.26	6	-0.19	0.835	6	-0.16
China	0.58	12	-0.55	-0.86	13	-0.93	0.041	5	0.01	0.61	9	-0.64	0.973	10	0.64
Hong Kong	19.10	1	2.88*	-0.22	7	-0.13	0.000	11	-0.39	-0.12	14	-1.14	0.814	4	-0.29
Indonesia	-1.40	14	-0.92	-0.05	6	0.08	0.021	7.5	-0.18	3.81	2	1.58*	0.891	8	0.16
Japan	0.24	13	-0.61	-0.29	8	-0.22	0.003	10	-0.36	0.12	13	-0.98	0.990	11	0.74
Korea	1.37	9	-0.40	1.30	1	1.78*	0.011	9	-0.28	0.26	12	-0.88	0.896	9	0.19
Malaysia	5.74	3	0.41	-0.41	9	-0.36	0.054	3	0.14	3.80	3	1.57*	0.745	3	-0.69
New Zealand	1.43	8	-0.39	-0.67	11	-0.69	-0.083	14	-1.19	0.56	10	-0.67	1.068	13	1.18
Philippines	1.84	6	-0.32	0.13	5	0.31	0.021	7.5	-0.18	2.69	4	0.81	0.822	5	-0.24
Singapore	11.11	2	1.40*	0.15	4	0.34	0.367	1	3.18*	1.93	5	0.27	0.408	1	-2.64*
Taiwan	2.72	5	-0.15	0.97	3	1.36*	0.028	6	-0.12	0.36	11	-0.81	0.850	7	-0.08
Thailand	3.25	4	-0.05	1.03	2	1.43*	0.046	4	0.06	3.83	1	1.59*	0.716	2	-0.85
United States	0.78	11	-0.51	-0.69	12	-0.72	-0.019	12	-0.57	1.04	8	-0.34	0.994	12	0.75
Mean	3.54			-0.12			0.040			1.53			0.863		
Std. Dev.	5.39			0.80			0.103			1.44			0.172		
CV	1.52			6.67			2.575			0.94			0.199		

Notes: X_1: Change in real trade as a share of GDP, 1980-1983 to 1990-1993.
X_2: Change in Institutional Investor rating, 1980-1982 to 1990-1992.
X_3: Change in FDI as a share of GDP, 1980-1982 to 1990-1992.
X_4: Change in manufacturing export share, 1981-1983 to 1991-1993.
The letters: A, B, C stand for Indicator, Rank, and *t*-values for significance at $\alpha = .10$, respectively.

Source: The *World Bank* (1996a).

By observing in Table 1 the "CV," the coefficient of variation (obtained by dividing the standard deviation by the mean) which is used as a measure of convergence (O'Leary, 1997), the indicator with the largest variability (divergence) among the 14 countries is X_2 (change in Institutional Investor rating). Korea, Thailand and Taiwan showed the largest improvement at one end while Australia showed the largest decline at the other end. The second largest coefficient of variation is for X_3 (change in FDI as a share of GDP) with the greatest disparity observed for Singapore. The smallest coefficient of variation is for X_4 (change in manufacturing export share), indicating a tendency for convergence more than the other variables.

Table 2 provides a similar summary of the index as well as the indicator variables for the initial level of integration. The largest index value (rated last) is attained by The Philippines, while Singapore attained the smallest value (rated first). Note here the ranks of Australia, the United States and Japan with ranks 7, 3, and 5, which are among the highest. This is also understandable because these countries are advanced economies and, therefore, well situated initially for economic integration. The largest coefficient of variation was for Y_3 followed closely by Y_1. The least was for Y_2. Remembering that the smallest distances were closest to the chosen reference point, the ordering of the distance in Column (14) suggests that Singapore led in the initial level of integration as well as the speed of integration. On the other hand, The Philippines replaced Australia for the last position.

Singapore was the only country which had a statistically significant *t*-value for Y_1 (population-adjusted trade ratio). The United States had the highest and most statistically significant Institutional Investor rating (97.23) while The Philippines had the lowest statistically significant rating (40.00). Singapore is the only country that showed statistical significance for Y_3 (FDI as a share of GDP), while Indonesia had a negative *t*-value for significance for manufacturing export share (Y_4).

Other comparisons are possible, such as determining whether the top ranked country by the index in Table 1, Singapore (d_1), differs significantly from Thailand ranked second (d_2). A one sided *t*-test given by:

$$|t| = \frac{|d_1 - d_2|}{\sqrt{2}\, S_d} = \frac{|0.408 - 0.716|}{\sqrt{2}\,(0.172)} = \frac{0.308}{0.243} = 1.27 \qquad (5)$$

indicates the difference is not statistically significant at the 5 percent significance level which requires t (.05, n-1) = t (.05, 13) = 1.771. Here S_d is the standard deviation for all countries from Table 1. A similar question for significance between the top rated Singapore (d_1) and the last rated Australia in Table 1 gives:

$$|t| = \frac{|0.408 - 1.085|}{\sqrt{2}\,(0.172)} = \frac{0.677}{0.243} = 4.11 \qquad (6)$$

which is significant.

Table 2. Initial Level of Integration Index and Related Indicators for Selected East Asian and Pacific Countries

	Y_1			Y_2			Y_3			Y_4			Index		
Country	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Australia	-0.17	11	-0.46	89.30	4	0.99	1.70	3	0.27	22.00	12	-1.05	0.901	7	0.09
Canada	19.67	6	-0.21	90.53	3	1.06	-0.34	14	-0.59	53.68	8	-0.04	0.906	8	0.11
China	14.52	7	-0.27	65.60	10	-0.38	0.06	11	-0.42	70.40	5	0.49	0.924	9	0.20
Hong Kong	79.59	2	0.56	75.16	7	0.17	0.00	13	-0.45	96.67	2	1.32	0.803	2	-0.42
Indonesia	11.70	9	-0.31	55.73	12	-0.95	0.12	7.5	-0.40	4.94	14	-1.60*	1.067	13	0.95
Japan	11.82	8	-0.31	95.33	2	1.33	0.03	12	-0.44	96.70	1	1.32	0.867	5	-0.09
Korea	23.40	4	-0.16	56.30	11	-0.91	0.07	10	-0.42	90.95	3	1.14	0.935	10	0.26
Malaysia	21.13	5	-0.19	72.10	8	-0.00	2.58	2	0.64	22.73	11	-1.02	0.865	4	-0.10
New Zealand	-7.01	14	-0.55	75.50	6	0.19	0.83	4	-0.10	20.62	13	-1.09	0.970	11	0.44
Philippines	-6.96	13	-0.55	40.10	14	-1.85*	0.10	9	-0.41	48.21	9	-0.22	1.079	14	1.00
Singapore	295.60	1	3.33*	78.23	5	0.35	8.80	1	3.29*	56.51	7	0.05	0.280	1	-3.13*
Taiwan	33.20	3	-0.03	67.67	9	-0.26	0.12	7.5	-0.40	89.14	4	1.08	0.879	6	-0.03
Thailand	-6.72	12	-0.54	51.30	13	-1.20	0.28	6	-0.33	28.89	10	-0.83	1.050	12	0.86
United States	10.52	10	-0.32	97.23	1	1.45*	0.51	5	-0.23	69.79	6	0.47	0.857	3	-0.14
Mean	35.70			72.15			1.06			55.09			0.884		
Std. Dev.	78.00			17.32			2.36			31.55			0.193		
CV	2.18			0.24			2.22			0.57			0.218		

Notes: Y_1: Population-adjusted trade ratio, 1981-1983.
Y_2: Institutional Investor rating, 1981-1983.
Y_3: FDI as a share of PPP GDP, 1981-1983.
Y_4: Manufacturing export share, 1981-1983.
The letters: A, B, C stand for Indicator, Rank, and *t*-values for significance at $\alpha = .10$, respectively.

Source: The *World Bank* (1996a).

Similarly for the initial level of integration index (Table 2), the country rated second, Hong Kong, with an index value of 0.802 shows statistical significance when compared with first ranked Singapore, and its index value of 0.280. In other words, Singapore was the exception among them all. This observation can also be validated by comparing as a benchmark Hong Kong (rated second) and its index value of 0.803 with The Philippines (rated last) and its index value of 1.079. Here $|t| = 0.143$ indicating no statistical significance between the country ranked second and the country ranked fourteenth.

Because the speed of integration index (Table 1) is derived from changes in the four integration variables between the early 1980s and the early 1990s rather than the levels of those variables (Table 2), it is of interest to find out whether these two classifications are somehow related (dependent) or whether they are unrelated (independent). To test for mutual independence between the four indicator variables as well as the index for the speed of integration (Table 1) and initial level of integration (Table 2), the Spearman rank correlation r_s and Kendall's Tau τ rank correlation (Conover, 1980, pp. 254-258) as well as the Pearson correlation r are chosen as the most appropriate because the data consist of observations occurring in pairs. There are a variety of statistical tests for independence such as the Chi-Square and the Cochrona's test for related observations in contingency tables. However, for bivariate observations occurring in pairs, the most commonly used tests are the Spearman, the Kendall and the Pearson, all of which are based on the concept of correlation between the pairs. In general, measures of dependence rely on covariance and correlation (Box, Hunter and Hunter, 1978; Rohatgi, 1984).

Let

X_i = an observation from Table 1 for country i, and

Y_i = a corresponding observation from Table 2.

The Spearman rank correlation coefficient is

$$r_s = 1 - (6T/n\,(n^2 - 1)) \tag{7}$$

where

$$T = \sum_i [R\,(X_i) - R\,(Y_i)]^2 \tag{8}$$

and where $R\,(X_i)$ and $R\,(Y_i)$ are the ranks of the variables under consideration. The Kendall's Tau (τ) is obtained by

$$\tau = (N_c - N_d) / (n\,(n-1)/2) \tag{9}$$

where N_c and N_d are the number of concordant and discordant pairs of observations. The test for significance for r_s and τ are obtained from Conover (1980), Tables A10 and A12, while for the Pearson correlation coefficients significance is tested (Hawkins and Weber, 1980, p. 536) by

$$t = r\,[(n - 2) / (1 - r^2)]^{1/2} \tag{10}$$

and compared for significance level α with t ($\alpha/2$, n-2). The correlation results (for r_s, τ and r) are

Trade:	$r_s = 0.424$*,	$\tau = 0.297$*,	$r = 0.598$*,
Institutional Investor:	$r_s = -0.574$*,	$\tau = -0.429$*,	$r = -0.587$*,
FDI:	$r_s = 0.016$,	$\tau = 0.044$,	$r = 0.838$*,
Manufacturing Export:	$r_s = -0.745$*,	$\tau = -0.626$*,	$r = -0.754$*,
Index:	$r_s = 0.147$,	$\tau = 0.066$,	$r = 0.636$*.

Significance at the 5 percent level or better (indicated by "*") were in agreement for r_s and τ. All coefficients of the Pearson correlation r were significant. Note that the correlation coefficients for institutional investor rating and the manufacturing export variables were negative. This indicates that there was a tendency for the smaller values of X to be paired with the larger values of Y or vice versa. The non-significance of the coefficients for FDI as well as the index using r_s and τ indicates that X and Y are independent. In other words, a favourable position of a country for FDI or a favourable position of a country at the index initially did not guarantee a favourable position in the speed of integration. Also, institutional investor rating and manufacturing export had the opposite effects.

7. SUMMARY AND CONCLUSIONS

This paper proposed the use of a composite index to measure how the economies of selected East Asian countries were converging relative to each other in their performance for economic integration with the rest of the world. Included in this index are four variables: trade, institutional investor rating, foreign domestic investment, and manufacturing export. Speed of integration and initial level of integration were the two categories by which the countries were rated. The speed of integration index was derived from changes in the variables between the early 1980s and the early 1990s, while the initial level of integration index was derived from the levels of these variables in the early 1980s.

Since the majority of these countries started with high levels for the four integration variables, it was expected that no significant differences would exist among them. The overall finding, however, was that Singapore was an exception (rated first) for both indexes and the rating was highly significant as compared to most other countries.

The selected East Asian countries were among the most economically successful in the past three decades, and exhibited common ingredients for economic growth. These included capital and human investment, high levels of financial savings, productivity improvement in agriculture and industry, government intervention to foster development, and sensible macroeconomic management among many other factors (The World Bank, 1993). These common characteristics which fostered exceptional development may confer on this group of countries the description of a "club," and, therefore, club convergence (Galor,

Market Integration. The Inter-American Development Bank: Washington, D.C.

Green J. and Heller, W.P. (1981) Mathematical analysis and convexity with applications to economics. In K.J. Arrow and M.D. Intriligator (eds.), *Handbook of Mathematical Economics*, Volume 1. North-Holland Publishing Company: Amsterdam, pp. 15-52.

Haass, R.N. and Litan, R.E. (1998) Globalisation and its discontent: navigating the dangers of a tangled world. *Foreign Affairs*, 77: pp. 2-6.

Hall, R.E. and Jones, C.I. (1997) Levels of economic activity across countries. *The American Economic Review* 87: pp. 173-177.

Hirst, P. and Thompson, G. (1996) *Globalisation in Question*. Polity Press, Cambridge, UK.

Kolm, S. C. (1977) Multidimensional egalitarianism. *The Quarterly Journal of Economics,* 91: pp. 1-13.

Kregel, J.A. (1998) Yes, "It" did happen again: a Minsky crisis happened in Asia. Working Paper No. 234. The Jerome Levy Economics Institute of Bard College: Annandale-on-Hudson, NY.

Lal, D. (1985) Poor countries and the global economy: crisis and adjustment. In *Global Economic Imbalances*. C.F. Bergsten (ed.), Institute for International Economics: Washington, D.C., pp. 65-76.

Malinvaud, E. (1985) European development and the world economy. In *Global Economic Imbalances*. C.F. Bergsten (ed.), Institute for International Economics: Washington, D.C., pp. 15-30.

Mayer, M. (1998) The Asian disease: plausible diagnoses, possible remedies. Working Paper No. 232. The Jerome Levy Economics Institute of Bard College: Annandale-on-Hudson, NY.

McKinnon, R. I. and Pill, H. (1997) Credible economic liberalizations and overborrowing. *The American Economic Review,* 87: pp. 189-193.

Minsky, H.P. (1982) *Can 'It' Happen Again*, M.E. Sharpe, Armonk, NY.

Minsky, H.P. (1975) *John Maynard Keynes*, Columbia University Press: New York, NY.

Minsky, H.P. (1972) *Financial Instability Revisited. In Reappraisal of the Federal Reserve Discount Mechanism*. Federal Reserve System: Washington, D.C.

O'Leary, E. (1997) The convergence performance of Ireland among EU countries: 1960 to 1990. *Journal of Economic Studies,* 24(1/2): pp. 59-71.

Quah, D.T. (1996) Twin peaks: growth and convergence in models of distribution dynamics, *The Economic Journal*, 106: pp. 1045-1055.

Ram, R. (1982) Composite indices of physical quality-of-life, basic needs fulfillment, and income. *Journal of Development Economics,* 11: pp. 227-247.

Rohatgi, V.K. (1984) *Statistical Inference*. John Wiley and Sons: New York, NY.

Sala-i-Martin, X.X. (1996) The classical approach to convergence analysis. *The Economic Journal*, 106: pp. 1019-1036.

Slaughter, M.J. (1997) Per capita income convergence and the role of international trade. *The American Economic Review,* 87: pp.194-199.

Smith, D.M. (1979) *Where the Grass is Greener: Living in An Unequal World.*

The Johns Hopkins University Press: Baltimore, MD.

Thurow, L. (1998) Asia: the collapse and the cure. *The New York Review of Books*, 45(2): pp. 22-26.

Wood, A. (1994) *North-South Trade, Employment, and Inequality: Changing Fortunes in a Skill-driven World*. Clarendon Press: Oxford.

World Bank (1998) *World Development Indicators*. The World Bank: Washington, D.C.

World Bank (1996a) *Global Economic Prospects and the Developing Countries*. The World Bank: Washington, D.C.

World Bank (1996b) *Managing Capital Flows in East Asia*. The World Bank: Washington, D.C.

World Bank (1993) *The East Asian Miracle: Economic Growth and Public Policy*. The World Bank: Oxford, UK.