COST AND PRODUCTIVITY TRENDS AND PATTERNS OF SPECIALIZATION IN APEC

Economic Committee
Asia-Pacific Economic Cooperation

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FOREWORD

Since its formation at the 1994 APEC Ministerial meeting in Jakarta, the Economic Committee has pursued a work program aimed at fulfilling the three major objectives established for it: namely to serve as a forum for discussion of economic trends and issues in the region; to support the Ministerial and Leaders' meetings and other APEC fora; and to disseminate information on economic issues and linkages in the region. In line with these objectives, the Committee has maintained a very active research and publications program.

While the attention of the economic policy community in the region has been focussed since the onset of the economic and financial crisis on restoring economic growth and stability, analytic work on the foundations of longer-term growth and economic development continues. In this regard, one of the issues which bears on the strategic choices that economies make in pursuing economic development is whether patterns of specialization are dynamically stable and how and to what extent they are affected by international trade and investment liberalization.

In this study, *Cost and Productivity Trends and Patterns of Specialization in APEC*, the Economic Committee has attempted to shed light on this question by examining the direction of causality running between a number of factors, including:

- trends in total factor productivity and costs of production of APEC member economies;
- the degree of specialization of APEC member economies, as revealed by indexes of comparative advantage; and
- trends in the degree of openness of APEC member economies.

On the basis of this analysis, insights can be gained into the efficacy of industrial policies in shaping the long-term growth potential of economies.

The work program of the Committee has consistently reflected the integrated nature of APEC's two broad agendas of trade and investment liberalization and facilitation (TILF) and economic and technical cooperation (ECOTECH). It is the hope of the Committee that this project will provide contextual background and analytical support for APEC's ongoing efforts to focus its ECOTECH agenda as well as for the objectives of the overall TILF agenda.

As an institution that has evolved at the dawn of the information age, APEC in general, and the Economic Committee in particular, has pioneered a "virtual" form of operation, relying heavily on the contributions of member economies from capitals to lead individual projects and to develop the papers that serve as the basis of discussion. In this case, particular thanks are due to Francis T. M. Lui and Larry D. Qiu, Consultants to the Government of the Hong Kong Special Administrative Region, who prepared this paper on behalf of the Committee. Thanks are also due to Bradley Crofts, Director (Program) at the APEC Secretariat for seeing this document through to publication.

A special acknowledgement in this case is also due to Dr. John M. Curtis, under whose chairmanship this document was developed over the past few years as well as to his team, Dan Ciuriak and Julie Gould.

Mitsuru Taniuchi

Chair
APEC Economic Committee
Tokyo, February 1999

CHAPTER 1
SUMMARY AND CONCLUSIONS

1.1 Introduction

This study examines productivity trends and patterns of specialisation and in APEC member economies to determine whether patterns of specialization tend to be dynamically stable, to see how they evolve in light of productivity trends in these economies, and to understand the role that international trade plays in influencing these structural relationships. The deeper objective is to shed light on, amongst other things, the following policy-related issues: (1) the benefits of opening up an economy to the world; (2) the advantages of having a diversified economy; (3) the gains from developing particular comparative advantages; and (4) the benefits from promoting R&D and developing sunrise industries.

Broadly speaking, gaining an understanding of these issues will allow a determination of whether economies' aspirations to progress towards high-income, high-productivity levels are consistent with progressively greater openness to trade, or whether initial patterns of specialization tend to be reinforced over time, making it more difficult for low-income economies to make a permanent jump to developed-economy status. This is a pertinent question in the Asia Pacific region as APEC developing economies are attempting to make precisely that jump in the context of (a) the post-Uruguay Round lower-tariff environment and the Bogor commitments to free and open trade and investment by 2010/2020 for developed and developing economies respectively; and (b) the blossoming of the information age which holds out both the promise of significant productivity improvements and the challenge to keep pace with the industrialised economies that are at the leading edge of the evolution towards the information society.

In addition, it is hoped that the assembly of data and empirical results from this project will serve as the basis for further research and analysis of related questions.

This Chapter provides a summary of the theoretical and empirical results and sets out some conclusions. Chapter 2 provides an analysis of total factor productivity and cost trends in APEC member economies through estimation of economy-specific production functions. Chapter 3 analyses the patterns of specialization that have emerged in APEC member economies, based on indexes of revealed comparative advantage.Chapter 4 examines the interactions amongst these variables and the degree of openness. Various techniques are employed to examine the issues from a number of different perspectives.

1.2 Theoretical Considerations

Productivity, openness in trade, and patterns of specialization are inter-related variables. Traditional trade theory, which emphasises constant returns to scale and perfect competition, tells us that an economy's patterns of trade and specialization depend on its comparative advantages, a key determinant of which is productivity. Thus, in the

traditional trade theory, productivity changes influence comparative advantage, which in turn determines the goods in which an economy will specialize when it engages in trade.

Comparative advantage in general and productivity in particular are not time invariant. Investment in human and physical capital will tend to raise productivity and may change the pattern of comparative advantage enjoyed by individual economies. Indeed, in the new trade literature, the possibility is considered of **creating** comparative advantage through judicious investments in human and physical capital. Accordingly, over time, trends in productivity might be expected to influence the pattern of specialization of production observed in trading economies.

Trade liberalization has important potential implications for the patterns of comparative advantage and specialisation of trading economies; however, it is not possible, *a priori*, to say exactly what those implications are in any particular case. On the one hand, changing economic conditions, such as result from trade liberalisation, will influence the pattern of investment by sector, changing patterns of productivity and ultimately inducing changes in the patterns of specialization. On the other hand, the experience accumulated in the course of specialized production in a good may further enhance comparative advantage in that good. Accordingly, the initial choice of specialization may reinforce itself over time with increasingly open trade.

Similar impacts may obtain from the demand side. For example, it is evident that the relative global demand for some products has increased dramatically while for other products it has declined to a considerable extent. Stronger demand for a product leads to higher market value and higher productivity growth, benefiting the economies that specialize in that product. Conversely, an economy that has the misfortune to specialize in products that face declining demand, will benefit less. Here, exogenous factors impact on both productivity trends and patterns of specialization simultaneously.

A number of theoretical models have been developed in the economic literature to deal explicitly with these relationships. As is evidenced by the empirical results below, no single approach seems to fit the situation in every APEC member economy. Two of the theoretical approaches are, however, worth highlighting as particularly relevant to the issues under consideration here.

Romer's 1990 study, in the tradition of the endogenous growth literature, is an important attempt to show that an increase in international trade can raise the productivity level of an economy. In this model, the driving force of economic growth is improvement in productivity, which in turn is driven indirectly by R&D. It is argued that R&D has the property of increasing returns to scale; thus, the bigger the economy, the greater the benefits from R&D. Since international trade in effect merges several economies together into one big economy and allows a greater degree of specialization in the production process, the benefits of innovations in the specialized area are increased. Thus, trade can cause productivity to go up by inducing specialization.

Lucas (1993) discusses another approach that explains the influence of trade on the patterns of production. Following Lucas, trade allows an economy to delink its production from its consumption. Since the goods produced need not be the goods consumed, the

economy does not have to spend resources on producing goods in which it does not have comparative advantage. This has two important effects. First, by focusing on the production of a narrower set of goods, the economy can accumulate knowledge faster. This is because the more resources are spent on the production of a good, the more effective is the learning-by-doing process. Second, human capital accumulated through experience in the production process has spill over effects. Knowledge in the production of a particular good can help to lower the cost of production of a different but closely related good. An economy can, therefore, first specialize in a good in the production of which it has comparative advantage and then shift to goods higher up on the quality and technology scales, based on the experience built up in producing the first good. Thus, specialization due to expansion in trade can allow an economy to learn faster and undergo continuous structural changes in the production process as it develops new comparative advantages.

In view of these theoretical considerations, knowledge about the relationship between productivity changes, trade, and patterns of specialization will go a long way in helping us to understand the process of economic development. This understanding in turn may be useful for policy formulations.

1.3 Quantitative Analysis

To provide a basis for examining the experience of APEC member economies in these regards, this study compiles the basic quantitative information on:

- total factor productivity (TFP) trends, constructing indices of TFP for all present APEC members (except Brunei);
- cost trends, derived from the parameters of production functions estimated for each APEC member economy;
- patterns of specialization for all APEC economies, using the revealed comparative advantage index as the basis for the calculations;
- the degree of openness of the economy, which is defined as (imports + exports)/GDP;
- the investment ratio in the economy, which is defined as aggregate investment/GDP; and
- the global market share of each APEC member economy, by SITC category.

As this study was designed prior to the entry into APEC of Peru, Russia and Viet Nam, estimates could not be included for these economies.

The estimation of TFP trends presents numerous difficulties and the results are therefore presented with caution. TFP is estimated as the time trend in a production function that expresses output as a function of labour and capital inputs. Various functional forms and estimation techniques are available and various possible adjustments can be made to the output, labour and capital data (e.g., to restrict output measures to business sector only, or to reflect factors such as increased "quality" of labour due to higher education, changes in average working hours per week, varying rates of depreciation of capital equipment, and so forth).

This paper adopts the standard Cobb-Douglas function estimated with the ordinary least squares approach. Output is measured by GDP, labour input by the number of employed workers, and capital input through construction of capital stock series, based on cumulated gross investment adjusted for assumed rates of depreciation. To the extent possible, account is taken in the estimations of events that may have induced structural shifts in the economy under consideration. The assumption of constant returns to scale is not made, although the impact of applying this restriction is checked. Generally, different approaches would result in different interpretations of the growth record of individual economies in terms of whether the main underlying factors were increase in factor inputs or improvements in productivity. While this makes it advisable to regard the results as preliminary and suggestive, some results are worthy of highlighting.

The estimates of **TFP trends** suggest that Japan and the fast-growing East Asian "Tiger" economies (Hong Kong, China; Korea; Singapore; and Chinese Taipei) all achieved high rates of productivity growth for a sustained period of time which, of course, allowed those economies to substantially raise their living standards. Amongst the remaining Southeast Asian economies, the estimates indicate mixed results with Thailand and to a lesser extent Malaysia achieving moderate rates while Indonesia and the Philippines experienced declining TFP, suggesting that their growth over the period of estimates resulted primarily from mobilization of factor inputs. In the case of China, the results indicate positive TFP growth in the post-1978 period. Amongst the developed economies, Canada led the way and the USA also achieved sustained TFP growth; for Australia and New Zealand, the estimates of TFP growth were negative but statistically insignificant. The Latin American APEC members also had estimates of TFP growth that were negative but statistically insignificant. Papua New Guinea saw declines of TFP as well, but in this case, the results appear to be robust.

The cost trends derived from the production functions used to estimate TFP trends are the mirror images of the TFP trends; those economies that achieved positive TFP trends had declining costs while those with declining TFP had rising costs.

As necessary background to the analysis of revealed comparative advantage, the study first calculates the export shares of various product groups in the world's total exports for the period 1970-94. The key developments to note for the purposes of this study are as follows:

1. At the single-digit level, the product group SITC 7 (machinery and transport equipment) has the largest share in world exports at 41.9% in 1994, up by about 7.3 percentage points from 34.6% in 1970; followed by SITC 6 (manufactured goods classified chiefly by material) at about 15% in recent years; and SITC 8 (miscellaneous manufactured goods) also at about 15% in recent years. The smallest market share product group is SITC 4 (animal and vegetable oils, fats and waxes) which is below 1 % in every single year.
2. Secondly, of the manufacturing groups SITC 6-8, SITC 6 has a declining share in the world exports, falling from 22.2% in 1970 to 15.0% in 1994, representing a 7.2 percentage points reduction. Conversely, the export shares of both SITC 7 and SITC 8 show slight increasing trends. For products other than these groups, export shares either remain stable or decline over the entire period examined. This seems to

indicate that world exports have been upgraded towards higher value-added commodities.

3. The contributions of the sub-categories of SITC 7 to world trade are significant and becoming larger and larger, particularly SITC 77 (electrical machinery) and SITC 78 (road vehicles).

Against this background of global trends, the analysis of **revealed comparative advantage** of APEC member economies yields a number of observations relevant to an understanding of their patterns of specialization:

Group 1: This group, which includes New Zealand, Brunei Darussalam, Australia and Papua new Guinea, are natural resource rich economies with comparative advantages concentrated in product groups SITC 0 to SITC 4.

Group 2: The four economies in this group, Mexico, Canada, Malaysia and Indonesia, are rich in resources but, unlike the first group, also evidence comparative advantages in some of the SITC 7 products or in the resource-based manufacturing (SITC 6), as in the case of Indonesia.

Group 3: These are the economies that evidence comparative advantages in labour-intensive products (SITC 8) and also in some of the technology-intensive products (under SITC 7). They include Philippines, China, Thailand, Chinese Taipei and Hong Kong, China.

Group 4: Unlike the economies in the above three groups, Singapore and Korea find their comparative advantages in technology-intensive products (SITC 7) while they still have comparative advantage in some other products.

Group 5: Japan is alone in having comparative advantages only in technology-intensive products (SITC 7).

Group 6: The United States, as the world's most diverse economy, has comparative advantages in both the resource- and technology-intensive products.

1.4 Empirical Results

Drawing on this quantitative analysis, the study uses the Granger Causality test to examine the direction of causality amongst the variables of interest.

As regards the relationship between productivity and openness.

- There are a number of economies in which openness does not necessarily affect TFP growth. These include Japan, two of the "East Asian Tigers" (Chinese Taipei and Hong Kong, China) and also Thailand. In their cases, a more open economy tends rather to stimulate faster capital accumulation. This appears to support Lucas's hypothesis, but is inconsistent with that of Romer.

- Two other members of the four East Asian "Tigers", Korea and Singapore, have a different pattern. In the case of the former, the three variables have no systematic relationship. This may be due to the fact that Singapore's economic activities are dominated by her huge central provident fund. Investment is therefore influenced more by the mandatory saving rate rather than by international trade. In the case of Korea, active government intervention may also obscure the effects of trade on the economy.

- Other than Singapore, the Philippines is the only economy that shows no significant causal relationship among the three variables. There is some evidence that there have been distortions of trade and investment policies and inconsistent implementation of them. This may be a plausible explanation for the lack of a clear relationship.

- There are also economies where openness does affect TFP. They are Canada, China, Indonesia, Papua New Guinea and the United States. They provide some support for the hypothesis of Romer. However, one can also interpret the results to be consistent with Lucas' model. In the latter, openness can raise investment and/or TFP. In the case of China, probably the open door policy has also helped to increase competition in the economy. This will raise efficiency. It appears that some economies respond to a change in TFP by changing their investment strategies, while others modify their R&D activities or simply become more efficient.

- For a few economies, Canada, Indonesia, Papua New Guinea and the United States, investment ratio affects TFP. This may be due to the fact that in some economies part of the investment goes to R&D directly. Alternatively, when investment goes up, people have better chance of learning by doing, which also raises R&D.

- Finally, there are also economies where an improvement in TFP can cause the openness of the economy to change. A simple explanation is that improvements in TFP affect the competitiveness of the economy in the international market. Hence, the degree of openness is affected.

As regards the possible relationship between productivity growth and patterns of specialisation, the SITC sectors are ordered by decrease/increase in market share and on this basis divided into three groups. The first group has decreasing market shares (SITC 71, SITC 6, SITC 2, SITC 0 and SITC 4). The second group of sectors (SITC 79, SITC 5, SITC 3 and SITC 78) has stable market shares. The final group includes SITC 74, SITC 9, SITC 75, SITC 76, SITC 77, SITC 8 and SITC 7, which have increasing market shares.

Re-ordering the economies by rates of productivity growth (from the fastest to the slowest), three groups can be identified. The first group includes those with TFP growth greater than 2%. The first group includes Hong Kong, China along with Chinese Taipei, Korea, Singapore and Japan. In the second group are Thailand, Canada, Malaysia, China and the United States, all with positive TFP growth of less than 2%. The last group contains all economies that experienced average negative TFP growth. They are Papua New Guinea, the Philippines and Indonesia. New Zealand, Australia, Mexico and Chile also have estimated negative TFP growth but the estimates are, as noted above, statistically insignificant.

This yields a number of observations. First, by and large, it can be seen that economies with negative TFP growth are those specializing in the products which have decreasing market shares. Economies with moderate TFP growth are those specializing in products which fall in all three groups of sectors. And economies with high TFP growth are those mainly specializing in the products which have increasing market shares. This empirical result is consistent with one of the theoretical propositions in Lucas (1988) that economies specializing in goods with fast growth of world demand tend to do better than others.

Second, no economy with negative estimated trend TFP growth has comparative advantage in the capital- and technology-intensive product group (except Mexico in SITC 71 and the Philippines in SITC 77), or in the labour-intensive product group (except the Philippines).

Third, like some other sectors, SITC 6 does not give a clear indication of how it is associated with the TFP growth. Some economies in each group have specialized in this sector.

1.5 Conclusions

As regards the relationship between productivity changes and patterns of specialization the results support the idea that productivity growth tends to be higher for an economy that specializes in products or industries whose market demands are growing faster. The result that productivity grows faster if the economy specializes in products or industries having higher growth in the demand is an important one. However, it begs more questions than it answers. One of these questions is how an economy aspiring for higher growth is able to pick an industry that will experience rapidly expanding world demand? Is the government capable of "picking the winner"? Is the market better able to provide signals that a certain industry is on the upward trend? Are there barriers prohibiting the government or the market to play a proper role in this matter? These are crucial and controversial questions. Although this paper does not purport to have the answers, these questions are made all the more important because the empirical results tell us that they are related to the long-term growth potential of an economy.

There have been some controversies about how international trade affects the development of an economy. In particular, does it enhance growth because it raises the investment rate? Or does it increase the growth rate because it improves productivity? The answer seems to be different for each economy, as is evidenced by the causality tests that are performed. These reveal that the effects of these variables differ significantly among the economies and there does not seem to be an economic development pattern that is universal. In particular, international trade induces Hong Kong, China as well as Chinese Taipei, Japan and Thailand to invest more heavily in physical capital, while in Canada, China, Mexico, Papua New Guinea and the United States it encourages R&D activities instead. In Indonesia, international trade enhances both investment and R&D activities. But it does not have any significant causal effect on these two activities for the remaining members of APEC.

These empirical results should not be interpreted as conclusive statements for policy recommendations. Rather, they can help us better understand the APEC member economies and possibly serve as the basis for further discussions on a number of important issues. For example, some APEC members have been pursuing active industrial policies while others have not. A comparison of their productivity or cost changes can be one of the criteria for assessing the merits of the two approaches. If the returns to these investments, measured as increases in TFP, do not compare favourably to the costs, then the industrial policies are not successful, and vice versa. If an economy is serious about pursuing an industrial policy, it is prudent for the government to keep track of its TFP changes.

Measurement of the TFP can also be useful for evaluating the success of some productivity-related policies. For example, R&D activities, trade liberalisation policies, and policies aimed at stimulating investment, can potentially enhance TFP growth. Again, it is useful for the government to monitor TFP growth on a continuous basis. However, it is important to bear in mind that, conceptually, TFP can be regarded as a measure of ignorance. When all explicit and hidden inputs are properly taken into account, TFP growth will be zero. The growth of the measured TFP can be interpreted as the returns to the inputs we have not incorporated in the production function.

Chapter 2
Productivity and Cost Trends

2.1 Methodology

The main objectives in this chapter are to measure productivity and cost changes and to construct total factor productivity (TFP) indices for the APEC member economies. To do this, we first estimate the underlying aggregate production functions of these economies.

A number of approaches are available for the estimation. Ideally one should adopt a functional form that is flexible enough to identify whether the productivity changes are neutral, labour augmenting, or capital augmenting.

A standard method that permits us to do so is the transcendental logarithmic (translog) production function introduced by Christensen, Jorgenson and Lau (1973). Unfortunately, the data requirement for estimating this type of production function is also stronger. Even if we assume that there are only two inputs (say, capital and labour) and a time trend (which is necessary for estimating productivity changes) in the production process, the number of variables involved in the regression analysis will be nine. Given that for each of the variables we typically only have about twenty to thirty observations that are reasonably reliable, estimated results for production functions with such a large number of variables may not be robust enough.[1]

Kim and Lau (1994) have avoided the above difficulty of the translog function by estimating the so-called meta-production function. In essence, it involves the hypothesis that several economies may have the same production function and therefore it is permissible to pool their data together in making the estimation. Thus, the number of observations is increased significantly. However, since APEC includes economies at very different levels of economic development, it is not a good approach to assume that they all have the same production function.

The World Bank (1993) has also adopted the approach of imposing the same production function on all the economies being studied. To allow for the flexibility of having different TFP growth rates across East Asian economies, the study has resorted to the use of dummy variables. While some meaningful results have been obtained, they are subject to the criticism of why economies at grossly different stages of development can have the same capital share in the production function.

In view of the above discussion, we have chosen another standard functional form in making the estimations. In particular, we assume that the production function of each individual economy is Cobb-Douglas, which has to be estimated separately:

$$Y(t) = A\, e^{rt + \varepsilon(t)}\, K(t)^{\beta}\, L(t)^{\alpha}, \qquad (1)$$

[1] If the particular economy involved has undergone rapid social and economic changes, then the data may contain enough variation to allow for more accurate estimation of production functions of the translog type. Young (1992) adopted this method for Singapore and Hong Kong, China.

where Y(t) = real GDP at year t,
A = constant technology parameter,
e = base of natural logarithm = 2.71828,
r = (annual) rate of growth of TFP,
K(t) = capital stock at year t,
L(t) = number of employed workers at year t,
ε(t) = random error term with mean zero,
β and α are parameters to be estimated.

Taking the logarithm of equation (1), we get

$$ln\ Y(t) = ln\ A + r\ t\ + \beta\ ln\ K(t) + \alpha\ ln\ L(t) + \varepsilon(t). \qquad (2)$$

After applying ordinary-least-squares to estimate equation (2), we construct the TFP index by calculating the following expression for each year:

$$e^{rt + \varepsilon\ (t)}.$$

In doing this, the residuals in the regression are taken to be estimated values for the random term ε(t). We also use the first year when data are available as the base year of the index.

Since estimating the changes in the cost of production is also one of our objectives, we also need to outline the method of doing this. Generally speaking, the cost of production depends on (1) the level of output, (2) the prices of the input factors, (3) the productivity of the firm or economy, and (4) the quantities of the input factors employed. If firms always try to choose the mix of input factors that minimise cost, the last item is completely determined once we have information about the first three. Hence, the cost function can be specified by the first three variables.

Let W_L be the price of labour and W_K be the price of capital. Then duality theorems tell us that the cost function of an economy whose underlying production function is given by equation (1) can be expressed as[2]

$$c(W_L, W_K, Y) = Je^{-M\ (rt + \varepsilon\ (t))}\ W_L^{M\alpha}\ W_K^{M\beta}\ Y^M \qquad (3)$$

where J is a constant, and $M = 1/(\alpha + \beta)$. If we have data on W_L , W_K , Y and the total cost, then we can directly estimate the parameters in (3). These data are generally not available. Fortunately, once the production function (2) has been estimated, we can determine the parameters of the cost function as well. If the prices of capital and labour remain unchanged, the average annual rate of change in the cost function is given by minus $r/(\alpha+\beta)$. The growth rate of cost index we shall present in Table 2.1 is calculated

[2] See Varian (1988) for the proof.

from this ratio. Note that the signs of productivity and cost changes must be opposite. In other words, when productivity change is positive, the costs of producing the same quantity of the good will go down.

2.2 Data Sources

GDP figures are mainly from the Penn World Data constructed by Summers and Heston (1991). Through the internet,[3] it is possible to update the data to 1992. The use of this data set has two advantages. First, it incorporates purchasing power parity into the construction and makes international comparisons more meaningful. Second, most of the other studies in estimating TFPs use other data sets. Our results therefore offer another benchmark for checking the robustness of the estimated productivity changes. In several cases, we also extend the data period by using official economy statistical sources. For example, GDP and investment figures for Hong Kong, China are from that economy's *Estimates of Gross Domestic Product 1961 to 1995*, those of Singapore are from *Yearbook of Statistics Singapore*. For the case of China, additional data are obtained from Chow (1993) and *China Statistical Yearbook*.

We use number of employed workers as the labour input. A better measurement of labour input is the product of employed workers, number of hours of work, and human capital as measured by the average level of educational attainment for people aged between 25 and 65. Unfortunately, data on the last two categories are insufficient for a significant portion of APEC member economies. To make productivity growth rates of different economies more comparable, we use the raw labour input, i.e., number of employed people, consistently for all economies. Employment data are from *United Nations, Yearbook of Statistics*, and *United Nations, Yearbook of Statistics for Asia and the Pacific*. Data for Chinese Taipei are not available in these publications. We make use of Chinese Taipei's *Statistical Yearbook* as the main data source. In compiling data on hours of work and educational attainment for a subset of the economies, we rely mainly on *Yearbook of Labour Statistics* of the International Labour Office. Educational data are from the United Nations publications above and UNESCO's *Yearbook of Statistics*.

We make a number of assumptions in constructing data for aggregate capital stocks. First, we extrapolate the real investment figures in Summers and Heston and individual economies' statistical yearbooks to 1945. Second, we assume that investment since then has been building up the capital stock. Third, we assume a depreciation rate of 5 percent a year.[4] The earliest capital stock data that we actually use are those of 1960.

In Chapter 4, we shall discuss the relationship between trade and productivity changes. An index of the degree of openness for each economy will be constructed. This requires exports and imports data for APEC member economies. The sources for these are the same as those stated above.

2.3 Results

[3] See website: ht./bized.ac.uk/dataserv /pennvars.html

[4] We have also tried other depreciation rates. The results are quite similar. We have therefore stayed with the 5 percent assumption throughout.

The estimated TFP growth rates (the estimated parameter, *r,* discussed above) are presented in the second column of Table 2.1. Notice that we do not have the result for Brunei Darussalam because investment time series data for this economy are not available.

In interpreting these growth rates, we should note that they have not been adjusted for changes in hours of work and educational attainment. In economies that have undergone rapid expansion in education, the TFP growth rates, after controlling for education, are likely to be lower. Prime examples of these are the four "little tigers" of East Asia. On the other hand, for economies that have experienced some reduction in the hours of work, but little changes in the average number of years of schooling for the working population, the adjusted TFP growth rates could be higher. An example is the United States. Its average working hours dropped from 36.8 in 1970 to 34.5 in 1995, but educational attainment has shown very little movement.

Several remarks on the estimation of the underlying production function should be made here. First, we have tried various scenarios for each of these economies. For example, since we do not have capacity utilisation data, we have to add different types of dummy variables to account for situations of significant under-utilisation.

Second, as is typical in the estimation of production functions with a time trend, the results for some economies are plagued by the problem of multicollinearity. In such cases, we use one of the following two methods to avoid the problem. The first one is to impose an *a priori* value on the coefficient that has a large standard error in the estimation. Different values have been experimented for the coefficient and the one with the best fit is chosen. The second is to impose constant returns to scale on the production function. The way to implement this is to regress *ln* (Y/L) against *ln* (K/L) rather than regressing *ln*(Y) on *ln*(K) and *ln*(L).

Third, another potential problem for the estimation is that the data may not contain enough information to allow us to distinguish between the effects of the scale of the economy and TFP changes. For example, if the economy exhibits increasing returns in its production, it will appear to be more efficient simply because the economy has become larger. The improvement in measured efficiency may be wrongly attributed to growth in TFP. This problem, if it exists, cannot be fixed easily. We have, however, experimented with imposing constant returns to scale on all the economies. Given this assumption, a new set of TFP growth rates have been estimated by using the method discussed in the last paragraph. We have found that the ranking of economies according to their TFP growth rates, which is the main information we need for establishing a result to be stated in Chapter 4, shows little changes. As we shall see, this is important for establishing the robustness of the result in Chapter 4.[5]

Australia is an example that illustrates the difficulty in distinguishing between the effects of increasing returns to scale and TFP growth. Our estimation indicates that Australia's production function exhibits increasing returns to scale, but TFP growth is negative,

[5] We have tried a number of other estimation methods. For example, some representatives of APEC economies have suggested to us that we should regress the growth rates of GDP on the growth rates of capital and labour in order to find out what the TFP growth rates are. The results from these exercises do not indicate that this method is an improvement.

although it is not statistically significant. Suppose we impose the assumption of constant returns to scale. Then it can be shown that the newly estimated TFP growth will be positive. This latter result is consistent with the results obtained in Australia's Industry Commission (1997). In this report, the assumption of constant returns to scale is imposed, and TFP growth from 1964 to 1996 is estimated to be 1.5 percent per year.[6]

Table 2.1: Total Factor Productivity and Cost Index Growth Rates

Economies	TFP Growth Rates	Cost Growth Rates	Period
	(in %)	(in %)	
Australia	-0.516	0.386	1960-92
Canada	1.355	-1.192	1960-93
Chile	-0.726	0.674	1960-92
China	0	0	1960-77
	0.335	-0.179	1978-94
Hong Kong, China	4.540	-7.299	1970-95
Indonesia	-4.017	4.017	1960-90
Japan	2.560	-2.680	1970-92
Republic of Korea	4.426	-4.299	1960-91
Malaysia	0.506	-0.414	1960-90
Mexico	-0.607	0.619	1960-90
New Zealand	-0.409	0.487	1970-92
Papua New Guinea	-1.573	1.573	1960-90
Philippines	-1.741	1.647	1970-92
Singapore	3.065	-2.789	1967-95
Chinese Taipei	4.406	-0.579	1965-92
Thailand	1.799	-2.065	1970-92
United States	0.099	-0.093	1960-93

In view of the problems just outlined, it is advisable to regard the results as preliminary and suggestive. Despite the reservation, there are also results that are worthy of highlighting.

First, in the case of China, we cannot reject the hypothesis that, prior to the economic reform beginning in 1978, the growth rate of TFP was zero. We have found that there has indeed been positive growth of TFP since then. This appears to be a confirmation of the result obtained by Chow (1993).

[6] We thank Mike Waslin of the Treasury, Australian Government, for referring us to this report. Note that the differences in the estimate of the TFP growth rate go beyond the issue of increasing versus constant returns to scale; the Australian Industry Commission estimates refer only to the non-farm business sector whereas the results reported here are for GDP and the time periods are not identical.

Second, Mexico is another example that also may have experienced structural changes after 1980. According to the estimates by Reyes and Gonzales[7] using time series for real wages, capital stock, labour and GDP covering the 1980-1994 period and employing the Klein-Bassman method, TFP growth was –0.1 percent a year and statistically insignificant. Moreover, the study finds that the production function exhibits a slight degree of increasing returns to scale, which may be attributed to Mexico's joining the former GATT in 1986 and the subsequent implementation of the NAFTA. Other liberalization policies also took place during the period. However, the differences between their estimates and ours for the entire sample period are quantitatively small and not statistically significant. Hence, we can neither conclusively state that structural changes occurred nor rule this possibility out.

Third, all the four little tigers of East Asia, namely Hong Kong, China as well as Korea, Chinese Taipei, and Singapore, exhibit significant TFP growth. This result is consistent with one set of results found in World Bank (1993), but different from those in Kim and Lau (1994) and Lau (1997). In the former study, positive growth rates of TFP are found for the four tigers, while in the latter two studies they are equal to zero. It is useful to understand how these two studies have arrived at the zero growth conclusion. To be more precise, the authors have also found positive, though statistically insignificant, TFP growth rates for these economies. In subsequent estimations the authors then *impose* the restriction that these growth rates are zero. Although one cannot say that this procedure is methodologically wrong, the studies also cannot reject the hypothesis that the growth rates are positive. Another reason for the apparent difference in the result is that in our approach, as we have pointed out earlier, human capital is not incorporated in the data. Part of the measured positive TFP growth may be due to the effect of human capital.

Fourth, once the parameters of the production function have been estimated, the methodology discussed in Section A can be applied to calculate the rate of change in the cost trend. The results are reported in column three of Table 2.1. A decline in the cost trend is interpreted as an improvement in efficiency. It should be emphasised that the actual cost of producing a given quantity of output depends not only on the rate of cost change reported here, but also on the prices of the input factors.

Fifth, Table 2.2 presents estimations of TFP growth rates in other studies. As is apparent in the Table, there are vast differences among the results, which are sensitive to the sample period, the methodology employed, and the data used. It is difficult to judge, *a priori*, which set of estimations is superior to others. This provides a further warning that due care must be taken when interpreting the any results on TFP estimations. Because of this, we have to investigate further how robust is the *ranking* of TFP growth rates estimated in this study.

Table 2.2: Estimated TFP Growth Rates in Different Economies (in Percentage)

	Our Estimates	OECD Business Sector	World Bank: Series A	World Bank: Series B	Madisson (73-92)	Dowling & Summers	Young (66-90)	Harber-ger (79-89)	Doug-herty (60-89)

[7] We are thankful to the Mexican representatives to APEC for providing us with the results obtained by Reyes and Gonzales.

		(60-93)	(60-90)	(60-93)		(61-95)			
Australia	-0.516	1.3							
Canada	1.355	0.9							0.5
Chile	-0.726								
China	0.335								
Hong Kong, China	4.54		3.65	2.41			2.3		
Indonesia	-4.017		1.25	-0.8		-0.1			
Japan	2.56	3.1	3.5	1.43	1.04			2	2
Rep. of Korea	4.426		3.1	0.24		2.6	1.7	5.7	
Malaysia	0.506		1.08	-1.34		1.9		-0.3	
Mexico	-0.607								
New Zealand	-0.409	0.07							
PNG	-1.573								
Philippines	-1.741					0.4			
Singapore	3.065		1.19	-3.01		2.8	0.2		
Chinese Taipei	4.406		3.76	1.28		2.5	2.1	3.8	
Thailand	1.799		2.5	0.55		1.6		3	
USA	0.099	0.7			0.18				0.4

Sources: OECD (1994, Annex Table 58); World Bank (1993); Madisson (1997); Dowling and Summers (1998); Young (1995); Harberger (1997); and Dougherty (1991).

Notes: (1) TFP growth rates in the OECD column refer to the business sector only. They are not comparable to other columns.
(2) The World Bank study has two sets of estimations. In series A, the Asian economies are assumed to have the same production function of the full sample of countries. In series B, they have the same production function as the high-income countries.
(3) The Dowling and Summers paper also has two sets of results. We choose the one that uses the Summers and Heston data set, which is also used in our study.

We compare our estimated TFP growth rates to those obtained in other studies by the following method. We first rank the APEC members according to our estimated TFP growth. For those economies that do not have new information on TFP estimates in Table 2.2, we omit them from the ranking. They are Australia, Chile, China, Mexico, and PNG. The OECD figures in the Table do not help us here because they are for the business sector only and therefore are not strictly comparable to economy-wide estimates. Second, we find the average of the estimations for every economy and rank them accordingly. In doing so, we have chosen series B rather than series A in the World Bank figures. This is because the estimated capital share in the latter looks more reasonable. Table 2.3 presents the ranking.

Table 2.3: Ranking of TFP Growth Rates in Selected Economies

	Ranking According to Table 2.1	Average TFP Growth Rates of other studies in Table 2.2	Ranking According to Column 3
Hong Kong, China	1	2.4	2
Republic of Korea	2	2.5	1
Chinese Taipei	3	2.4	2

Singapore	4	2.0 (or -0.1)	4
Japan	5	1.7	5
Thailand	6	1.7	5
Canada	7	0.5	8
Malaysia	8	0.87	7
USA	9	0.18	10
New Zealand	10	0.07	11
Philippines	11	0.4	9
Indonesia	12	-0.5	12

Note: In the case of Singapore, the ranking depends crucially on which of the two World Bank estimates we choose to use. Here, the ranking is based on the use of Series A in Table 2.2. If that in Series B is used, the ranking will differ accordingly.

One can readily notice that the ranking in column 4 almost coincides with that of column two. This is remarkable in view of the diversity in the estimations by different authors. Since the relative ranking of TFP growth rates is more important in this study than their absolute quantitative values, the robustness of the former gives us more confidence in one of the main results in Chapter 4.

Finally, readers are reminded that the production and cost functions reported in this chapter are estimated from aggregate economy-wide data. Presumably, it is of some interest to estimate the corresponding production or cost functions for different sectors of an economy. Unfortunately, the data necessary for doing this are generally lacking. We therefore do not attempt to implement the estimation.

Since APEC includes many export-oriented economies, we shall examine the relationship between TFP changes and international trade. We shall do this task formally in Chapter 4. A necessary condition for doing this is to construct the TFP indices for these economies. By using the methodology discussed in Section 2.1 above, these indices can be derived. They are used in Chapter 4 for causality tests.

Chapter 3
Patterns of Specialisation

3.1 Comparative Advantage and Patterns of Specialisation

In a closed economy, the range of goods produced, as well as their quantities and prices, will be determined by the production possibilities in that economy (i.e., technology, natural resources) and the interplay of domestic demand and supply relationships. With the opportunity of international trade, an economy will move resources away from some sectors towards some other sectors. In this case, we say that specialisation occurs in the latter sectors.

Specialisation can take two different forms. When two economies specialise and trade with each other, the products in which the economies respectively specialise may belong to different industries or sectors (e.g., automobiles and textiles) or they may belong to the same industry (e.g., GM and Toyota). The former case is called specialisation of sectors and the latter case is called specialisation of products. Trade in the former case is called inter-industry trade while trade in the latter case is called intra-industry trade. In the traditional trade theory approach, specialisation means specialisation of sectors and trade refers to inter-industry trade, while in the new trade theory specialisation includes specialisation of products and trade refers also to intra-industry trade.

This section briefly reviews these theories to provide some background for the discussion of APEC members' patterns of specialisation that is presented in the following sections. We will not however discuss whether a member economy's particular pattern of trade is mainly consistent with the traditional theory or the new theory. To answer such a question, we need much more information, which is hardly available for many member economies. Moreover, since we will only rely on export data, rather than import data, to construct the specialisation index below, intra-industry trade and inter-industry trade are not distinguished

Traditional Trade Theory

Traditional trade theory, which emphasises constant returns to scale and perfect competition, tells us that an economy's pattern of trade and specialisation depends on its comparative advantages. An economy may have comparative advantages in some products due to its technology and/or factor endowments.

The best known and extensively studied theories are the Ricardian model and the Heckscher-Ohlin model. The former attributes comparative advantage entirely to differences in technology or labour requirements of production (and thus labour productivity), while the latter attributes comparative advantage to differences in relative factor endowments. More specifically, in a one-factor, two-good, two-economy setting, the Ricardian model demonstrates that both economies can gain from trade if their labour productivity differs. The labour productivity difference gives rise to comparative advantage of each economy in one good's production, and an economy will export the good in which it has comparative advantage. That is the pattern of trade or pattern of specialisation.

On the other hand, the Heckscher-Ohlin model assumes that there are two factors, two goods and two economies, and that technologies are the same in both economies. It then shows that a difference in the relative endowments of the two factors results in the two economies having comparative advantages in production of different goods. The same conclusion about the patterns of trade is also obtained. An economy will export the product in which it has a comparative advantage.

Thus, the difference between the two models lies in their different emphases on what are the sources of comparative advantage. There is a very large literature on empirical tests of the validity of these two models. For excellent and extensive surveys, see Deardorff (1984) for early works and Leamer and Levinsohn (1995) for more recent works.

However, at least two features emerge from the empirical literature. First, most studies are *static* in the sense that they use cross-industry data in examining the relationship between an economy's import/export structure and its given labour costs or factor endowments.

Second, we should note that labour productivity is usually higher in more capital intensive industries. Thus, when a capital-abundant economy is exporting capital-intensive goods, we cannot tell whether the export pattern is due to the economy's high labour productivity or due to its abundance in capital. Early empirical investigations using the Ricardian model therefore failed to distinguish themselves from tests using the Heckscher-Ohlin model.[8] As a result, most attention has been directed to the Heckscher-Ohlin model.

In general, there are two types of test of the Heckscher-Ohlin model. One is the Leontief-type analysis, which uses input-output table to measure the capital and labour embodied in an economy's exports and import substitutes and then examines how the ratio of capital to labour embodied in exports relates to that embodied in import substitutes. The other is regression analysis, in which trade is modelled as a function of factor intensities among other determinants.

Although, as pointed out above, most empirical studies in the literature have been static in nature, there are some exceptions.[9] These have tested the effects of *changing* factor endowments on net exports, along the line of the Heckscher-Ohlin model.

The New Trade Theory

The new trade theory, which began in late 1970s and has been growing rapidly ever since, assumes economies of scale and imperfect competition.[10] While the traditional trade theory attributes gains from trade and specialisation to comparative advantage, the new trade theory emphasises the benefits of trade and specialisation to economies of scale. The new trade theory can also explain the widespread practice of intra-industry trade. If the products in an industry are differentiated and manufactured with increasing returns to scale, then even lacking comparative advantage, an economy can benefit from specialisation in producing a subset of varieties for home consumption and export while importing other varieties produced abroad. The strong relationship between productivity and specialisation becomes more

[8] For some recent attempts to test the Heckscher-Ohlin theorem in combination with the Ricardian model, see Trefler (1993, 1995).
[9] For example, Leamer (1984) Bowen (1983), Saxonhouse (1983), and Noland (1992), among others.
[10] See Krugman and Helpman (1985) and Grossman (1991) among others.

compelling because not only does productivity give rise to specialisation (as in the traditional trade theory approach), but more importantly specialisation leads to higher productivity due to increasing returns to scale.

According to the new trade theory, the pattern of intra-industry trade among symmetric economies cannot be predicted. Trade policy and history affect the trade patterns. This is not only true for intra-industry trade, but it is also true for inter-industry trade under certain circumstances. For example, it can be shown that even with perfect competition but in the presence of external economies (i.e., increasing returns to scale at the industry level), an economy may still import goods in which it has comparative advantage but which it did produce historically. In other words, external economies tend to confirm existing patterns of inter-industry trade even when the established pattern of specialisation runs counter to comparative advantage. One implication of the above is that more attention should be paid to identifying industries with significant economies of scale and studying how patterns of specialisation and productivity of these industries are correlated.

3.2 Revealed Comparative Advantages

The concept and measurement of revealed comparative advantage (RCA) was developed by Balassa (1965). Revealed comparative advantage pertains to the relative export performances of individual economies in particular products or product groups. In other words, an economy's RCA in product (or product group) *i*, is defined as the export share of *i* in the economy's total exports relative to the export share of *i* in the world total exports. That is,

$$RCA_i^j = \left(x_i^j / X^j\right) \div \left(x_i^w / X^w\right)$$

where RCA_i^j = RCA of economy *j* in product *i*

x_i^j = Exports of product *i* by economy *j*

X^j = Total exports of economy *j*

x_i^w = World exports of product *i*

X^w = Total world exports.

When the RCA index is greater than unity (i.e., when product *i*'s share in an economy's exports exceeds its share in world exports), the economy is regarded as having a revealed comparative advantage in the given product or commodity group. Conversely, when the RCA index is less than unity, this is interpreted as the economy having a revealed comparative disadvantage in the given product or commodity group. In general, the higher is the RCA, the greater is the economy's comparative advantage.

It is generally recognised that it is difficult to empirically measure comparative advantage because "comparative advantage is usually specified with respect to pre-trade relative prices, whereas empirical researchers in international economics confront trade data generated by trade flows in post-trade equilibrium".[11] Therefore, we have to rely on measures that *reveal* the comparative advantage from post-trade data.

[11] Hillman (1980, page 315).

There are several caveats pertaining to the use of this approach to reveal an economy's comparative advantage. First of all, an economy's data or information may be poor. In that case, the RCA will not be able to reflect the economy's true comparative advantages and disadvantages. Second, an economy's RCA can be distorted by its government's industrial and trade policies. For example, export promotion policies for targeted sectors, such as export subsidies, would enlarge their export share in the economy and result in higher RCA for these sectors than those that are determined by the economy's resource endowments and productivity. On the other hand, various degrees of protection by importing economies, such as tariffs, could also affect the applicability of RCA to the exporting economy's comparative advantages. Nevertheless, if the distortions from factors such as the above are not excessive, the RCA index can still be a reasonably good choice of measurement.

Despite their shortcomings, RCA indexes have been widely used in studies relating to issues of trade structure, economic development and commercial policies by academic and government economists.[12] Some of those empirical applications and policy analyses include Balassa (1965, 1977), UNIDO (1982) and UNCTAD (1983).

There are at least two natural questions on the RCA index even though we have no disagreement on its validity to represent an economy's comparative advantage. Why shouldn't we simply use the export share of a product (x_i^j / X^j) to identify its areas of comparative advantage or specialization? And how is the RCA index related to an economy's pattern of specialization?

First, a product's export share, x_i^j / X^j, indicates the product's relative contribution to the total export earnings of the economy. But the ratio is affected by the world demand and the price of the particular product. In the extreme case, suppose that an economy is the sole exporter of product *i* and therefore it has a very strong comparative advantage in this product. However, due to low demand for the product in both the home and the world markets, the product price could be very low and thus the value from exporting product *i* is low, resulting in a small export share. On the other hand, the economy also exports some amount of product *j* in which it does not have any comparative advantage. However, due to strong demand in the world market and the resulting high price for the product, the economy's export earning in product *j* could be higher than product *i*. In this case, the export share of product *i* would be smaller than that of product *j*. This example shows that the export share fails to capture a product's comparative advantage. Note that the above problem is overcome if we divide the product's export share in an economy by the export share of the same product in the world market.

Second, in an environment dominated by free markets and free trade, if an economy possesses comparative advantage in certain products, the market would direct more resources to these sectors, leading to more specialization (not necessarily complete specialization) and larger exports in these products. Thus, an economy's pattern of trade is determined by its comparative advantage and it also reflects the pattern of specialization.

[12] RCA is the most common type of measure of comparative advantage. Some other studies use export-to-import ratio or export share of a particular industry/sector/product. However, these measures are less satisfactory.

It is worth noting that we use the RCA index to examine the comparative advantage of a given economy for different products, sectors or industries, but not to compare the comparative advantage of a given product (sector or industry) across different economies. Yeats (1985) shows how and what additional information is needed for a cross-economy comparison. Thus, in this study, we confine our analysis to sectoral comparison within the same economy. That is, it is meaningful to compare the RCA value of good *i* with the RCA value of good *j* for, say, Japan, but it is totally meaningless to compare the Japanese RCA value of good *i* with the Korean RCA value of good *i.*

A final point to make is that the number of products (sectors or industries) which have RCA index values greater than unity in an economy is normally positively related to its economic development. This is particularly true in terms of the manufacturing sector. When an economy is in an early stage of its industrialisation, it has a narrow capacity for manufactured exports and so it has a limited number of comparative advantage products. However, as its industrial base widens, the economy can export a wider range of manufacturing goods and therefore, has more comparative advantage goods. Yeats (1991) discusses and demonstrates this by comparing the RCA profiles of China, Japan, Chinese Taipei and the Philippines. Our results below also support this relation.

3.3 Data Sources

As discussed above, to measure an economy's pattern of trade or specialization, we make use of the revealed comparative advantage index. To calculate an economy's RCA index in product *i*, we need information about the economy's export value of product *i* and the economy's total exports, to construct the product's export share in the economy. In addition, we also need information about the exports of product *i* by all other economies in the world and the world's total exports of all products. For this purpose, we find that the *International Trade Statistics Yearbook*, published by the United Nations, contains sufficient information for all economies except Hong Kong, China as well as Singapore and Chinese Taipei. For these three economies, we rely on other data sources: *Annual Review of Hong Kong External Trade, Review of Overseas Trade, and Hong Kong Trade Statistics Summary* for Hong Kong, China; *Yearbook of Statistics: Singapore* for Singapore, and *Monthly Statistics of Finance* for Chinese Taipei. The reasons will be explained below.

The next question is: for what types of products we should calculate their RCA? This is equivalent to asking how an economy is to be broken down into various sectors. In this study, we chose to break down commodities according to the single-digit level SITC (Standard International Trade Classification)[13], which are:

SITC 0:	Food and live animals
SITC 1:	Beverages and tobacco
SITC 2:	Crude materials, inedible, excluding fuels
SITC 3:	Mineral fuels, lubricants and related materials

[13] "In July 1950, the United Nations Economic and Social Council, on the advice of its Statistical commission, recommended that Governments compile trade by commodity statistics according to the original SITC in order to have available data internationally comparable categories suitable for the economic analysis of trade." (UN, 1994, page xxi). The SITC has been revised ever since.

SITC 4: Animal and vegetable oils, fats and waxes
SITC 5: Chemicals and related products, nes
SITC 6: Manufactured goods classified chiefly by material
SITC 7: Machinery and transport equipment
SITC 8: Miscellaneous manufactured goods
SITC 9: Commodities and transactions, nes

It is also useful to calculate the RCA of particular two-digit level classes because of their significance in world trade. In particular, we include some special items within the group of machinery and transport equipment (SITC 7). They are:

SITC 71: Power generating machinery and equipment
SITC 74: General industrial machinery and equipment, nes, and machine parts, nes
SITC 75: Office machines and automatic data processing machines
SITC 76: Telecommunications and sound recording and reproducing apparatus and equipment
SITC 77: Electrical machinery, apparatus and appliances, nes, and electrical parts thereof
SITC 78: Road vehicles
SITC 79: Other transport equipment

Finally, it is also useful to classify products according to their nature of factor intensity.[14] Accordingly, we have:

Group 1: *Natural resource intensive products*, which include products from group SITC 0 to group SITC 5;

Group 2: *Natural resource intensive manufactured goods*, which are those in group SITC 6, such as cork and wood manufactures (SITC 63), paper and articles of paper pulp (SITC 64), textiles (SITC 65), iron and steel (SITC 67), manufactures of metals (SITC 69), etc;

Group 3: *Labour intensive manufactured goods*, which are those classified as miscellaneous manufactured goods (SITC 8). They include heating and lighting equipment (SITC 81), furniture, bedding, mattresses and cushions (SITC 82), travel goods and handbags and similar containers (SITC 83), articles of apparel and clothing accessories (SITC 84), footwear (SITC 85), precision instruments (SITC 87), photo equipment and optical goods, toys, musical instruments and watches (SITC 88), etc; and

Group 4: *Capital and technology intensive goods*, which are the products in SITC 7.

[14] In UNIDO (1982), products are subdivided into resource-based and non-resource-based industries, based on three-digit level SITC code. Since we are using single-digit level SITC data, the classification here differs from that in UNIDO.

3.4 A Discussion of the World Exports

Recall that when calculating an economy's RCA of product group *i,* we have to know the share of the world's exports of product group *i* in the world's export of all products, i.e., x_i^w / X^w. However, the UN Yearbook does not provide the aggregate data of x_i^w. Thus, for each product group, this would require adding up the data of all economies, which are 182 in total (183 when Chinese Taipei is included).

Alternatively, we take the approximation approach by just selecting some large trading economies. In particular, when calculating the world figures, we only include all the APEC member economies and those non-APEC-member economies whose export shares in the world market are not less than 1%. It turns out that these non-APEC-member economies are all ranked among the 24 largest exporters and they are Germany, France, United Kingdom, Italy, Netherlands, Belgium-Luxembourg, Spain, Switzerland, Sweden, Austria and Denmark. In addition they include new APEC member economy the Russian Federation which, as noted earlier, for purposes of this study could not be included within the APEC totals. The total exports of these economies together with those of the APEC member economies[15] accounted for 84.5% of the world exports in 1995.[16]

Before calculating the RCA indexes, we calculate the export shares of various product groups in the world's total exports for the period 1970-94. The results are reported in the Appendix. There are three main observations. Firstly, at the single-digit level, the product group of SITC 7 (machinery and transport equipment) has the largest share in the world exports, higher than 40% in recent years. It is followed by SITC 6 (manufactured goods classified chiefly by material) at about 15% in recent years, and SITC 8 (miscellaneous manufactured goods) which is also about 15% in recent years. The product group with the smallest market share is SITC 4 (animal and vegetable oils, fats and waxes) which is below 1% in every single year.

Secondly, considering the manufacturing groups SITC 6-8, SITC 6 is seen to have a declining share in world exports, while the export shares of both SITC 7 and SITC 8 show slight increasing trends. For products other than these groups, export shares either remain stable or decline over the entire period examined. This seems to indicate that world exports have been shifting towards higher value-added commodities.

Finally, the contributions of the sub-categories of SITC 7 to world trade are significant and growing. Note that, in recent years, the export share of SITC 77 (electrical machinery, apparatus and appliances, nes, and electrical parts thereof) or that of SITC 78 (road vehicles) is larger than the export share of any other single-digit commodity group, except those of SITC 5, SITC 6 and SITC 8. For example, in 1994, SITC 77 contributed to 9% and SITC 78 contributed to another 10% of the world exports, while the contributions of SITC 0, SITC 1, SITC 2, SITC 3, SITC 4 and SITC 5 were smaller, at 7%, 2%, 5%, 4%, and less than 1%, respectively. This is the major reason that we take these two-digit level items into our analysis.

[15] The APEC membership here does not include the three new members that joined in 1998.
[16] See WTO (1996, page 5).

3.5 Report and Analysis of the Member Economies' RCA

In what follows, we examine the APEC member economies' RCA tables, which are presented in the Appendix, and discuss individual economies' characteristics. In those tables, one may find that there is no figure in some years for some product groups. It does not mean that the corresponding exports were nil, but rather that we could not find data for the corresponding time and products or that the RCA is too small.

The following discussion only presents the main characteristics of individual economy's pattern of specialization. For those who want to examine the details of each individual economy regarding the dynamic changes of RCA index for each sector, please refer to the appendices.

Australia

Australia has a revealed comparative advantage in the product groups SITC 0, SITC 2 and SITC 3. Among these, crude materials excluding fuels (i.e., SITC 2) exhibit the strongest comparative advantage, with RCA values ranging from 3.31 in 1991 to 5.74 in 1986. During the entire period, the pattern of revealed comparative advantage for these product groups is quite stable, a picture that is consistent with Australia's comparative richness in natural resources. Australia also evidenced revealed comparative advantages in animal, vegetable oil and fat (i.e., SITC 4) in some periods of time, but not in other periods, especially in recent years. Australia also has increasing comparative advantage in SITC 9 (goods not classified by kind in SITC).

Brunei Darussalam

Brunei does not export many types of products. This naturally gives the economy a very strong comparative advantage in a single product group, namely mineral fuels and related materials (SITC 3). The RCA of this item is above 20 for many years.

Canada

Canada is a resource-rich economy with a pattern of specialization similar to that of Australia, as discussed above. In particular, Canada demonstrates revealed comparative advantage in SITC 0, SITC 2 and SITC 3. Within these categories, SITC 2 products (i.e., crude materials excluding fuels) are the strongest sector in export. The RCA for SITC 2 is very stable, remaining between 2.5 and 3.0 most of the time. On more detailed study, this is seen to result from large exports of wood, pulp and paper.

Unlike Australia, though, Canada also shows comparative advantage in some other groups of industrial products. These include SITC 6 (basic manufactures) in certain periods as well as some capital-intensive industrial products such as SITC 71 in some periods, and in particular, SITC 78 (road vehicles) in all periods.

Chile

Chile has a revealed comparative advantage in SITC 0, SITC 2 and SITC 6. These products are all resource intensive. The strongest comparative advantage is in crude materials excluding fuels (SITC 2), although the category of food and live animals (SITC 0) is showing an increasing trend.

People's Republic of China

China started her economic reform and opened up her door to foreign trade and foreign capitals since 1979, but in the early reform period, government planning and control were very significant in the whole economy. In particular, various incentives were provided for promoting certain types of exports while imports remained under tight controls. Moreover, the state-owned foreign trade corporations directly conducted most of the trades. Thus, data for the early years would not reflect the economy's genuine comparative advantages since the patterns otherwise revealed were heavily distorted by the trade policies.

Focusing on data after 1983[17], we find that in general, China has evidenced comparative advantage in SITC 0, SITC 2, SITC 3, SITC 6 and SITC 8, categories that include either resource-intensive or labour-intensive products.

Not surprisingly, given the rapid pace of change in China, the pattern of comparative advantage has changed over the years; in particular, the comparative advantages in SITC 2 and SITC 3 have been declining over time and have in fact disappeared in more recent years. This can be at least partly explained by the pricing reform in China. In the early stage of the reform, the Chinese government suppressed the prices of producer goods while liberalizing the prices of consumer goods. Consequently, exporting producer goods was more profitable than selling them in the domestic market. As the prices of those goods in domestic markets rose in the more recent period of reform in the context of strong

[17] From the UN Yearbook we are only able to get China's trade data for 1983 and beyond. Even though we could obtain and compile the corresponding data for the earlier periods from the Chinese statistics publication such as Almanac of China's Foreign Economic Relations and Trade, we did not do so because those data are heavily distorted for the reasons cited.

domestic demand, exports of these products naturally slowed and even decreased as production was diverted to domestic markets.

A second trend of note is the rapid rise in the RCA index of SITC 8, which mainly includes labour-intensive products. Textiles (SITC 65) are China's major exports. However, textile exports are constrained by the Multifibre Arrangement (MFA) and hence it is reasonable to expect that without MFA, China's comparative advantage in SITC 8 would have been better revealed by the data. That is, the RCA index of SITC 8 would have been higher.

Lastly, China also shows comparative advantage in SITC 76 (telecommunications and sound recording and reproducing apparatus and equipment). It is expected that the successful reform and sustainable growth will transform the economy towards producing more capital and technology intensive products in the future.

Hong Kong, China

In 1995, re-exports accounted for almost 83% of Hong Kong, China's total exports, with domestic exports accounting for the remaining 17%.[18] The panel below shows the decreasing relative importance of domestic exports in Hong Kong since 1971.

Given the preponderance of re-exports in recent years, total export data would be inappropriate to evaluate Hong Kong, China's pattern of revealed comparative advantage. To capture Hong Kong, China's comparative advantages, we must concentrate on the export products that are actually produced in the economy. Since the UN Yearbook does not separate domestic exports from total exports, we have to use some other publications mentioned before.

Hong Kong's Domestic Export as Percentage of Total Exports

1971	**1972**	**1973**	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**
80.1	78.6	74.9	76.3	76.6	78.5	78.1	75.5	74.1	69.4	65.8	65.2
1983	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**
65.0	62.3	55.2	55.7	51.6	49.3	39.3	35.3	30.2	25.5	21.3	19.0

Source: *Annual Review of Hong Kong External Trade*, 1994.

From the respective RCA table, we can see that SITC 8 is Hong Kong, China's only sector with a revealed comparative advantage at the single-digit SITC breakdown. This is a labour intensive industry. The products within this group, which are important components of Hong Kong, China's exports, include among others: apparel and clothing accessories (SITC 84); toys, watches and clocks (SITC 88); and footwear (SITC 85). However, the revealed comparative advantages in this group have been declining over time. There are two obvious reasons for this downtrend. The first reason has to do with the MFA as discussed in the section on China. Second, Hong Kong, China has been the largest source of foreign direct investment in China ever since China opened up her door in 1979. The types of investments from Hong Kong, China's companies are mainly

[18] See WTO (1995, page 5).

labour-intensive production, to exploit the cost advantage in China. This has led to a great structural change in the Hong Kong, China economy, with a continued decline of her manufacturing sector. Note that the decrease in the SITC 8's RCA accelerated after 1979 and continued to decline over time.

On the other hand, Hong Kong, China also has comparative advantages in some capital and technology intensive products, which are, as shown in the RCA table, SITC 75, SITC 76 and SITC 77.[19] As well, the rising importance of re-exports indicates that Hong Kong, China has increasing comparative advantages in financial services, trade-related services and port services as these are the essential factors which lead to demand for re-export services.

Indonesia

Indonesia's comparative advantages are in the resource-intensive product groups: SITC 0, SITC 2, SITC 3 and SITC 4. During the last decade, as Indonesia experienced rapid economic growth and industrialisation, it began to show comparative advantages in SITC 6 and SITC 8 as well.

Japan

It is generally expected that larger and more developed economies will tend to have more diversified export structures in industrial products, mainly because large domestic markets permit the exploitation of economies of scale in a wide range of industries. This expectation has been confirmed by other studies.[20] This expectation is confirmed in the case of Japan. In SITC 7, Japan maintains comparative advantages in all the two-digit level product groups considered, except SITC 79 in some periods of time. Japan also had comparative advantages in SITC 6 in the 1970s and SITC 8 in early 1970s respectively, but these have disappeared in recent years. This is a natural transformation for a developed economy.

Republic of Korea

Korea has revealed comparative advantage in manufacturing and other industrial products. Korea has maintained stable RCA values in SITC 6, at around 1.5 in most periods, and also has comparative advantages though with a decreasing trend in SITC 8, the labour intensive group. As in the case of China and Hong Kong, China, the MFA has affected Korea's export pattern.

In recent years, Korea has started to build up comparative advantage in the capital and technology intensive product group (SITC 7) and, in particular, in SITC 76, SITC 77 and SITC 79.

[19] We have also constructed Hong Kong, China's RCA table based on the calculation of total exports. In that case, we can see that in addition to the comparative advantages discussed above, the RCA of SITC 6 is also greater than unity when total export data are used. It is clear that Hong Kong, China is poorly endowed with natural resources and it is re-exports of products produced in China, which has comparative advantage in this sector, that give rise to this statistical result.

[20] Balassa (1977) calculated the standard deviation of the comparative advantage indices and used it to measure degree of diversification, with smaller standard deviation meaning more diversification.

Malaysia

The Malaysian economy has a pattern of RCA scores that is somewhat similar to Indonesia's, with strong comparative advantages in natural resources such as crude materials (SITC 2), mineral fuels (SITC 3), and animal and vegetable oils (SITC 4). It is worth noting that the RCA value of Malaysia's SITC 4 has been greater than 22 in many years and close to 20 for most other periods. Moreover, perhaps due to the rapid economic growth and strong foreign capital inflows during the second half of the 1980s and the first half of the 1990s, Malaysia shows comparative advantages in many capital and technology intensive products like SITC 75, SITC 76 and SITC 77.

Mexico

Mexico has consistently had comparative advantage in the natural-resource-intensive sectors SITC 0 (food and live animals) and SITC 3 (mineral fuels, lubricants and related materials). However, as an indicator of Mexico's industrialisation, comparative advantages appeared in the capital and technology intensive product group (SITC 7) in the early 1990s. In particular, in the 1990s, she has RCA values greater than unity in SITC 71, SITC 76, SITC 77 and SITC 78.

New Zealand

The RCA table clearly reflects New Zealand's richness in natural resources, with comparative advantages concentrated on three resource-based sectors, SITC 0, SITC 2 and SITC 4. Quite uniquely, New Zealand's pattern of RCAs remained stable during the period under consideration, with no sector at the single-digit SITC level exhibiting comparative advantage in some years and comparative disadvantage in others. Moreover, the RCA values of most sectors do not change much. The most dynamic sector is SITC 6; here the RCA index continuously increased from 0.25 in 1970 to 0.92 in 1994. If this trend continues, New Zealand would soon begin to show revealed comparative advantage in this material-based manufacturing sector.

Papua New Guinea (PNG)

Papua New Guinea has a narrow export base in resource-intensive products, in respect of which, it has strong comparative advantages. These are SITC 0 (food and live animals), SITC 2 (crude materials, inedible, excluding fuels) and SITC 4 (animal and vegetable oils, fats and waxes). It is also worth pointing out that PNG has the comparative advantage in SITC 9.

Republic of the Philippines

The Philippines is rich in natural resources but also has had a dynamic evolution of comparative advantages in some industrial sectors. Reflecting this, the economy has comparative advantages in natural resource intensive sectors SITC 0, SITC 2, and SITC 4 as well as in SITC 8 (miscellaneous manufactured goods) and SITC 9. Moreover, in recent years the Philippines has developed comparative advantages in some capital- and technology-intensive product sectors, such as SITC 76 and SITC 77. This could be the result of inward foreign direct investment by multinational enterprises, as has been the case in some other East Asian economies.

Singapore

Like Hong Kong, China, a large share of Singapore's total exports are accounted for by re-exports. In 1994, Singapore 's re-exports accounted for 40% of the economy's total exports and domestic exports accounted for the other 60%.[21] However, as shown in the panel below, in contrast to Hong Kong, China, the share of domestic exports in Singapore has remained comparatively stable over the years

Singapore's Domestic Exports as Percentage of Total Exports

1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
66.5	65.6	63.3	64.4	64.9	65.5	64.8	62.7	63.4	65.9	64.8	64.2	63.1	60.1

Source: *Yearbook of Statistics*, Singapore, 1994.

For the same reason as in the case of Hong Kong, China, we need to calculate Singapore's RCA based on domestic export data, which can be obtained from the *Yearbook of Statistics, Singapore*. Singapore's RCA table reveals that the economy has comparative advantages in SITC 3 and SITC 4. Singapore has also developed comparative advantage in SITC 7 and in particular, in SITC 75, SITC 76 and SITC 77. Similar to Hong Kong, China, the large share of re-exports shows that Singapore has comparative advantages in trade-related services.

Chinese Taipei[22]

Chinese Taipei is a diversified economy with comparative advantages in some of resource-based product sectors and some of non-resource-intensive sectors. In particular, comparative advantage is revealed in sectors SITC 6, SITC 8 and more recently, SITC 7. Chinese Taipei has also experienced a rapid development in the capital and technology industries. The RCA value of SITC 7 is rising and in particular, the values for SITC 75, SITC 76 and SITC 77 exceed unity, showing comparative advantages of the relevant capital and technology intensive products.

[21] See WTO (1995, page 5).
[22] Since trade data for Chinese Taipei are not available in the UN Yearbook, we mainly rely on the Monthly Statistics of Exports/Imports, published by the Department of Statistics, Ministry of Finance, Chinese Taipei.

Thailand

The economy of Thailand grew rapidly during the East Asian boom that started in the mid-1980s and its industry became very dynamic. In addition to comparative advantages in some resource-intensive sectors such as SITC 0 and SITC 2, Thailand also comparative advantages in the labour intensive industry (SITC 8) and in some technology-intensive industries such as SITC 75, SITC 76 and SITC 77.

The United States

The United States, which is perhaps the most diverse economy globally, has revealed comparative advantage in many sectors over long periods of time. This can be seen in the RCA table. The United States has comparative advantages in the capital- and technology-intensive sector SITC 7 and in many two-digit level products within the group such as SITC 71, SITC 74, SITC 75, SITC 77 and SITC 79. The USA also has comparative advantages in many natural resource-intensive industries including SITC 0, SITC 2, SITC 4, SITC 5 and SITC 9.

Summary

The results of this investigation of the revealed comparative advantage of the individual APEC member economies is summarised in Appendix Table A2. A dot (•) in a cell of this table shows that an economy has consistently maintained an RCA greater than unity in that sector over the years. In the case where an economy has an RCA greater than unity in a particular sector in some years but less than one in some other years during the period between 1970 and 1994, the economy is considered as having comparative advantage in that sector if its RCA value is greater than one for most of time.

Two general points are worth noting in these data. First, it can be seen that no economy has a comparative advantage in SITC 1 (beverages and tobacco). This implies that the rest of the world must have the comparative advantage in this sector. In fact, we have done the calculation and the outcome confirms it. This is not surprising since the European economies constitute the rest of the world in our study.

Second, UNIDO (1981) has conducted a research on revealed comparative advantages for many economies on various industrial products. There are some overlaps of time span, economies and sectors between the UNIDO study and ours. For those RCA indices under the examination of both studies, the results are not contradictory.

One way to identify patterns of specialization within the APEC region is to group these economies according to their comparative advantages. By re-arranging the orders of the economies and commodities in Appendix Table A2, we obtain Table A3 which separates the economies into six groups. It is then easy to observe that the dots, which represent comparative advantages, scatter around a downward sloping curve. The characteristics of these groups are briefly discussed as follows.

Group 1: This group includes New Zealand, Brunei, Australia and Papua new Guinea. These are natural-resource-rich economies and their comparative advantages concentrate on SITC 0 to SITC 4.

Group 2: This group includes Mexico, Canada, Malaysia and Indonesia. The characteristic of this group is that the economies are rich in resources, but unlike the first group, they also obtain comparative advantages in some of the SITC 7 products or, as in the case of Indonesia, in the resource-based manufacturing (SITC 6).

Group 3: These are the economies that demonstrate comparative advantage in labour-intensive products (SITC 8) and also in some of the technology-intensive products (under SITC 7). They include Philippines, China, Thailand, Chinese Taipei and Hong Kong, China.

Group 4: Unlike the economies in the above three groups, Singapore and Korea evidence comparative advantage in technology-intensive products (SITC 7) while still having comparative advantage in some other products.

Group 5: Japan has comparative advantages only in technology-intensive products (SITC 7).

Group 6: The United States has comparative advantage in both the resource- and technology-intensive sectors.

3.6 Market Share and Competitive Advantage

The standard trade theory has shown that an economy can gain from trade by exporting and importing according to its comparative advantages and comparative disadvantages. While international trade can lead to improvements in an economy's productivity, the resultant productivity improvements could vary according to the economy's pattern of comparative advantages in different sets of products. Moreover, given that a higher value of an economy's RCA in product *i* than in product *j* does not imply that the economy's exports of product *i* is greater than its exports of product *j,* it is also useful to look at APEC member economies' trade performance in terms of their market shares of various products in the world market. However, we should treat this part as a supplement to, rather than a substitute for, the above RCA analysis.

For this reason, we have calculated the ratio x_i^j / x_i^w, which is the share of economy *j*'s exports of product *i* in the world export market for product *i*, or simply called economy *j*'s market share of product *i*. Appendix Table A4 shows all economies' market shares of all commodities in 1994. The market share table for other periods is also available upon request. Because Brunei Darussalam is relatively small, its export market shares are not significant and so we report 0.00 in all columns of the table. The market shares of Singapore and Hong Kong, China are calculated using their total exports, rather than just domestic exports.

Australia and Canada

Australia has large market shares in SITC 0, SITC 2, SITC 3 and SITC 9, which are just her sectors of comparative advantages. Canada also has large market shares in the four

sectors in which it has comparative advantages, namely SITC 0, SITC 2, SITC 3 and SITC 78. In addition, Canada also has significant market shares in SITC 6, SITC 7 and SITC 9.

Chile, Indonesia, New Zealand, Papua New Guinea, Philippines and Thailand

These economies' market shares in almost all products are small even if they have very high RCAs. However, some of them have large share in the world market in respect of some particular products such as SITC 3 and SITC 4 for Indonesia, and SITC 4 and SITC 9 for Philippines.

China, Republic of Korea, Malaysia, Mexico and Chinese Taipei

These economies maintain some degrees of market shares in most commodities. China is strong in SITC 0, SITC 6 and SITC 76, Republic of Korea in SITC 5, SITC 76, SITC 77 and SITC 79, Malaysia in SITC 4 and SITC 76, Mexico in SITC 3, and Chinese Taipei in SITC 6, SITC 7, SITC 8, SITC 75, SITC 76 and SITC 77.

Singapore and Hong Kong, China

These two economies have some similarities as well as differences in their market shares. The strongest market share is in SITC 8 for both economies, recording two-digit level. They also have large market shares commonly in SITC 74, SITC 75, SITC 76, SITC 77, SITC 1 and SITC 7.

Japan and the United States

For these two large economies and exporters, Japan has very large market shares in her comparative advantage sectors (over 10%) while the United States has very large market shares in all sectors (over 10% except the 6.9% in SITC 3 and the 8.9% in SITC 6).

Summary

To get a systematic overview of market share distribution among APEC member economies, Appendix Table A5 is derived from Table A4 by rearranging the economies in an ascending order of their contributions to the world exports while eliminating the market shares which are less than 2.0%. The last column of Table A5 is the number of sectors in which an economy has market shares no less than 2.0%.

There are two observations that might usefully be made on these data. First, larger exporters have more number of sectors with significant market shares. Second, the market shares of those larger exporters also tend to be bigger.

Chapter 4
Productivity, Trade and Specialisation

4.1 Introduction

Productivity, openness in trade, and pattern of specialisation are three inter-related variables. Traditional trade theory, which emphasises constant returns to scale and perfect competition, tells us that an economy's pattern of trade and specialisation depends on its comparative advantages. Productivity is one of the key elements shaping comparative advantage. Thus, productivity changes may affect the goods in which an economy will specialise. On the other hand, we should note that comparative advantage in general and productivity in particular are not time invariant. Changing economic conditions, such as trade liberalisation, may induce an economy to invest more in raising the productivity (through innovation) in certain sectors. Hence, the degree of openness in an economy's trade activities may affect its investment and growth of productivity. Moreover, the experience accumulated due to specialised production in a good may further enhance comparative advantage in that good. The initial choice of specialisation may reinforce itself over time.

Knowledge about the relationship between productivity changes, trade, and patterns of specialisation will go a long way in helping us to understand the process of economic development. This understanding in turn may be useful for policy formulations. This chapter is divided into two major parts. In the first, we shall investigate how trade and productivity affect each other. In the second, we focus on the interaction between productivity and specialisation.

4.2 International Trade and Productivity

General Discussion

In this section, we discuss the relationship between productivity changes and international trade. There are a number of models that explicitly deal with this relationship. However, as is evidenced from the empirical results below, no single approach seems to fit the situation in every APEC economy. We shall briefly discuss only two of the more relevant approaches.

Romer (1990), in the tradition of the endogenous growth literature, makes an important attempt to show that an increase in international trade activities can raise the productivity level of an economy. In his model, the driving force of economic growth is improvement in productivity. To achieve this, more resources have to be spent on R&D. The latter has the property of increasing returns to scale. In other words, if an economy is bigger, the benefits from R&D will be larger because more people can gain from the inventions and innovations. People will also have greater incentive to invest in R&D if the economy is larger. International trade in effect merges several economies together into one big economy. This allows a greater degree of specialisation in the production process. The benefits of innovations in the specialised area will go up. Thus, trade can cause productivity to go up.

Lucas (1993) discusses another approach that explains why trade can be beneficial to economic growth. Trade allows an economy to delink its production from its consumption. Since the goods produced need not be the goods consumed, the economy does not have to spend resources on producing goods in which it does not have comparative advantage. This has two important effects. First, by focusing on the production of a narrower set of goods, the economy can accumulate knowledge faster. This is because the more resources are spent on the production of a good, the more effective is the learning-by-doing process. Second, human capital accumulated through the productive experience has spillover effects. Knowledge in the production of a particular good can help to lower the cost of production of a different but closely related good. An economy can therefore first specialise in a good that it has comparative advantage. After some time, the new experience will enable it to develop comparative advantage in the goods higher up on the quality and technology scales. Thus, specialisation due to expansion in trade can allow an economy to learn faster and undergo continuous structural changes in the production process. These effects raise productivity and encourage investment. Both can increase the economic growth rate.

The basic questions we want to ask are: (1) Does the opening up of the economy raise investment or productivity? (2) Does improvement in productivity encourage investment activities and further open up the economy? (3) Do changes in investment affect productivity and the degree of openness of an economy?

Methodology

We perform econometric tests to answer the questions posed above. Ordinary regression analyses only tell us whether certain variables are correlated. They cannot verify whether variable X is causing Y, or vice versa. The appropriate methodology that can be used to test for the direction of causality is the Granger causality test.

Suppose we want to test whether Y is causing X. Then we can do the following two regressions.

$$X(t) = \alpha_0 + \alpha_1 X(t-1) + ... + \alpha_p X(t-p) + \beta_1 Y(t-1) + ... + \beta_p Y(t-p) + u(t), \quad (1)$$

$$X(t) = \gamma_0 + \gamma_1 X(t-1) + ... + \gamma_p X(t-p) + v(t), \quad (2)$$

where the α's, β's, and γ's are coefficients to be estimated, p is the number of time lags included in the regression, v(t) and u(t) are random error terms. Let RSS(1) and RSS(2) be the residual sums of squares for equations (1) and (2), respectively. Then we can calculate the F statistics with degrees of freedom equal to p and T-2p-1 by the following expression:

$$[(RSS(2) - RSS(1)) / p] / [RSS(1) / (T-2p-1)].$$

In this expression, T is the number of observations in the regression. Y is said to Granger-cause X if the F statistics calculated is big enough.

For our purpose, we construct for each economy three variables and test the directions of their causality. The first variable is the total factor productivity (TFP) index constructed in Chapter 2. The second is the degree of openness of the economy. It is defined as (imports + exports)/ GDP. The third is the investment ratio in the economy. It is equal to aggregate investment / GDP. Time trends of these three variables for APEC members are plotted in Appendix B.

Causality Results

Results of the Granger causality tests for the APEC member economies are presented in Appendix Table A6. Simple observation immediately reveals that the effects of these variables differ significantly among the economies. There does not seem to be an economic development pattern that is universal.

One of the most important questions in economic development is how trade affects growth. Among the economies that were growing rapidly during the period under investigation (i.e., Hong Kong, China along with Japan, Chinese Taipei, and Thailand) all indicate that openness of the economy does not necessarily raise TFP. Rather, a more open economy tends to stimulate faster capital accumulation. This appears to support Lucas's hypothesis, but is inconsistent with that of Romer.

Two other members of the four little tigers, Singapore and the Republic of Korea, have a different pattern. In the case of the former, the three variables have no systematic relationship. This may be due to the fact that Singapore's economic activities are dominated by her huge central provident fund. Investment is therefore influenced more by the mandatory saving rate rather than by international trade. The results that investment ratio and openness have no significant effect on TFP seem to support similar findings by Young (1994, 1995). In the case of Korea, active government intervention may also obscure the effects of trade on the economy.

Other than Singapore, the Philippines is the only economy that shows no significant causal relationship among the three variables. There is some evidence that there have been distortions of trade and investment policies and inconsistent implementation of them. This may be a plausible explanation for the lack of relationship.

There are also economies where openness does affect TFP. They are Canada, China, Indonesia, Papua New Guinea and the United States. They provide some support for the hypothesis of Romer. However, one can also interpret the results to be consistent with Lucas' model. In the latter, openness can raise investment and/or TFP. In the case of China, probably the open door policy has also helped to increase competition in the economy. This will raise efficiency. It appears that some economies respond to a change in TFP by changing their investment strategies, while others modify their R&D activities or simply become more efficient.

For a few economies, Canada, Indonesia, Papua New Guinea and the United States, investment ratio affects TFP. This may be due to the fact that in some economies part of the investment goes to R & D directly. Alternatively, when investment goes up, people have better chance of learning by doing, which also raises R & D.

As can be seen from Table A6, there are also economies where an improvement in TFP can cause the openness of the economy to change. A simple explanation is that improvements in TFP affect the competitiveness of the economy in the international market. Hence, the degree of openness is affected.

4.3 Productivity and Specialisation

In the preceding section, we have examined the relationship between productivity growth and international trade. We now discuss the possible relationship between productivity growth and pattern of specialisation.[23]

Our basic hypothesis in this regard is as follows. The world demand structure has undergone large changes in the past, with the relative demand for some products increasing dramatically while that for some others declining to a large extent. Stronger demand for a product will lead to higher market value of the product. This benefits the economies that specialise in the production of the product. In contrast, an economy will benefit less from specialising in declining sectors. This is in fact the terms of trade effect argument. As a result, productivity growth will be higher for an economy that luckily has comparative advantages in the commodities with stronger world demand.

To confirm the above idea, we first re-examine trends in world market shares of different product groups over time as shown in Appendix Table B2. It is easily found that over time some sectors are gaining their market shares, some are quite stable and the others are losing market shares. For example, SITC 7 gains market share by about 7.3%, increasing from 34.6% in 1970 to 41.9% in 1994. There is little change in SITC 5. However, the market share of SITC 6 decreases from 22.2% in 1970 to 15.0% in 1994, representing a 7.2% reduction. Then, we re-arrange the order of SITC sectors such that the first sector is the one with the largest decrease in market share and the last sector is the one with the largest increase in market share. This is shown in Table 4.2 below. In that table, we also re-order the economies such that the productivity growth of the first economy is the highest and the productivity reduction of the last economy is the largest. As mentioned in Chapter 2, we have also tried other approaches to estimate TFP and obtained only slightly different rankings for economies' TFP. When those rankings are used in Appendix Table A7, our conclusion will not be changed.

From Appendix Table A7, we divide APEC member economies into three groups. The first group includes those with TFP growth greater than 2%, and they are Hong Kong, China, as well as Chinese Taipei, Korea, Singapore and Japan. In the second group are Thailand, Canada, Malaysia, China and the United States, all with positive TFP growth of less than 2%. The last group contains all economies that experience average negative TFP growth. They are New Zealand, Australia, Mexico, Chile, Papua New Guinea, Philippines and Indonesia. As for the sectors, there are also three groups. The first group has decreasing market shares (SITC 71, SITC 6, SITC 2, SITC 0 and SITC 4), indicated by a negative sign in the last row of the table. The second group of sectors (SITC 79, SITC 5, SITC 3 and SITC 78) has stable market shares, indicated by 0 in the last row. The final

[23] Another issue is the relationship between productivity growth and the degree of specialisation. However, theoretically and empirically, it is unclear how the latter should be defined and measured. We are unable to perform this exercise.

group includes SITC 74, SITC 9, SITC 75, SITC 76, SITC 77, SITC 8 and SITC 7, which have increasing market shares, indicated by a plus sign in the last row.

There are a number of observations. First, by and large, economies with negative TFP growth are those specialising in the products which have decreasing market shares. Economies with moderate TFP growth are those specialising in products which fall in all three groups of sectors. And economies with high TFP growth are those mainly specialising in the products which have increasing market shares. This empirical result is consistent with one of the theoretical propositions in Lucas (1988) that economies specialising in goods with fast growth of world demand tend to do better than others.

Second, no negative growth economy has comparative advantage in the capital and technology intensive product group (except Mexico in SITC 71 and Philippines in SITC 77), or in the labour intensive product group (except Philippines).

Third, like some other sectors, SITC 6 does not give a clear indication of how it is associated with the TFP growth. Some economies in each group have specialised in this sector.

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APPENDIX A

Table A1: Total Factor Productivity Indices

	Australia	Canada	Chile	China	HK, China	Indonesia	Japan	Korea	Malaysia	Mexico	New Zealand	PNG	Philippines	Singapore	Chinese Taipei	Thailand	USA
1960	1.000	1.000	1.000	1.000		1.000		1.000	1.000	1.000		1.000					1.000
1961	0.988	1.062	0.967	0.842		0.755		1.015	0.988	0.987		1.126					1.038
1962	0.968	1.048	0.990	0.802		0.774		1.007	1.003	0.950		1.073					1.017
1963	0.965	1.153	0.960	0.757		0.673		1.267	0.982	0.951		1.057		1.091	1.144		1.099
1964	0.957	1.032	0.997	0.779		0.859		0.992	1.015	0.939		1.070					1.009
1965	0.956	1.172	0.958	0.815		0.669		1.346	0.972	0.934		1.123		1.181	1.184		1.100
1966	0.953	1.194	0.946	0.884	1.000	0.643	1.000	1.510	1.134	0.932	1.000	1.007	1.000	1.272	1.252	1.000	1.080
1967	0.942	1.081	0.968	0.902		0.709		1.030	0.999	0.967		1.134			1.000		1.071
1968	0.941	1.106	0.989	0.958		0.683		1.153	1.005	0.953		1.118			1.051		1.094
1969	0.933	1.018	1.012	0.847		0.940		0.998	1.007	0.966		1.036					0.986
1970	0.933	1.199	0.988	0.867	1.045	0.604	1.026	1.577	1.106	0.906	1.018	0.970	0.974	1.330	1.347	0.942	1.094
1971	0.930	1.210	0.954	0.879	1.116	0.565	1.098	1.541	1.116	0.916	1.032	0.915	0.964	1.401	1.445	0.968	1.105
1972	0.927	1.206	0.880	0.895	1.220	0.556	1.141	1.655	1.161	0.925	1.065	0.886	0.975	1.457	1.518	1.027	1.120
1973	0.926	1.133	0.963	0.858		0.676		1.175	0.982	0.943		1.066		1.000	1.104		1.084
1974	0.903	1.279	0.808	0.899	1.418	0.457	1.247	2.104	1.153	0.845	0.939	0.860	0.879	1.571	1.838	1.084	1.087
1975	0.901	1.212	0.853	0.875	1.212	0.536	1.121	1.738	1.203	0.920	1.056	0.889	0.975	1.462	1.468	1.006	1.072
1976	0.898	1.225	0.856	0.888	1.175	0.515	1.144	1.778	1.078	0.901	1.018	0.874	0.960	1.453	1.492	0.997	1.049
1977	0.898	1.246	0.832	0.824	1.262	0.482	1.157	1.859	1.108	0.866	1.013	0.827	0.958	1.484	1.624	1.043	1.069
1978	0.888	1.279	0.867	0.933	1.535	0.442	1.291	2.238	1.181	0.879	0.951	0.862	0.893	1.625	1.909	1.149	1.074
1979	0.887	1.422	0.735	0.948	1.897	0.353	1.438	2.627	1.204	0.846	1.025	0.746	0.810	1.883	2.264	1.149	1.075
1980	0.883	1.404	0.846	0.910	1.768	0.373	1.391	2.414	1.219	0.830	0.998	0.772	0.781	1.811	2.118	1.200	1.041
1981	0.879	1.295	0.906	0.982	1.610	0.440	1.323	2.079	1.235	0.904	0.947	0.839	0.867	1.705	1.980	1.118	1.046
1982	0.879	1.444	0.755	1.001	1.878	0.332	1.500	2.674	1.086	0.856	1.004	0.759	0.756	1.814	2.320	1.145	1.076
1983	0.878	1.443	0.817	0.932	2.399	0.287	1.632	3.185	1.053	0.807	0.948	0.776	0.718	2.049	2.859	1.287	1.089
1984	0.873	1.311	0.949	0.930	1.671	0.434	1.357	2.126	1.249	0.912	0.988	0.810	0.845	1.786	2.029	1.171	1.053
1985	0.869	1.271	0.760	0.854	1.377	0.463	1.210	1.972	1.146	0.822	0.945	0.824	0.946	1.526	1.694	1.068	1.081
1986	0.867	1.434	0.800	0.923	2.256	0.297	1.565	2.970	0.976	0.794	0.960	0.768	0.805	1.926	2.720	1.210	1.074
1987	0.853	1.468	0.864	0.931	2.441	0.287	1.670	3.332	1.129	0.835	0.966	0.744	0.739	2.162	2.994	1.358	1.094
1988	0.851	1.426	0.766	0.944	2.034	0.314	1.522	2.838	0.988	0.795	0.968	0.756	0.756	1.843	2.503	1.144	1.074
1989	0.834	1.608	0.857	0.929	2.748		1.748				0.937		0.695	2.419	3.319	1.443	1.082
1990	0.828	1.389	0.940	0.880	1.698	0.389	1.381	2.211	1.242	0.937	0.989	0.780	0.826	1.760	2.032	1.131	1.020
1991	0.817	1.565	0.819	0.879	2.601		1.752	3.746			0.913		0.710	2.362	3.210	1.460	1.062
1992	0.812	1.508	0.822	0.879	2.511	0.290	1.714	3.550	1.204	0.867	0.939	0.684	0.738	2.269	3.079	1.455	1.080
1993		1.625		1.026	2.852									2.385			1.066
1994				1.100	2.931									2.752			
1995					3.010									2.883			

Table A2: Comparative Advantage (1970 - 1994)

SITC Code:	0	1	2	3	4	5	6	7	8	9	71	74	75	76	77	78	79
Australia	•		•	•						•							
Brunei				•													
Canada	•		•	•												•	
Chile	•		•				•										
China	•		•	•			•		•					•			
Hong Kong, China									•				•	•	•		
Indonesia	•		•	•	•		•										
Japan								•			•	•	•	•	•	•	
Korea							•	•	•					•	•		•
Malaysia			•	•	•									•	•		
Mexico	•			•							•						
New Zealand	•		•		•												
PNG	•		•		•					•							
Philippines	•		•		•				•	•					•		
Singapore				•	•			•					•	•	•		
Chinese Taipei							•	•	•				•	•	•		
Thailand	•		•						•				•	•	•		
United States	•		•		•	•		•		•	•	•	•		•		•

Note: A dot (•) in a cell indicates that an economy has comparative advantage in the corresponding sector and the economy does not have comparative advantages in the sectors which have no dots.

Table A3: Comparative Advantage (1970 – 1994)

SITC Code:	0	2	3	4	5	6	8	7		76	77	75	79	71	78	74
New Zealand	•	•		•												
Brunei			•													
Australia	•	•	•													
PNG	•	•		•												
Mexico	•		•											•		
Canada	•	•	•												•	
Malaysia		•	•	•						•	•					
Indonesia	•	•	•	•		•										
Philippines	•	•		•			•				•					
China	•	•	•			•	•			•						
Thailand	•	•					•			•	•	•				
Hong Kong, China							•			•	•	•				
Singapore			•	•				•		•	•	•				
Chinese Taipei						•	•	•		•	•	•				
Korea						•	•	•		•	•		•			
Japan								•		•	•	•		•	•	•
United States	•	•		•	•			•			•	•	•	•		•

Note: A dot (•) in a cell indicates that an economy has comparative advantage in the corresponding sector and the economy does not have comparative advantages in the sectors which have no dots.

Table A4: 1994 Market Share in World Export (in Percentage %)

SITC Code:	0	1	2	3	4	5	6	7	8	9	71	74	75	76	77	78	79
Australia	2.8	0.4	5.2	5.3	1.2	0.5	1.1	0.4	0.3	13.	0.5	0.6	0.6	0.3	0.3	0.2	0.6
Brunei	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada	4.4	1.2	16.	13.	0.0	3.1	5.4	5.1	2.0	9.8	4.2	3.4	3.0	2.2	1.8	12.	3.6
Chile	1.2	0.2	2.2	0.0	0.4	0.2	0.8	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
China	4.3	1.3	3.2	3.1	4.0	2.0	4.7	1.5	10.	0.3	0.0	0.0	0.0	4.5	2.2	0.5	0.8
Hong Kong, China	1.0	2.8	1.7	0.9	0.0	2.8	5.0	3.4	12.	0.9	1.8	2.2	3.9	9.5	5.0	1.1	0.0
Indonesia	1.5	0.2	2.5	7.9	11.	0.0	1.9	0.2	1.6	0.1	0.0	0.0	0.2	1.0	0.2	0.1	0.1
Japan	0.1	0.0	2.0	2.0	0.0	7.6	8.5	20.	6.5	7.2	19.	18.	19	20.	20.	24.	12.
Korea	0.1	0.0	1.1	1.3	0.0	2.0	4.6	3.3	2.8	0.6	1.1	1.6	2.0	5.5	6.2	2.0	5.2
Malaysia	0.1	0.0	3.4	3.2	32.	0.5	1.1	2.3	1.2	0.4	0.6	0.9	2.7	6.7	4.1	0.1	1.8
Mexico	1.6	0.6	1.1	5.6	0.0	0.9	1.2	2.4	1.4	0.1	3.9	1.5	1.2	4.2	3.4	2.6	0.3
New Zealand	2.2	0.0	1.8	0.2	0.0	0.3	0.3	0.0	0.1	0.3	0.0	0.1	0.0	0.1	0.1	0.2	0.1
PNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Philippines	0.6	0.1	0.3	0.2	4.0	0.1	0.2	0.2	0.4	4.6	0.0	0.0	0.1	0.5	0.6	0.0	0.0
Singapore	1.0	2.1	1.1	7.0	3.1	1.8	1.2	4.5	18.	1.2	1.8	2.4	13.	9.1	6.4	0.3	1.1
Chinese Taipei	1.4	0.0	1.2	0.4	0.2	1.8	4.2	2.9	3.6	0.1	0.7	2.2	5.9	3.9	3.9	1.2	0.4
Thailand	4.0	0.2	1.7	0.3	0.0	0.4	1.1	1.1	2.3	0.3	0.4	0.9	2.2	1.7	1.7	0.3	0.6
United States	15.	10.	21.	6.9	14.	17.	8.9	18.	12.	25.	23.	17.	19.	11.	18.	14.	32.

Note: A share of 0.0% does not necessarily imply zero export.

Table A5: 1994 Market Share in World Export (in Percentage %)

SITC Code:	0	1	2	3	4	5	6	7	8	9	71	74	75	76	77	78	79	#
Chile			2.2															1
New Zealand	2.2																	1
Philippines					4.0					4.6								2
Indonesia			2.5	7.9	11.													3
Thailand	4.0								2.3				2.2					3
Australia	2.8		5.2	5.3						13.								4
Mexico				5.6				2.4			3.9			4.2	3.4	2.6		6
Malaysia			3.4	3.2	32.			2.3					2.7	6.7	4.1			7
Chinese Taipei							4.2	2.9	3.6			2.2	5.9	3.9	3.9			7
China	4.3		3.2	3.1	4.0	2.0	4.7		10.					4.5	2.2			9
Korea						2.0	4.6	3.3	2.8				2.0	5.5	6.2	2.0	5.2	9
Singapore		2.1		7.0	3.1			4.5	18.			2.4	13.	9.1	6.4			9
Hong Kong, China		2.8				2.8	5.0	3.4	12.			2.2	3.9	9.5	5.0			9
Canada	4.4		16.	13.		3.1	5.4	5.1	2.0	9.8	4.2	3.4	3.0	2.2		12.	3.6	14
Japan			2.0	2.0		7.6	8.5	20.	6.5	7.2	19.	18.	19	20.	20.	24.	12.	14
United States	15.	10.	21.	6.9	14.	17.	8.9	18.	12.	25.	23.	17.	19.	11.	18.	14.	32.	17

We only report here the sectors with market share greater than or equal to 2.0 percent.

Table A6: Granger Causality Test Results

Economies	Openness causes Inv Ratio	TFP causes Inv Ratio	Inv Ratio causes Openness	TFP causes Openness	Inv Ratio causes TFP	Openness causes TFP
Australia	No	Yes***	Yes***	Yes***	No	No
Canada	No	No	No	Yes**	Yes***	Yes**
Chile	No	No	No	Yes*	No	No
China	No	No	No	No	No	Yes***
Hong Kong, China	Yes*	No	No	Yes***	No	No
Indonesia	Yes*	No	No	Yes*	Yes***	Yes*
Japan	Yes**	No	No	No	No	No
Korea	No	Yes*	No	No	No	No
Malaysia	No	Yes*	No	No	No	No
Mexico	No	No	No	Yes*	Yes*	Yes*
New Zealand	No	Yes*	No	No	No	No
Papua New Guinea	No	No	No	No	Yes***	Yes***
Philippines	No	No	No	No	No	No
Singapore	No	No	No	No	No	No
Chinese Taipei	Yes***	No	No	No	No	No
Thailand	Yes**	Yes*	No	No	No	No
USA	No	Yes**	No	No	Yes***	Yes***

Notes:
* means significance at the 95% level.
** means significance at the 97.5% level.
*** means significance at the 99% level.

Table A7: Productivity and Specialization

SITC Code:	71	6	2	0	4		79	3	5	78		74	9	75	76	77	8	7
Hong Kong, China														•	•	•	•	
Chinese Taipei		•												•	•	•	•	•
Korea		•					•								•	•	•	•
Singapore					•			•						•	•	•		•
Japan	•									•		•		•	•	•		•
Thailand			•	•										•	•	•	•	
Canada			•	•				•		•								
Malaysia			•		•			•							•	•		
China		•	•	•				•							•		•	
United States	•		•	•	•		•		•			•	•	•		•		•
New Zealand			•	•	•													
Australia			•	•				•					•					
Mexico	•			•				•										
Chile		•	•	•														
PNG			•	•	•								•					
Philippines			•	•	•								•			•	•	
Indonesia		•	•	•	•			•										
Changes	-	-	-	-	-		0	0	0	0		+	+	+	+	+	+	+

Note: A dot (•) in a cell indicates that an economy has comparative advantage in the corresponding sector and the economy does not have comparative advantages in the sectors which have no dots.

APPENDIX B

Table B1: World Export Share by Commodity, 1970-1994

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	0.09	0.32	0.09	0.04	0.01	0.08	0.22	0.35	0.15							0.93	0.02
1971	0.09	0.03	0.08	0.04	0.01	0.08	0.21	0.36	0.15							0.10	0.02
1972	0.09	0.03	0.08	0.04	0.01	0.08	0.21	0.36	0.15							0.10	0.01
1973	0.11	0.04	0.09	0.04	0.01	0.09	0.21	0.34	0.14							0.09	0.01
1974	0.10	0.04	0.08	0.06	0.01	0.10	0.22	0.32	0.13							0.08	0.01
1975	0.10	0.04	0.07	0.06	0.01	0.09	0.20	0.36	0.15							0.09	0.01
1976	0.09	0.04	0.07	0.06	0.01	0.09	0.20	0.37	0.12							0.09	0.01
1977	0.09	0.03	0.07	0.06	0.01	0.09	0.19	0.37	0.10	0.01			0.01	0.01		0.09	0.02
1978	0.09	0.03	0.06	0.06	0.01	0.09	0.20	0.37	0.06	0.03	0.01	0.02	0.04	0.08	0.03	0.12	0.02
1979	0.09	0.03	0.07	0.07	0.01	0.10	0.19	0.32	0.05	0.03	0.01	0.02	0.04	0.08	0.03	0.10	0.02
1980	0.09	0.03	0.07	0.09	0.01	0.09	0.19	0.34	0.03	0.03	0.02	0.02	0.04	0.07	0.03	0.10	0.02
1981	0.09	0.04	0.06	0.10	0.01	0.09	0.18	0.35	0.03	0.04	0.02	0.03	0.04	0.09	0.03	0.10	0.02
1982	0.09	0.03	0.06	0.11	0.01	0.09	0.17	0.35	0.03	0.04	0.02	0.03	0.04	0.11	0.04	0.10	0.02
1983	0.08	0.03	0.06	0.10	0.01	0.09	0.17	0.35	0.03	0.03	0.03	0.03	0.05	0.10	0.03	0.10	0.02
1984	0.08	0.03	0.06	0.10	0.01	0.09	0.16	0.35	0.02	0.03	0.03	0.03	0.05	0.10	0.03	0.10	0.02
1985	0.07	0.02	0.05	0.10	0.01	0.09	0.16	0.37	0.03	0.04	0.04	0.03	0.05	0.11	0.03	0.11	0.03
1986	0.08	0.02	0.05	0.06	0.00	0.09	0.17	0.39	0.03	0.04	0.04	0.04	0.06	0.12	0.03	0.12	0.03
1987	0.07	0.02	0.05	0.05	0.00	0.10	0.16	0.39	0.03	0.04	0.04	0.04	0.06	0.12	0.02	0.12	0.03
1988	0.07	0.02	0.05	0.04	0.00	0.10	0.17	0.36	0.03	0.04	0.05	0.04	0.06	0.11	0.03	0.12	0.03
1989	0.07	0.02	0.05	0.04	0.00	0.09	0.23	0.34	0.03	0.04	0.05	0.04	0.06	0.11	0.03	0.12	0.03
1990	0.07	0.02	0.04	0.05	0.00	0.09	0.17	0.41	0.03	0.04	0.05	0.04	0.06	0.11	0.03	0.13	0.03
1991	0.08	0.03	0.05	0.06	0.00	0.10	0.18	0.44	0.03	0.04	0.06	0.05	0.07	0.11	0.04	0.16	0.03
1992	0.07	0.02	0.05	0.05	0.00	0.09	0.16	0.40	0.03	0.04	0.05	0.04	0.07	0.10	0.03	0.14	0.03
1993	0.07	0.02	0.05	0.05	0.00	0.09	0.15	0.41	0.03	0.04	0.05	0.04	0.08	0.10	0.03	0.14	0.03
1994	0.07	0.02	0.04	0.04	0.00	0.09	0.15	0.42	0.03	0.04	0.05	0.04	0.09	0.10	0.03	0.14	0.03

Note : All blank entries do not necessarily mean that the economy does not export any of the products concerned. It is simply because data for the corresponding time and products may not be available, or the RCA is too small.

Table B2: The RCA of Australia

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	3.45	0.10	3.80	1.44	1.12	0.53	0.60	0.21	0.17							0.16	1.03
1971	3.86	0.12	3.68	1.58	1.11	0.59	0.55	0.22	0.20							0.21	0.99
1972	3.72	0.09	3.99	1.55	1.22	0.55	0.59	0.22	0.16							0.19	0.79
1973	2.83	0.06	3.92	1.50	0.99	0.55	0.54	0.28	0.19							0.20	0.85
1974	3.50		3.79	1.50	0.84	0.56	0.61	0.21	0.19							0.18	0.55
1975	3.10		3.86	1.75	0.88	0.40	0.55	0.15	0.16							0.14	0.43
1976	3.35		4.14	2.06	1.22	0.76	0.57	0.12	0.17							0.14	1.30
1977	3.41		4.18	2.16	1.16	0.78	0.61	0.12	0.21							0.14	1.01
1978	3.18		3.90	2.43	1.26	0.82	0.62	0.13	0.40							0.13	3.47
1979	3.69		3.32	1.73	1.12	0.46	0.64	0.15	0.40	0.23			0.12	0.13	0.41	0.17	3.52
1980	3.81		4.38	1.26	0.86	0.23	0.60	0.16	0.08	0.27			0.12	0.12	0.59	0.18	2.30
1981	3.33		5.06	1.61	0.78	0.23	0.59	0.14	0.10	0.20			0.12	0.10	0.24	0.18	1.74
1982	3.42		5.58	1.70	0.95	0.23	0.56	0.11	0.16	0.16			0.10	0.09	0.08	0.17	1.52
1983	2.84		5.30	2.19	0.72	0.24	0.67	0.11	0.27	0.18			0.09	0.09	0.09	0.19	1.13
1984	3.51	0.09	4.91	2.50	0.68	0.21	0.65	0.10	0.23	0.15	0.06		0.09	0.10	0.08	0.18	1.30
1985	3.19	0.08	5.33	2.76	0.66	0.18	0.61	0.09	0.23	0.12	0.06		0.08	0.07	0.09	0.15	1.75
1986	3.42	0.14	5.74	3.90	1.57	0.18	0.62	0.10	0.24	0.13	0.09	0.03	0.09	0.07	0.11	0.15	1.59
1987	3.07	0.24	5.70	3.93	0.94	0.19	0.75	0.12	0.28	0.15	0.10	0.08	0.11	0.11	0.18	0.17	2.25
1988	2.31	0.20	4.26	3.76	0.66	0.21	0.69	0.18	0.32	0.19	0.22	0.09	0.10	0.08	0.41	0.21	6.70
1989	2.56	0.15	4.12	3.39	0.45	0.23	0.53	0.20	0.29	0.19	0.22	0.13	0.11	0.09	0.42	0.21	6.97
1990	2.44	0.18	3.72	3.34	0.40	0.24	0.66	0.19	0.33	0.19	0.26	0.15	0.12	0.13	0.35	0.19	9.56
1991	1.80	0.22	3.31	2.72	0.33	0.25	0.62	0.20	0.37	0.22	0.26	0.12	0.13	0.13	0.31	0.17	7.80
1992	2.07	0.25	3.71	3.52	0.61	0.31	0.69	0.23	0.38	0.27	0.29	0.15	0.15	0.14	0.43	0.20	8.75
1993	2.67	0.32	4.50	3.91	1.06	0.38	0.79	0.26	0.36	0.34	0.33	0.15	0.17	0.17	0.53	0.22	4.37
1994	1.89	0.30	3.55	3.65	0.82	0.37	0.77	0.27	0.34	0.38	0.41	0.20	0.18	0.15	0.42	0.24	8.98

Table B3: The RCA of Brunei Darussalam

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	0.04		0.04	26.40													
1971	0.05		0.03	25.04													
1972	0.04		0.02	25.07													
1973	0.02		0.02	24.44													
1974	0.01			17.73													
1975				16.28													
1976				16.10													
1977				15.86			0.01	0.01	0.05							0.01	
1978				17.16			0.01	0.02	0.11							0.09	
1979				13.90			0.01	0.02	0.07							0.08	
1980				11.21			0.02	0.01	0.12							0.05	
1981				9.99			0.02	0.01	0.10							0.03	
1982				9.28			0.01	0.02	0.17							0.01	
1983	0.01			9.49			0.01	0.02	0.16							0.01	
1984	0.02			10.32			0.01	0.01	0.15							0.03	
1985	0.02			10.33			0.01	0.02	0.27							0.02	
1986	0.06			17.06			0.02	0.04								0.03	
1987	0.06			19.21			0.02	0.03								0.03	
1988	0.09			24.24			0.02	0.02	0.05	0.07						0.02	
1989	0.07			23.18			0.02	0.04	0.10	0.06						0.05	
1990	0.09			20.03			0.03	0.03	0.15	0.08						0.06	
1991	0.04			15.51			0.02	0.03	0.12	0.06						0.06	
1992																	
1993																	
1994																	

Table B4: The RCA of Canada

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	1.04	0.46	2.51	1.61		0.40	1.01	0.94	0.51							0.18	0.37
1971	1.11	0.46	2.76	1.80		0.40	0.93	0.95	0.53							0.19	0.25
1972	1.10	0.42	2.75	2.17		0.38	0.91	0.95	0.55							0.19	0.25
1973	1.07	0.28	2.62	2.40		0.35	0.86	0.91	0.54							0.20	0.24
1974	1.15	0.24	2.82	2.69		0.32	0.83	0.84	0.51							0.21	0.26
1975	1.13	0.27	2.80	2.69		0.37	0.83	0.84	0.56							0.19	0.21
1976	1.09	0.24	2.92	2.23	0.33	0.42	0.86	0.86	0.65							0.20	0.31
1977	1.05	0.27	3.05	1.99	0.44	0.46	0.90	0.89	0.83							0.17	0.13
1978	1.05	0.24	2.99	1.88	0.38	0.52	0.97	0.93	0.56	0.48	0.79	0.40	0.21	2.59	0.49	0.15	0.16
1979	1.02	0.25	3.07	1.87	0.45	0.58	0.90	0.95	0.49	0.53	0.90	0.49	0.24	2.24	0.78	0.20	0.14
1980	1.16	0.20	2.92	1.65	0.50	0.59	0.96	0.76	0.68	0.48	0.79	0.49	0.24	1.93	0.86	0.26	1.37
1981	1.17	0.21	2.88	1.43	0.55	0.66	0.97	0.81	0.90	0.37	0.63	0.46	0.25	1.65	0.56	0.26	1.39
1982	1.32	0.23	2.67	1.38	0.49	0.57	0.93	0.91	0.90	0.34	0.62	0.52	0.22	1.78	0.71	0.27	1.07
1983	1.28	0.22	2.53	1.36	0.35	0.55	0.90	0.98	1.11	0.39	0.55	0.50	0.21	2.27	0.48	0.28	0.92
1984	1.16	0.22	2.55	1.38		0.56	0.94	1.08	1.22	0.38	0.47	0.57	0.25	2.55	0.45	0.28	1.13
1985	1.02	0.22	2.53	1.48		0.51	0.91	1.05	1.06	0.03	0.42	0.52	0.27	2.45	0.52	0.27	0.97
1986	1.02	0.25	2.79	1.67		0.50	0.90	1.00	1.09	0.34	0.39	0.43	0.25	2.34	0.88	0.29	1.11
1987	1.10	0.26	3.08	1.98		0.52	1.07	0.96	1.09	0.36	0.46	0.42	0.26	2.08	0.85	0.30	0.65
1988	1.11	0.19	2.82	2.24		0.57	0.97	1.04	1.09	0.44	0.48	0.31	0.33	2.15	0.65	0.30	1.10
1989	0.96	0.17	3.10	2.19		0.56	0.75	1.13	1.15	0.46	0.45	0.35	0.39	2.15	0.77	0.30	1.13
1990	1.07	0.24	3.18	2.07		0.56	0.97	0.91	1.05	0.43	0.47	0.35	0.48	1.96	0.87	0.28	2.15
1991	0.90	0.25	2.38	1.73		0.54	0.09	0.84	0.88	0.44	0.44	0.28	0.47	1.84	0.75	0.24	1.87
1992	1.06	0.32	2.78	2.18		0.61	1.01	0.93	0.91	0.52	0.50	0.36	0.46	2.20	0.64	0.30	2.13
1993	0.90	0.38	2.65	2.23		0.59	1.02	0.96	0.97	0.56	0.46	0.36	0.36	2.43	0.65	0.32	0.20
1994	0.88	0.23	3.06	2.45		0.59	1.02	0.95	0.83	0.67	0.51	0.36	0.32	2.41	0.72	0.34	1.95

Table B5: The RCA of Chile

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	0.44		1.52	0.01	0.44	0.15	3.59	0.02									
1971	0.82		2.57	0.02	1.08	0.23	3.23	0.02									
1972	0.59		2.52	0.08	0.73	0.34	3.40	0.02									
1973	0.33		1.96	0.05	0.02	0.23	3.62	0.01									
1974	0.42		2.35	0.14	0.44	0.21	3.35	0.01									
1975	0.97	0.07	2.55	0.14	0.34	0.43	3.31	0.02	0.03							0.03	
1976	0.96	0.10	2.38	0.25	0.91	0.35	3.41	0.03	0.05							0.10	0.01
1977	1.44	0.12	2.84	0.43	0.85	0.40	3.00	0.03	0.06							0.07	0.25
1978	1.58	0.12	3.25	0.29	1.41	0.44	2.86	0.03	0.10							0.05	0.41
1979	1.33	0.20	3.28	0.18	0.91	0.26	3.04	0.04	0.09							0.02	
1980	1.55	0.15	3.36	0.15	1.31	0.44	2.85	0.06	0.13							0.02	0.27
1981	1.84	0.13	4.49	0.18	1.49	0.26	2.68	0.07	0.12							0.03	0.13
1982	2.14		2.40				3.05	0.03								0.04	
1983	2.17	0.12	5.20	0.15	0.61	0.24	2.38	0.03								0.02	0.01
1984	2.80	0.17	5.66	0.13	1.15	0.25	2.36	0.04								0.02	0.23
1985	3.30	0.24	6.00	0.05	1.58	0.30	2.47	0.02								0.03	0.29
1986	4.15	0.25	6.68	0.01	2.14	0.30	2.44	0.05								0.07	0.36
1987	3.56	0.27	5.63	0.03	0.93	0.27	2.45	0.03								0.11	0.31
1988	3.04	0.20	5.06	0.04	1.06	0.30	2.44	0.02						0.02	0.10	0.12	0.91
1989	3.01	0.23	5.05	0.07	0.99	0.39	1.92	0.02						0.02	0.08	0.12	0.95
1990	3.26	0.33	4.70	0.11	0.67	0.36	2.76	0.03					0.02	0.02	0.16	0.13	1.41
1991	2.91	0.43	4.55	0.08	0.96	0.36	2.10	0.03		0.05			0.03	0.04	0.03	0.15	1.88
1992	3.49	0.62	5.80	0.07	0.65	0.39	2.23	0.04		0.06			0.04	0.08	0.06	0.19	1.47
1993	3.56	0.69	5.65	0.04	0.77	0.45	2.22	0.06		0.06			0.05	0.14	0.09	0.25	1.44
1994	3.45	0.65	6.64	0.05	1.16	0.51	2.24	0.07		0.08			0.04	0.13	0.15	0.21	1.39

Table B6: The RCA of People's Republic of China

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970																	
1971																	
1972																	
1973																	
1974																	
1975																	
1976																	
1977																	
1978																	
1979																	
1980																	
1981																	
1982																	
1983	1.52	0.15	1.49	2.01	0.89	0.63	1.15	0.16	0.16			0.30	0.15	0.03	0.47	1.69	3.66
1984	1.59	0.15	1.65	2.41	0.78	0.61	1.21	0.17	0.19	0.07		0.42	0.14	0.03	0.56	1.82	2.55
1985	1.90	0.16	1.83	2.71	0.76	0.55	1.01	0.08	0.07	0.05		0.10	0.09	0.02	0.24	1.21	4.75
1986	1.92	0.17	1.85	2.06	1.54	0.59	1.14	0.09	0.09	0.06	0.03	0.22	0.11	0.03	0.18	1.37	6.50
1987	1.70	0.20	1.79	2.27	0.53	0.59	1.41	0.24	0.10	0.10	0.05	0.36	0.15	0.02	0.20	1.32	6.01
1988	1.73	0.21	1.69	2.07	0.47	0.63	1.30	0.34	0.15	0.15	0.10	0.82	0.19	0.41	0.16	1.99	1.41
1989	1.70	0.25	1.59	1.97	0.56	0.66	0.94	0.45	0.18	0.19	0.11	1.03	0.25	0.51	0.12	2.21	0.29
1990	1.60	0.24	1.31	1.75		0.66	1.24	0.43	0.16	0.20	0.19	1.15	0.31	0.56	0.13	2.18	0.66
1991	1.23	0.27	0.95	1.06	0.64	0.55	1.16	0.44	0.18	0.18	0.13	0.93	0.32	0.62	0.12	1.98	0.31
1992	1.31	0.35	0.88	1.15	0.56	0.59	1.22	0.39	0.34	0.25	0.26	1.15	0.62	0.14	0.29	2.77	0.18
1993	1.28	0.41	0.78	0.95	0.73	0.58	1.20	0.40	0.36	0.27	0.33	1.14	0.62	0.14	0.16	2.90	0.14
1994	1.19	0.35	0.88	0.85	1.11	0.57	1.31	0.43	0.30	0.27	0.40	1.24	0.61	0.15	0.21	2.87	0.10

Table B7: The RCA of Hong Kong, China

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	0.17	0.12	0.22		0.05	0.10	0.67	0.34								7.32	0.14
1971	0.19	0.12	0.15		0.04	0.11	0.67	0.34								7.23	0.21
1972	0.17	0.10	0.17		0.07	0.10	0.69	0.39								6.83	0.19
1973	0.15	0.04	0.16		0.05	0.10	0.78	0.43								6.91	0.19
1974	0.14	0.06	0.23		0.03	0.09	0.74	0.50								7.54	0.19
1975	0.15	0.06	0.14		0.02	0.10	0.67	0.41								7.90	0.20
1976	0.18	0.04	0.13		0.01	0.08	0.68	0.41	0.01	0.54				0.06	0.49	7.58	0.17
1977	0.20	0.05	0.16		0.01	0.09	0.61	0.45	0.01	0.35				0.02	0.39	7.20	0.13
1978	0.20	0.04	0.14		0.01	0.09	0.58	0.43	0.04	0.07	1.97	2.89	1.34		0.04	5.65	0.48
1979	0.17	0.04	0.17	0.01	0.01	0.08	0.60	0.41	0.05	0.10	1.87	3.32	1.53		0.06	6.91	0.40
1980	0.14	0.05	0.25	0.01	0.02	0.09	0.59	0.54	0.10	0.11	1.98	3.12	1.65	0.01	0.06	6.69	0.37
1981	0.14	0.07	0.21	0.01	0.02	0.11	0.60	0.54	0.08	0.10	1.60	2.43	1.68	0.01	0.04	6.77	0.18
1982	0.16	0.07	0.18	0.01	0.02	0.11	0.58	0.52	0.10	0.12	1.21	2.40	1.63		0.04	6.78	0.30
1983	0.15	0.13	0.02	0.01	0.02	0.11	0.62	0.64	0.12	0.13	1.78	2.61	1.64		0.11	6.08	0.31
1984	0.13	0.17	0.02	0.02	0.01	0.11	0.63	0.70	0.18	0.12	1.89	2.58	1.65		0.03	6.17	0.34
1985	0.14	0.35	0.22	0.04	0.01	0.11	0.61	0.59	0.28	0.17	1.43	2.07	1.52		0.03	5.90	0.49
1986	0.14	0.33	0.16	0.05	0.03	0.10	0.66	0.55	0.26	0.16	1.18	2.12	1.31		0.03	5.29	0.41
1987	0.12	0.36	0.19	0.05	0.02	0.13	0.79	0.56	0.29	0.17	1.12	2.14	1.29		0.02	4.96	0.41
1988	0.13	0.40	0.19	0.06	0.10	0.20	0.69	0.69	0.32	0.22	1.39	2.16	1.27		0.02	4.71	0.35
1989	0.13	0.43	0.21	0.07	0.15	0.26	0.53	0.74	0.27	0.24	1.49	2.00	1.26		0.03	4.49	0.37
1990	0.15	0.64	0.22	0.07	0.14	0.32	0.71	0.61	0.19	0.22	1.58	2.01	1.20		0.02	4.27	0.44
1991	0.13	0.48	0.17	0.09	0.07	0.33	0.69	0.58	0.19	0.22	1.41	1.46	1.14		0.02	3.42	0.45
1992	0.15	0.53	0.19	0.19	0.17	0.38	0.76	0.66	0.22	0.27	1.74	1.39	1.25		0.01	3.66	0.64
1993	0.16	0.54	0.18	0.18	0.17	0.41	0.82	0.67	0.20	0.29	1.44	1.38	1.31		0.03	3.52	0.61
1994	0.19	0.57	0.21	0.09	0.16	0.42	0.79	0.67	0.20	0.29	1.45	1.16	1.28		0.01	3.58	0.56

Table B8: The RCA of Indonesia

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	1.26	0.15	5.65	8.74	5.84	0.06	0.05	0.01	0.02								0.16
1971	1.60	0.48	4.71	10.07	5.64	0.06	0.10	0.01	0.04								0.26
1972	1.28	0.54	3.66	12.95	5.29	0.07	0.12	0.02	0.05								0.26
1973	0.77	0.30	3.76	12.29	4.28	0.05	0.17	0.02	0.05							0.01	0.21
1974	0.53	0.14	2.37	11.93	3.12	0.04	0.15		0.01								
1975	0.52	0.13	2.20	12.19	3.04	0.04	0.06	0.01	0.01							0.03	
1976	0.73	0.13	2.63	11.33	2.97	0.04	0.04	0.02	0.02							0.03	
1977	1.09	0.16	2.39	10.79	2.60	0.06	0.11	0.02								0.03	
1978	0.95	0.14	2.57	11.78	2.73	0.05	0.15	0.02								0.02	
1979	0.88	0.11	2.87	9.21	2.02	0.04	0.19	0.02								0.05	
1980	0.67	0.08	2.49	8.17	2.12	0.04	0.15	0.01					0.11			0.06	0.06
1981	0.46	0.07	1.66	8.06	1.07	0.03	0.19	0.02					0.08			0.06	0.12
1982	0.47	0.06	1.28	7.72	1.18	0.03	0.21	0.02		0.01			0.12			0.06	0.12
1983	0.61		1.36	7.33	1.32	0.06	0.37	0.02		0.01			0.12			0.10	0.47
1984	0.80	0.07	1.44	7.66	1.13	0.09	0.45	0.03		0.11			0.12			0.17	0.31
1985	1.01	0.11	1.42	7.20	3.45	0.13	0.59	0.01		0.01			0.08			0.22	0.07
1986	1.59	0.20	1.98	9.86	4.58	0.19	0.80	0.01		0.03			0.02			0.39	0.07
1987	1.37	0.19	2.18	9.86	4.33	0.15	1.22	0.01		0.01		0.01	0.02			0.35	0.51
1988	1.44	0.15	2.61	9.99	3.74	0.19	1.30	0.02				0.03	0.04		0.05	0.50	0.51
1989	1.33	0.21	2.49	9.51	7.02	0.24	1.03	0.03				0.06	0.05	0.01	0.04	0.66	0.35
1990	1.32	0.23	1.77	9.08	5.98	0.26	1.33	0.04				0.11	0.06	0.01	0.09	0.85	0.17
1991	1.04	0.19	1.60	6.15	5.93	0.30	1.27	0.05		0.03	0.02	0.16	0.09	0.02	0.10	0.91	0.15
1992	0.98	0.26	1.83	6.88	7.68	0.27	1.57	0.11		0.04	0.08	0.44	0.15	0.05	0.06	1.18	0.16
1993	1.11	0.22	1.62	6.00	7.55	0.26	1.73	0.15		0.06	0.08	0.60	0.15	0.09	0.13	1.32	0.16
1994	1.27	0.15	2.10	6.63	9.31	0.03	1.59	0.18		0.08	0.14	0.82	0.18	0.08	0.11	1.32	0.12

Table B9: The RCA of Japan

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	0.35		0.19	0.07		0.75	1.51	1.17	0.70							1.43	0.49
1971	0.29		0.22	0.07		0.74	1.51	1.22	0.69							1.23	0.51
1972	0.24		0.22	0.07		0.74	1.39	1.32	0.74							1.20	0.64
1973	0.21		0.21	0.06		0.68	1.37	1.43	0.85							1.13	0.83
1974	0.15		0.26	0.08		0.73	1.52	1.42	0.81							0.94	1.10
1975	0.13		0.22	0.06		0.79	1.56	1.37	0.81							0.91	0.89
1976	0.13		0.19	0.03		0.61	1.44	1.51	0.18							0.78	0.75
1977	0.11		0.18	0.03		0.59	1.32	1.58	0.29							0.83	0.56
1978	0.11		0.18	0.05		0.56	1.21	1.63	0.58	1.68	1.80	3.80	1.58	2.44	2.61	0.66	0.51
1979	0.12		0.17	0.05		0.60	1.30	1.79	0.55	1.73	1.91	4.15	1.71	2.69	1.56	0.83	0.48
1980	0.13		0.17	0.05		0.56	1.24	1.73	1.02	1.73	1.72	3.98	1.73	3.10	1.51	0.85	0.54
1981	0.12		0.16	0.04		0.51	1.24	1.77	1.14	1.52	1.35	3.68	1.62	2.34	1.46	0.84	0.40
1982	0.11		0.16	0.03		0.52	1.30	1.75	1.05	1.45	1.50	3.59	1.56	2.06	1.47	0.84	0.48
1983	0.10		0.16	0.03		0.52	1.16	1.82	1.11	1.50	1.73	3.59	1.68	2.27	1.25	0.85	0.44
1984	0.10		0.15	0.03		0.51	1.11	1.92	1.23	1.38	1.70	3.85	1.82	2.28	1.49	0.84	0.41
1985	0.09		0.14	0.03		0.48	1.00	1.82	1.10	1.27	1.59	3.66	1.65	2.24	1.12	0.82	0.39
1986	0.09		0.14	0.05		0.47	0.85	1.79	1.18	1.16	1.74	3.32	1.59	2.20	0.93	0.73	0.33
1987	0.09		0.13	0.07		0.52	0.84	1.79	1.25	1.18	1.83	3.08	1.66	2.17	0.90	0.70	0.33
1988	0.08		0.13	0.06		0.53	0.78	1.92	1.22	1.34	1.85	2.89	1.72	2.06	0.66	0.71	0.42
1989	0.08		0.14	0.09		0.56	0.57	2.07	1.28	1.39	1.84	2.77	1.81	2.08	0.62	0.67	0.44
1990	0.07		0.16	0.10		0.58	0.73	1.73	1.27	1.32	1.90	2.74	1.72	2.10	0.69	0.66	0.56
1991	0.06		0.13	0.07		0.55	0.67	1.60	1.20	1.35	1.53	2.25	1.53	1.96	0.58	0.55	0.49
1992	0.06		0.16	0.11		0.64	0.72	1.79	1.40	1.54	1.79	2.27	1.71	2.31	0.74	0.58	0.55
1993	0.06		0.15	0.13		0.63	0.73	1.75	1.50	1.57	1.70	1.89	1.69	2.24	0.96	0.56	0.57
1994	0.06		0.17	0.16		0.64	0.72	1.71	1.64	1.56	1.63	1.69	1.69	2.04	1.06	0.55	0.62

Table B10: The RCA of Republic of Korea

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	0.85	0.53	1.37	0.28		0.16	1.19	0.21	0.07							4.52	1.03
1971	0.70	0.47	1.15	0.27		0.17	1.45	0.23	0.08							4.37	0.99
1972	0.70	0.26	0.96	0.28		0.26	1.52	0.29	0.14							4.01	0.79
1973	0.71	0.17	0.70	0.27		0.18	1.62	0.36	0.13							3.89	0.85
1974	0.70	0.29	0.59	0.41		0.20	1.49	0.47	0.13							4.15	0.55
1975	1.18	0.35	0.44	0.34		0.17	1.45	0.38	0.10							4.30	0.43
1976	0.69	0.28	0.35	0.31		0.16	1.56	0.49	0.02							4.23	1.30
1977	1.05	0.34	0.43	0.19		0.25	1.56	0.51	0.03							3.65	1.01
1978	0.83	0.28	0.41	0.06		0.28	1.53	0.58	0.04	0.12	0.40	2.49	1.25	0.17	2.56	2.88	3.47
1979	0.82	0.24	0.34	0.03		0.34	1.65	0.68	0.07	0.19	0.42	3.07	1.40	0.25	2.09	3.33	3.52
1980	0.75	0.22	0.29	0.03		0.47	1.85	0.60	0.20	0.21	0.33	2.63	1.33	0.28	1.78	3.02	2.30
1981	0.69	0.16	0.22	0.09		0.35	1.90	0.65	0.21	0.19	0.21	2.10	1.10	0.23	2.20	3.12	1.74
1982	0.57	0.18	0.22	0.13		0.35	1.76	0.80	0.20	0.17	0.25	1.79	1.18	0.18	3.77	3.00	1.52
1983	0.53	0.16	0.21	0.22		0.31	1.67	0.93	0.19	0.14	0.35	2.04	1.30	0.14	4.55	2.71	1.13
1984	0.51	0.14	0.20	0.30		0.34	1.58	1.03	0.26	0.14	0.44	2.05	1.47	0.23	5.27	2.81	1.30
1985	0.51	0.14	0.19	0.33		0.34	1.43	1.01	0.31	0.21	0.52	1.94	1.26	0.30	5.50	2.62	1.75
1986	0.60	0.12	0.19	0.33		0.33	1.41	0.86	0.24	0.23	0.71	2.50	1.48	0.45	2.31	2.72	1.59
1987	0.61	0.09	0.18	0.32		0.29	1.46	0.91	0.34	0.28	0.79	2.96	1.55	0.64	1.07	2.69	2.25
1988	0.54		0.21	0.24		0.31	1.22	1.06	0.26	0.33	0.92	2.77	1.68	0.67	1.19	2.56	6.70
1989	0.50		0.28	0.26		0.35	0.99	1.11	0.32	0.35	0.96	2.71	1.81	0.52	1.11	2.43	6.97
1990	0.46		0.35	0.22		0.41	1.34	0.96	0.41	0.35	0.91	2.63	1.84	0.47	1.50	2.19	9.56
1991	0.36		0.27	0.34		0.45	1.28	0.92	0.23	0.36	0.72	2.00	1.77	0.44	1.50	1.54	7.80
1992	0.37		0.33	0.47		0.67	1.53	1.06	0.39	0.49	0.80	2.14	2.03	0.57	1.67	1.44	8.75
1993	0.35		0.33	0.48		0.69	1.66	1.10	0.39	0.54	0.79	1.99	1.94	0.70	1.67	1.19	4.37
1994	0.34		0.39	0.46		0.72	1.61	1.17	0.39	0.57	0.69	1.91	2.17	0.70	1.81	0.98	8.98

Table B11: The RCA of Malaysia

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	0.63	0.38	5.90	1.96	9.68	0.13	1.02	0.06	0.06							0.14	0.59
1971	0.67	0.15	6.17	2.61	12.56	0.09	1.04	0.05	0.05							0.10	0.79
1972	0.80	0.17	6.08	1.73	16.86	0.11	1.21	0.05	0.06							0.15	0.65
1973	0.56	0.07	6.46	1.33	13.46	0.11	0.85	0.06	0.08							0.33	0.46
1974	0.52	0.06	5.88	1.44	18.49	0.08	0.87	0.12	0.12							0.46	0.48
1975	0.64	0.08	5.17	1.77	22.08	0.10	0.87	0.17	0.15							0.66	0.44
1976	0.63	0.06	5.99	2.33	17.98	0.07	0.81	0.15	0.08							0.50	0.34
1977	0.61		5.89	2.27	19.37	0.06	0.80	0.18	0.07							0.39	0.25
1978	0.58		5.89	2.35	18.25	0.07	0.84	0.29	0.15	0.15		0.24	2.19		0.22	0.24	0.47
1979	0.51		5.44	2.53	17.67	0.06	0.70	0.33	0.15	0.16		0.28	2.25		0.16	0.26	0.26
1980	0.41		4.95	2.81	18.10	0.07	0.68	0.34	0.05	0.15		0.33	2.29		0.28	2.66	0.14
1981	0.46		4.76	2.69	23.08	0.08	0.67	0.35	0.08	0.14		0.29	2.34		0.06	0.26	0.23
1982	0.47		4.86	2.69	22.75	0.10	0.54	0.44	0.19	0.16		0.44	0.27		0.16	0.27	0.14
1983	0.46		4.40	2.75	21.96	0.10	0.54	0.49	0.23	0.16		0.57	2.66		0.26	0.27	0.12
1984	0.49		3.77	3.12	21.47	0.13	0.41	0.55	0.17	0.17		0.60	2.76		0.43	0.31	
1985	0.60		3.62	2.12	19.87	0.13	0.50	0.50	0.13	0.16	0.05	0.74	2.56		0.42	0.35	0.07
1986	0.73		4.37	4.53	41.38	0.18	0.43	0.64	0.21	0.21	0.02	1.05	3.22		0.47	0.43	0.09
1987	0.76		4.54	3.93	23.60	0.17	0.52	0.66	0.21	0.27	0.04	1.37	2.98	0.02	0.54	0.48	0.08
1988	0.71		4.18	3.93	31.28	0.22	0.49	0.78	0.21	0.32	0.07	1.76	2.85	0.01	0.29	0.58	0.12
1989	0.66		3.66	3.89	30.98	0.19	0.38	0.95	0.19	0.36	0.21	2.56	2.83	0.04	0.47	0.66	0.09
1990	0.64		3.29	3.80	26.05	0.17	0.49	0.87	0.19	0.28	0.51	2.96	2.78	0.04	0.64	0.77	0.14
1991	0.46		2.30	2.49	20.21	0.18	0.45	0.93	0.28	0.41	0.72	2.85	2.40	0.04	0.74	0.70	0.14
1992	0.49		2.52	2.68	22.59	0.24	0.54	1.09	0.36	0.48	1.16	3.30	2.58	0.07	0.87	0.78	0.15
1993	0.46		2.11	2.19	19.58	0.25	0.63	1.18	0.37	0.52	1.31	3.49	2.54	0.08	0.70	0.72	0.23
1994	0.42		1.93	1.83	18.52	0.29	0.61	1.27	0.35	0.53	1.57	3.80	2.33	0.07	1.05	0.67	0.23

Table B12: The RCA of Mexico

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	4.09	0.41	1.97	0.85		0.96	0.74	0.31	0.28							0.53	
1971	3.90	0.44	1.92	0.60		0.96	0.86	0.37	0.34							0.55	
1972	4.31	0.40	2.18	0.30		0.73	0.80	0.36	0.39							0.48	
1973	3.34	0.37	1.52	0.25		0.81	0.70	0.55	0.59							0.84	
1974	3.25	0.49	1.89	0.72		0.95	1.07	0.30	0.28							0.61	
1975	2.86	0.47	1.98	2.52		0.84	0.94	0.26	0.28							0.55	
1976	3.20	0.49	2.15	2.58		0.71	0.90	0.20	0.35							0.52	
1977	3.55	0.46	1.45	3.47		0.72	0.92	0.16	0.27							0.47	0.06
1978	3.25	0.41	1.50	4.92		0.59	0.64	0.27	0.68							0.31	0.02
1979	2.47	0.29	1.16	6.20		0.52	0.36	0.19	0.25							0.18	2.45
1980	1.26	0.22	0.85	7.66		0.37	0.17	0.13	0.30							0.11	1.40
1981	0.88	0.18	0.87	7.54		0.36	0.12	0.08	0.29							0.08	1.25
1982	0.85	0.17	0.61	7.27		0.35	0.14	0.11	0.65							0.07	0.19
1983	0.94	0.14	0.48	7.10		0.33	0.34	0.13	0.97							0.10	0.30
1984	0.94	0.17	0.60	6.45		0.38	0.46	0.39	1.59							0.30	
1985	0.99	0.25	0.57	6.30		0.34	0.40	0.43	2.50							0.32	
1986	2.63	0.69	1.06	7.69		0.51	0.67	0.30	2.46							0.16	
1987	1.60	0.66	0.78	8.21		0.58	0.76	0.53	3.85							0.24	0.00
1988	1.69	0.59	0.92	7.97		0.74	0.85	0.65	4.30							0.32	0.01
1989	1.54	0.51	0.95	8.10		0.73	0.63	0.72	4.13	0.37	0.59	0.09	0.43	0.83	0.42	0.31	0.01
1990	1.42	0.46	0.90	7.15		0.69	0.65	0.57	3.41	0.37	0.43	0.05	0.31	0.99	0.19	0.29	0.17
1991	1.32	0.48	0.83	4.72		0.78	0.66	0.68	1.95	0.40	0.50	0.11	0.31	1.39	0.09	0.27	0.12
1992	0.81	0.30	0.63	3.64		0.59	0.69	1.17	1.81	0.71	0.50	2.08	2.17	0.80	0.09	0.70	0.09
1993	0.91	0.30	0.51	2.98		0.53	0.70	1.22	1.83	0.70	0.54	2.05	2.07	1.38	0.11	0.76	0.11
1994	0.87	0.33	0.58	3.02		0.49	0.65	1.28	2.09	0.81	0.67	2.25	1.83	1.40	0.15	0.78	0.06

Table B13: The RCA of New Zealand

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	6.13		3.26	0.20	1.59	0.45	0.25	0.06	0.07							0.14	
1971	6.26		3.50	0.25	1.34	0.33	0.26	0.07	0.07							0.14	
1972	6.00		3.87	0.22	1.20	0.27	0.32	0.07	0.07							0.12	
1973	4.99		3.91	0.10	1.27	0.25	0.31	0.06	0.05							0.09	
1974	5.22	0.08	4.18	0.16	1.43	0.26	0.37	0.11	0.10							0.21	
1975	5.03	0.08	3.94	0.28	1.38	0.25	0.51	0.14	0.12							0.25	
1976	4.81	0.07	4.13	0.29	1.99	0.29	0.56	0.17	0.12							0.27	
1977	4.95	0.08	4.33	0.27	1.74	0.36	0.60	0.14	0.16							0.30	
1978	4.90	0.07	4.50	0.27	1.50	0.33	0.64	0.18	0.32							0.22	
1979	5.06	0.07	4.18	0.29	1.31	0.37	0.67	0.14	0.35							0.27	
1980	5.13	0.08	4.01	0.27	1.57	0.44	0.70	0.14		0.24			0.29	0.09	0.29	0.29	0.03
1981	5.29	0.09	3.78	0.28	1.63	0.44	0.73	0.16		0.21			0.29	0.05	0.39	0.33	0.01
1982	5.83	0.08	3.68	0.03	1.29	0.49	0.75	0.21		0.22			0.26	0.04	0.99	0.32	0.02
1983	5.92	0.07	3.82	0.03	1.60	0.46	0.84	0.12		0.24			0.23	0.03	0.13	0.32	0.41
1984	5.82	0.10	3.75	0.04	1.38	0.50	0.91	0.13		0.28		0.09	0.24	0.04	0.15	0.39	1.28
1985	6.18	0.11	3.90	0.17	1.61	0.52	0.85	0.12		0.29	0.06	0.10	0.24	0.03	0.12	0.38	1.32
1986	6.03	0.16	4.32	0.14	2.11	0.55	0.87	0.14		0.24	0.07	0.11	0.23	0.03	0.41	0.31	0.74
1987	6.23	0.19	4.57	0.18	1.53	0.49	0.91	0.13		0.29	0.07	0.09	0.26	0.04	0.20	0.29	0.63
1988	5.82	0.16	4.66	0.34	2.40	0.51	0.85	0.16		0.24	0.09	0.09	0.24	0.05	0.27	0.27	0.63
1989	6.15	0.16	4.31	0.48	2.41	0.54	0.68	0.20		0.29	0.12	0.11	0.22	0.06	0.31	0.25	0.58
1990	6.48	0.19	4.23	0.79	2.06	0.56	0.88	0.17		0.25	0.12	0.12	0.26	0.05	0.45	0.26	0.94
1991	5.32	0.14	3.40	0.51	1.95	0.61	0.82	0.17	0.08	0.27	0.13	0.10	0.22	0.04	0.43	0.22	0.79
1992	6.16	0.20	3.98	0.51	2.20	0.66	0.88	0.19	0.07	0.30	0.10	0.13	0.27	0.06	0.46	0.29	0.84
1993	6.22	0.19	4.22	0.54	2.04	0.67	0.90	0.18	0.08	0.34	0.09	0.14	0.25	0.06	0.37	0.30	0.87
1994	5.99	0.21	4.87	0.51	1.77	0.84	0.92	0.20	0.12	0.39	0.08	0.16	0.27	0.05	0.38	0.31	0.75

Table B14: The RCA of Papua New Guinea

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	5.69		3.38		13.11	0.03	0.18									0.02	0.09
1971	4.21		3.16		11.49	0.06	0.20	0.35	0.37							0.10	6.44
1972	3.41		4.39		10.07	0.03	0.13	0.30	0.37							0.08	10.61
1973	1.80		7.31		4.75	0.02	0.07	0.11	0.06							0.06	6.64
1974	1.53		9.86		4.69		0.05	0.06	0.04							0.03	
1975	2.13		9.87		6.78		0.09	0.03	0.03							0.02	
1976	2.50		8.85		6.76		0.12	0.05	0.06								4.03
1977	4.96		7.12		5.92		0.09										
1978	5.31		7.32		5.94		0.08										
1979	3.96		8.40		7.96		0.07										0.14
1980																	
1981	2.75		10.21		8.67		0.10	0.03	0.24								2.65
1982	2.49		11.41		11.41		0.08	0.05	0.35								2.50
1983																	
1984	3.44	0.07	9.67		18.22		0.02	0.03									2.48
1985	3.13	0.12	8.51	0.05	14.06		0.02	0.03									8.41
1986	3.77	0.22	8.76	0.05	16.42		0.01	0.01	0.02						0.05	0.01	8.14
1987	2.75	0.03	12.10	0.06	9.37		0.01	0.01	0.01					0.04	0.04		4.35
1988	1.98		13.07	0.05	12.27		0.02	0.07	0.18					0.01	0.40	0.03	2.63
1989	2.46		13.71	0.02	15.13		0.04	0.10	0.17	0.05				0.03	0.31	0.02	2.11
1990	1.97		12.64	0.03	12.66		0.11	0.14	0.24	0.11				0.08	0.60	0.07	6.85
1991	1.03		8.53	0.04	11.49		0.07	0.19	0.03	0.06				0.06	1.49	0.11	9.97
1992	1.06		10.00	0.02	17.86		0.07	0.15	0.05	0.12				0.02	0.71	0.03	12.70
1993	0.81		8.62	0.03	12.06		0.03	0.06	0.04	0.03				0.01	0.46	0.01	6.62
1994																	

Table B15: The RCA of Republic of the Philippines

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	2.78	0.45	6.20	0.43	15.55	0.06	0.28									0.09	
1971	3.04	0.46	6.62	0.55	13.84	0.07	0.28	0.01								0.09	0.03
1972	3.28	0.56	6.40	0.25	16.45	0.07	0.32	0.01								0.15	0.07
1973	2.24	0.37	5.48	0.21	14.93	0.06	0.50	0.01								0.25	2.94
1974	3.74	0.32	4.39	0.11	19.57	0.06	0.34	0.01								0.30	2.97
1975	3.71	0.42	4.35	0.28	14.19	0.11	0.35	0.02	0.02							0.55	4.07
1976	3.16	0.33	3.95	0.22	21.14	0.11	0.47	0.03	0.02							0.81	6.69
1977	3.41	0.31	3.88	0.10	19.70	0.19	0.43	0.05	0.04							0.75	5.80
1978	2.26	0.29	3.86	0.05	27.57	0.20	0.47	0.06	0.08			0.12	0.17	0.07		0.81	7.50
1979	2.10	0.23	3.92	0.03	23.07	0.25	0.47	0.06	0.05			0.16	0.10	0.10		1.05	5.98
1980	2.76	0.17	3.82	0.10	16.14	0.17	0.48	0.07				0.14	0.24	0.08		1.08	6.90
1981	2.59	0.27	3.15	0.07	17.42	0.21	0.46	0.08				0.11	0.36	0.07		1.26	9.19
1982	2.60	0.33	3.11	0.06	15.78	0.22	0.39	0.10				0.10	0.46	0.04		1.23	11.50
1983	2.27	0.25	2.60	0.22	19.63	0.19	0.44	0.15				0.17	0.79	0.05		1.21	10.73
1984	2.35	0.22	1.88	0.17	15.91	0.23	0.43	0.23				0.07	1.36	0.05		1.00	9.67
1985	2.41	0.27	1.95	0.09	12.41	0.36	0.62	0.18				0.06	1.15	0.04		1.11	10.43
1986	2.40	0.26	2.13	0.24	29.27	0.53	0.54	0.23				0.06	1.36	0.05		1.03	8.80
1987	2.16	0.23	1.81	0.33	17.75	0.45	0.53	0.27				0.10	1.49	0.08		1.10	9.45
1988	2.06	0.19	1.89	0.54	18.04	0.38	0.57	0.27				0.26	1.27	0.02		1.12	9.09
1989																	
1990	1.94	0.31	1.54	0.46	16.76	0.35	0.56	0.31			0.19	0.75	1.22	0.06		1.27	10.89
1991	1.67	0.36	1.25	0.42	10.85	0.35	0.53	0.64			0.67	0.98	2.55	0.05		2.00	9.61
1992	1.54	0.22	1.19	0.50	17.26	0.32	0.44	0.43			0.39	1.04	1.44	0.06		1.18	10.96
1993	1.64	0.16	0.85	0.40	14.14	0.31	0.51	0.62			0.35	1.03	1.42	0.10		1.09	11.89
1994	1.42	0.14	0.79	0.40	9.88	0.25	0.44	0.51			0.32	1.12	1.50	0.13		1.04	11.58

Table B16: The RCA of Singapore

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	0.61	0.20	0.19	11.39	4.46	0.28	0.42	0.31	0.02							0.90	9.66
1971	0.51	0.14	0.13	11.14	4.53	0.30	0.42	0.41	0.03							1.02	6.72
1972	0.42	0.11	0.13	8.80	2.09	0.26	0.41	0.66	0.09							1.29	8.14
1973	0.36	0.07	0.11	7.00	1.63	0.49	0.47	0.84	0.10							1.41	7.46
1974	0.31	0.06	0.07	7.13	1.08	0.69	0.25	0.71	0.08							0.94	7.81
1975	0.36	0.09	0.09	6.92	0.99	0.31	0.32	0.62	0.08							1.09	7.59
1976	0.23	0.09	0.09	6.18	1.16	0.31	0.34	0.72	0.11							1.20	8.13
1977	0.28	0.12	0.09	6.32	1.60	0.31	0.34	0.71	0.14							1.04	6.51
1978	0.29	0.17	0.10	6.70	1.89	0.31	0.40	0.71	0.26		0.86	3.02	2.86		0.74	0.84	5.25
1979	0.28	0.15	0.10	5.53	1.77	0.25	0.34	0.87	0.24		0.78	3.80	2.99		0.97	0.95	4.27
1980	0.26	0.12	0.09	5.05	2.45	0.24	0.26	0.75	0.48		0.67	3.33	2.34		0.89	0.80	6.00
1981	0.20	0.11	0.08	5.66	2.91	0.24	0.25	0.71	0.65		0.46	2.60	1.76		0.94	0.79	0.05
1982	0.18	0.14	0.08	5.42	3.20	0.27	0.24	0.67	0.76		0.58	2.11	1.75		0.72	0.71	0.05
1983	0.19	0.13	0.11	4.92	2.54	0.33	0.22	0.85	1.37		1.02	2.08	1.89		0.96	0.76	0.05
1984	0.19	0.11	0.09	4.88	2.81	0.46	0.22	0.95	1.43		1.94	2.13	1.95		0.60	0.75	0.19
1985	0.20	0.13	0.11	5.00	2.93	0.54	0.23	0.83	1.65		2.06	2.00	1.44		0.10	0.70	0.19
1986	0.25	0.16	0.15	6.43	8.33	0.58	0.21	0.99	1.72		3.03	2.10	1.62		0.12	0.76	0.25
1987	0.26	0.20	0.17	5.79	3.86	0.62	0.22	1.14	1.23		3.80	2.78	3.03		0.20	0.84	0.21
1988	0.25	0.21	0.18	5.55	3.59	0.64	0.21	1.43	1.26		4.25	3.18	1.65		0.28	0.85	0.17
1989	0.26	0.24	0.18	5.58	4.58	0.65	0.15	1.54	0.85		4.60	3.18	1.60		0.14	0.74	0.14
1990	0.22	0.27	0.17	5.52	3.32	0.62	0.20	1.25	0.74		5.09	2.85	1.41		0.15	0.65	0.14
1991	0.20	0.22	0.13	4.03	2.49	0.65	0.19	1.16	0.80		4.07	2.17	1.35		0.10	0.53	0.12
1992	0.23	0.28	0.16	4.06	2.90	0.72	0.21	1.43	0.82		5.38	2.34	1.60		0.26	0.60	0.16
1993	0.19	0.28	0.13	3.96	1.90	0.68	0.21	1.47	0.84		5.40	2.22	1.54		0.37	0.51	0.16
1994	0.18	0.25	0.13	3.84	0.98	0.58	0.21	1.57	1.08		5.74	2.41	1.63		0.23	0.45	0.12

Table B17: The RCA of Chinese Taipei

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	2.15	0.05	0.44	0.48	0.03	0.27	1.27	0.47				152.84		152.84		2.89	0.05
1971	1.91	0.05	0.37	0.39	0.01	0.21	1.18	0.47				123.02		123.02		3.48	0.03
1972	1.65	0.03	0.38	0.33	0.01	0.19	1.20	0.58				100.81		100.81		3.23	0.02
1973	1.34	0.03	0.25	0.24	0.01	0.18	1.22	0.64				92.81		92.81		3.44	0.01
1974	1.53	0.04	0.19	0.16	0.03	0.25	1.05	0.73				99.22		99.22		3.89	0.01
1975	1.53	0.05	0.29	0.18	0.03	0.22	1.17	0.55				111.55		111.55		4.08	0.01
1976	1.23	0.03	0.26	0.22	0.02	0.23	1.20	0.58				41.56		6.68		4.12	0.01
1977	1.29	0.04	0.24	0.26	0.02	0.26	1.15	0.62				35.51		3.85		3.89	0.01
1978	1.14	0.02	0.30	0.37	0.01	0.21	1.19	0.46	0.07	0.27	0.81	4.13	1.40	0.25	0.42	2.98	0.01
1979	1.00	0.02	0.30	0.25	0.01	0.22	1.30	0.75	0.10	0.33	0.83	4.43	1.43	0.28	0.24	3.58	
1980	0.97	0.02	0.26	0.17	0.03	0.28	1.18	0.74	0.22	0.34	0.69	4.17	1.52	0.34	0.26	3.71	0.01
1981	0.79	0.02	0.31	0.20	0.01	0.28	1.28	0.73	0.24	0.30	0.64	3.36	1.40	0.26	0.33	3.75	
1982	0.79	0.02	0.38	0.18	0.02	0.31	1.27	0.72	0.24	0.29	0.66	3.00	1.35	0.23	0.64	3.80	
1983	0.74	0.02	0.34	0.18	0.02	0.28	1.30	0.75	0.20	0.34	0.81	3.00	1.33	0.30	0.26	3.72	
1984	0.69	0.01	0.30	0.19	0.04	0.30	1.32	0.81	0.24	0.35	1.02	2.86	1.53	0.33	0.16	3.82	
1985	0.75	0.02	0.36	0.19	0.01	0.28	1.34	0.75	0.26	0.37	1.12	2.28	1.47	0.30	0.16	3.52	
1986	0.79	0.01	0.33	0.18	0.03	0.29	1.24	0.74	0.26	0.35	1.42	2.17	1.26	0.30	0.19	3.18	
1987	0.76	0.01	0.29	0.16	0.02	0.27	1.30	0.82	0.25	0.40	1.74	2.33	1.28	0.30	0.22	2.93	
1988	0.67	0.02	0.33	0.15	0.04	0.35	1.21	0.96	0.25	0.41	1.96	2.10	1.36	0.30	0.18	2.67	
1989	0.58	0.02	0.38	0.14	0.04	0.39	0.93	1.09	0.23	0.65	1.80	2.34	1.39	0.33	0.23	2.46	0.05
1990	0.58	0.02	0.42	0.12	0.10	0.45	1.29	0.96	0.23	0.42	2.21	2.05	1.41	0.39	0.17	2.17	0.05
1991	0.49	0.02	0.33	0.09	0.06	0.47	1.23	0.88	0.20	0.63	1.92	1.49	1.24	0.38	0.09	1.75	0.04
1992	0.50	0.03	0.39	0.13	0.08	0.54	1.35	1.02	0.21	0.79	2.34	1.57	1.40	0.45	0.09	1.80	0.05
1993	0.52	0.03	0.37	0.15	0.07	0.60	1.45	1.09	0.22	0.81	0.24	1.56	1.47	0.48	0.16	1.58	0.04
1994	0.53	0.03	0.43	0.16	0.08	0.66	1.55	1.08	0.26	0.82	2.20	1.44	1.46	0.46	0.17	1.34	0.03

Table B18: The RCA of Thailand

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	5.13	0.44	3.26	0.19		0.04	0.67	0.02								0.07	3.27
1971	5.13	0.46	3.40	0.23		0.10	0.69	0.02								0.14	4.12
1972	5.35	0.39	2.78	0.31		0.05	0.74	0.02								0.31	4.72
1973	4.12	0.25	3.08	0.33		0.06	0.88	0.01	0.02							0.35	3.18
1974	5.80	0.25	2.49	0.14		0.09	0.71	0.03	0.02							0.34	2.55
1975	5.92	0.34	2.25	0.10		0.08	0.71	0.05	0.02							0.44	1.99
1976	6.15	0.33	2.24	0.04		0.06	0.78	0.06	0.04				5.68			0.48	1.49
1977	6.28	0.41	2.27	0.01		0.06	0.85	0.07	0.06				3.21			0.47	1.66
1978	5.50	0.43	2.39	0.02		0.06	1.05	0.09	0.07				0.71			0.56	1.85
1979	5.27	0.36	2.41	0.03		0.07	1.09	0.12					0.82		0.01	0.65	1.55
1980	5.07	0.32	2.20	0.07		0.08	1.12	0.18		0.07			1.25		0.05	0.70	1.73
1981	5.79	0.33	1.83	0.05		0.09	0.96	0.17		0.06			1.02		0.02	0.83	1.48
1982	6.23	0.51	1.73	0.04		0.10	0.94	0.17		0.07			1.04		0.18	0.90	0.90
1983	5.97	0.41	1.95	0.04		0.10	1.00	0.16		0.10			0.99		0.02	1.13	0.70
1984	6.33	0.34	1.94	0.07	0.37	0.11	1.00	0.21		0.21	0.05		1.09	0.02		1.26	0.58
1985	6.00	0.34	1.96	0.15	0.48	0.15	1.06	0.24		0.33	0.20		1.18	0.02		1.31	0.46
1986	5.75	0.29	1.76	0.14	0.42	0.17	0.97	0.28		0.27	0.17		1.45	0.02		1.41	0.30
1987	5.04	0.22	1.73	0.14	0.30	0.17	1.05	0.30	0.11	0.33	0.31	0.06	1.41	0.03		1.86	0.29
1988	4.70	0.18	1.71	0.19		0.17	0.84	0.43	0.14	0.38	0.71	0.18	1.36	0.08		1.92	0.22
1989	4.79	0.14	1.41	0.18		0.18	0.59	0.52	0.16	0.33	1.15	0.75	1.04	0.08		1.97	0.36
1990	4.15	0.17	1.31	0.17		0.22	0.82	0.54	0.18	0.41	1.49	1.25	1.09	0.09		2.01	0.42
1991	3.16	0.17	0.98	0.16		0.26	0.72	0.54	0.18	0.48	1.23	1.21	0.99	0.09	0.06	1.70	0.37
1992	3.42	0.21	1.14	0.20		0.29	0.76	0.66	0.23	0.59	1.47	1.49	1.21	0.10	0.10	1.82	0.38
1993	2.99	0.17	1.01	0.23		0.33	0.80	0.72	0.26	0.82	1.41	1.24	1.28	0.17	0.21	1.85	0.51
1994	2.96	0.15	1.27	0.20		0.31	0.81	0.79	0.32	0.68	1.67	1.34	1.25	0.19	0.42	1.72	0.25

Table B19: The RCA of The United States

Year	*SITC0*	*SITC1*	*SITC2*	*SITC3*	*SITC4*	*SITC5*	*SITC6*	*SITC7*	*SITC71*	*SITC74*	*SITC75*	*SITC76*	*SITC77*	*SITC78*	*SITC79*	*SITC8*	*SITC9*
1970	1.11	0.10	1.23	1.04	1.93	1.05	0.54	1.20	1.32							0.67	2.10
1971	1.08	0.12	1.28	0.91	2.09	1.04	0.48	1.23	1.30							0.68	2.24
1972	1.24	0.09	1.34	0.85	2.05	0.99	0.49	1.21	1.32							0.68	2.20
1973	1.59	0.06	1.36	0.58	1.72	0.95	0.50	1.14	1.24							0.64	2.04
1974	1.50		1.14	0.29	0.97	0.90	0.52	1.18	1.29							0.68	1.98
1975	1.45		1.51	0.52	1.80	0.92	0.52	1.19	1.31							0.65	1.98
1976	1.47		1.36	0.59	1.50	0.97	0.51	1.19	1.57							0.67	1.70
1977	1.35		1.58	0.55	1.65	1.01	0.50	1.17	1.87							0.68	1.69
1978	1.47		1.71	0.48	1.61	1.04	0.48	1.17	0.73	1.71	2.58	0.82	1.12	1.12	2.13	0.60	2.06
1979	1.45		1.69	0.45	1.51	1.09	0.50	1.30	0.77	1.71	2.69	0.81	1.12	1.11	2.33	0.76	2.26
1980	1.45		1.65	0.42	1.47	1.03	0.55	1.16	1.50	1.70	2.59	0.71	1.21	0.92	2.52	0.79	1.69
1981	1.45		1.51	0.45	1.41	1.06	0.53	1.20	1.62	1.25	2.04	0.62	1.16	0.75	2.06	0.76	1.56
1982	1.32		1.64	0.57	1.46	1.09	0.49	1.20	1.72	1.26	2.17	0.68	1.22	0.62	1.83	0.79	1.47
1983	1.44		1.62	0.47	1.40	1.11	0.47	1.20	1.75	1.18	2.18	0.65	1.30	0.74	1.99	0.77	1.44
1984	1.17	0.09	1.34	0.37	1.03	0.97	0.38	0.99	1.43	0.90	1.63	0.51	1.07	0.68	1.42	0.60	1.56
1985	1.24	0.08	1.50	0.50	1.08	1.12	0.43	1.23	1.76	1.05	1.96	0.66	1.23	0.85	2.28	0.73	2.01
1986	1.08	0.14	1.60	0.66	1.98	1.09	0.42	1.17	1.72	0.89	1.88	0.63	1.21	0.74	2.80	0.71	2.28
1987	1.06	0.24	1.58	0.61	1.05	1.06	0.47	1.15	1.61	0.89	1.83	0.62	1.22	0.73	3.04	0.69	2.59
1988	1.15	0.20	1.50	0.64	1.43	1.02	0.44	1.21	1.56	0.84	1.68	0.62	1.16	0.72	2.54	0.69	2.82
1989	1.19	0.15	1.48	0.66	1.24	1.08	0.35	1.27	1.49	0.91	1.51	0.65	1.17	0.67	2.42	0.74	2.77
1990	1.13	0.18	1.60	0.66	1.08	1.07	0.52	1.14	1.49	0.97	1.56	0.69	1.25	0.71	2.64	0.80	1.66
1991	0.86	0.22	1.34	0.47	0.80	0.97	0.51	1.07	1.45	0.99	1.25	0.57	1.11	0.69	2.17	0.67	1.44
1992	1.01	0.25	1.49	0.53	1.06	1.08	0.55	1.20	1.58	1.11	1.37	0.69	1.21	0.85	2.48	0.76	1.71
1993	1.02	0.32	1.24	0.46	1.02	1.13	0.56	1.18	1.59	1.16	1.25	0.71	1.20	0.90	2.27	0.78	1.95
1994	0.99	0.30	1.38	0.45	0.94	1.11	0.59	1.17	1.53	1.14	1.26	0.74	1.18	0.91	2.12	0.78	1.61