THE COMPOSITION OF U.S.-EAST ASIA TRADE

AND CHANGING COMPARATIVE ADVANTAGE

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Abstract

This paper examines the composition of trade between the United States and eight Asian Pacific economies from 1962 to 1992. Analysis of the time series pattern of individual commodities at the SITC four-digit level reveals economically significant changes in the pattern of trade, reflecting changing comparative advantage based on changing factor proportions, technology transfer and product cycles. The composition of the eight bilateral trade relationships shows both increasing specialization over time, and a sequence from Japan to the four tigers, Korea, Taiwan, Singapore and Hong Kong, and then to the remaining three East Asian economies, Malaysia, Indonesia and Thailand.

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1. Introduction

How much do trade patterns change over time? If trade is based on comparative advantage, which arises from differences in technology and in factor proportions,[1] and these change slowly, then trade composition would be highly persistent. This is the conclusion of a recent empirical study by Gagnon and Rose (1995).

In this paper, we examine bilateral trade data for the United States (U.S.) and several Asian economies on the Pacific rim in order to discover what commodity trade data can tell us about changing trade patterns and changing comparative advantage in this region. We take an approach similar to that of Gagnon and Rose, yet make several departures in our analysis. While they use multilateral trade data, we use bilateral data to discriminate more finely product cycle or similar dynamic effects. These effects might be masked in multilateral data for a developed economy whose trade is with both developed and developing economies. Second, we look more closely at the year-to-year time path of commodity trade balances to identify changes in trade patterns. Following the World Bank report, *The East Asian Miracle*, and related studies, we look at U.S. bilateral trade with Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, Taiwan and Thailand. These trade flows include many of the world's most dynamic economies and would therefore be more likely to contain changing trade patterns.

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[1] Technology can be considered an input, "knowledge capital," as is done in endogenous growth models. We discuss this later in the paper when interpreting our results. Also, in contrast to traditional trade theory, the "new trade theory" has offered explanations for the substantial trade between countries that appear to have more similarities than differences. These models rely on such elements as economies of scale, imperfect competition and a preference for close substitutes. New trade theory explains intra-industry trade, which is not the focus here.

Considerable attention has been given to trade within the Pacific region. Recent empirical studies include an NBER conference volume, (Bradford and Branson, 1987), a study on Japan by Park and Park (1992) and the report from the World Bank (1993). In the NBER volume, Krause's (1987) work suggests that the fast-growing Asian Pacific economies' dynamism in the 1970s was marked by expanding trade and, more important for our study, marked as well by clear changes in the composition of trade based on changing comparative advantage. In the same volume, Bradford (1987) finds results similar to Krause's, based on a somewhat different approach, and he concludes that "rapid structural change internally *and in the composition of exports is central to successful development*."[2] Park and Park look at Japan and the East Asian newly industrialized countries (NICs): Hong Kong, Korea, Singapore and Taiwan. They note that these economies no longer specialize in exporting unsophisticated, labor-intensive manufactures, but have moved into manufacturing sectors requiring skill- and capital-intensive production processes. A pattern similar to that suggested by Bradford and Krause emerges from Park and Park's study. They also discuss the product cycle model and its applicability to Japan, the NICs, and the next tier of Asian Pacific developing economies, using the metaphor of flying geese with Japan as the leader. The World Bank report includes a test of a particular aspect of comparative advantage. The authors set up factor endowments as a static property upon which industrial and trade policies might act to effect change in what is produced and traded. However, their results are mixed.

[2] Bradford (1987) p. 200, emphasis added. Other relatively aggregate, cross-country studies that make similar points include Syrquin and Chenery (1989), and the pieces in Chenery, Robinson and Syrquin (1986).

All these studies are highly suggestive of the importance of changing comparative advantage in the changing composition of U.S.-East Asia trade. Yet they typically study East Asian exports only and leave imports unexamined. Imports can be a channel for technology transfer and can initiate a product cycle in trade. Therefore imports should be analyzed along with exports when considering the importance of trade. Furthermore, can one reconcile the findings of changing trade (exports) in the studies mentioned above with Gagnon and Rose's finding of persistence in trade composition? In response this paper begins with Gagnon and Rose's methodology and offers a more detailed examination of disaggregated two-way trade flow patterns, to the exclusion of changes in aggregate trade flows and other macroeconomic variables. We use the same disaggregated level of data and the same empirical methods across the group, and we examine a longer time span than most other studies.

We refer to three major explanations of changing trade composition: changing factor proportions, technology gap/transfer, and product cycle.[3] Empirical work on factor proportions as a source of comparative advantage usually tests variations of the Heckscher-Ohlin theorem in a static framework, and results in general have been disappointing.[4] Grossman and Helpman's (1994) survey of theories linking technology and trade cites several recent studies that estimate knowledge spillovers from research and development (R&D) activities. All the studies agree that

[3] Theory and previous empirical work are discussed in more detail in the working paper version, Carolan, Singh and Talati (1995). In endogenous growth models, technology transfer and the product cycle work through the mechanism of endogenously changing comparative advantage; see Grossman and Helpman (1991) in particular.

[4] See Deardorff (1984) and Leamer and Levinsohn (1994).

such spillovers occur internationally.[5] The concept of a product cycle can be considered a subset of technology gap/transfer theories, yet it has a fairly long history of its own. Hirsch (1967), following Kuznets (1953), argued that new products go through cycles of systematic changes in technology, going from skill intensive at the development phase to capital intensive as volume grows and then to unskilled labor intensive as the production process becomes standardized. Empirical studies of the product cycle use quite aggregate data or specific industry data and achieve qualified success. In general they focus on technology or product innovation and perform regression analyses with explanatory variables such as R&D or product characteristics.

The paper by Gagnon and Rose takes a different approach in seeking evidence of the product cycle. They use highly disaggregated data, at the 4-digit Standard International Trade Classification (SITC) level, and ask a different sort of question, namely, not whether there is evidence for innovation and technology transfer, but whether product cycle-type dynamics are pervasive in the commodity trade data. They answer this question in the negative: they find that most of the trade volume share that started in surplus stayed in surplus. The exception in their study is South Korea, which is one of the dynamic Asian economies in our sample.[6] Our interpretation of Gagnon and Rose's results is that they decisively reject the hypothesis of no persistence in trade flows. On the other hand, the results do not contradict the hypothesis of significant changes in trade flows. In other words, if the null hypothesis is one of complete persistence in trade patterns, this too will be rejected by the data. One of the goals of our paper is

[5] See Grossman and Helpman (1994) pp. 38-39.

[6] South Korean trade is also studied in Lee (1995). Our results are consistent with this and other studies.

to demonstrate this contention more formally. Note that we do not test determinants of changing trade patterns, and in particular we do not test product cycle theory. Rather we undertake an initial step of discerning and then describing changing trade patterns.

The remainder of the paper is organized as follows. In section 2 we describe the data and methodology. We present results in section 3. Section 4 concludes by summarizing the paper and discussing work that remains to be done.

2. Data and Methodology

The data consist of comprehensive annual, bilateral commodity trade flows disaggregated to the four-digit SITC level**,** Revision 1. The years cover 1962 through 1992, with some exceptions where the data begin in a later year.[7] Examples of goods at this level are "trucks and buses" (SITC #7322), "television receivers" (7241), "plastic polymers" (5812), and "porcelain or china household ware" (6664). Although we will use the terms "commodity" and "good," the four-digit level is commonly considered the industry level. With some missing observations excepted, nominal dollar values of exports and imports are available for each year and each of several hundred categories of goods at this level of disaggregation.[8]

[7] The exceptions are Malaysia (1964) and Singapore (1966). Subsequently, we shall ignore these exceptions in our exposition and use 1962 as representative of the general case.

[8] The trade data do not account for re-exporting of commodities. We believe this activity to be an insignificant part of trade for all the countries with the exception of Hong Kong and, possibly, Singapore. Hong Kong serves as an entrepot for China's trade, and Singapore serves as a middleman for the region in general though likely on a much smaller scale. A more detailed description of the data is available in the working paper version.

Our approach to the data follows from Gagnon and Rose. An important data issue they consider is that the categories may be too aggregated, so that product cycle or other dynamic effects are masked.[9] Gagnon and Rose suggest that the intra-industry trade index for U.S. multilateral data at the 4-digit SITC level is low enough to support a claim of little intra-industry trade at that level of disaggregation.[10] The authors report that "the sample average is slightly over 0.4, indicating that trade in one direction is almost four times the level of trade in the other direction for a typical subgroup." (p. 235) Another, related problem is that quality improvements may not be recognized by the data. However, inadequate disaggregation or unaccounted-for quality improvements would bias results against finding changing trade composition, and therefore any changes uncovered would be understated in overall importance to trade.

Another key data issue is that the value of international trade grew substantially from 1962 to 1992 as a result of economic growth, inflation, and the growing relative importance of trade. Gagnon and Rose suggest a normalization procedure that tends to remove these effects from the data. The normalized trade balance for commodity group *i* at time *t* is defined by

$$NB_{it} \equiv \left(\frac{X_{it}}{\sum_i X_{it}} - \frac{M_{it}}{\sum_i M_{it}} \right) * 100,$$

where X_{it} denotes the value of exports of subgroup *i* at time *t*, and M_{it} denotes imports. This normalization removes the impact of macroeconomic imbalances on trade patterns, since the sum

[9] This point is emphasized by Swagel (1993) for computers, where new products have proliferated in the last decade or so.

[10] The index used is $1 - (1/n)\Sigma_i (|NB_{it}|/2NV_{it})$, where n is the number of subgroups.

of NB_{it} for any year is always zero. Furthermore, for example, a macroeconomic effect such as 1 percent growth in exports spread uniformly across all subgroups will not affect the level of *NB.*

A similar normalization is used for commodity trade shares. This measures the relative importance of a commodity in terms of its share of trade for a given year, as follows:

$$NV_{it} \equiv \frac{1}{2} * \left(\frac{X_{it}}{\sum_i X_{it}} + \frac{M_{it}}{\sum_i M_{it}} \right) * 100 .$$

NV_{it} measures the importance of trade in commodity *i* at time *t*. The sum for any time period over commodities is 100, and thus NV_{it} is a percentage measure.

Gagnon and Rose's first analysis of the data is to examine changes in the direction of trade between the beginning and the end of the sample. To eliminate small deviations from balance, subgroups are classified into three categories: 1) surplus: those with a value of *NB* greater than one standard deviation above zero, 2) balance: those with a value of *NB* within one standard deviation of zero, and 3) deficit: those with a value of *NB* more than one standard deviation below zero, where the standard deviation is computed for each commodity's *NB* time series. The standard deviations used are commodity-specific, being measured over time for a given SITC number. Therefore each commodity defines its trade balance (ie. surplus, balance or deficit) relative to its own time series behavior, regardless of the magnitude of trade balance swings for other commodities. When this categorization is done for the first and last year of the data, and the normalized trade volume share in each category is computed, one obtains two-way tables such as those in Table I.

Note that in Table I, the share of trade volume in balance in the early year is larger than in 1992. We will discuss this in the two-way tables part of the results section, specifically in regard to commodities that move from the Gagnon-Rose-defined balance to surplus or to deficit. Another point relates to the χ^2 test for independence performed by Gagnon and Rose on the two-way tables. This is the standard χ^2 test for contingency, with a null hypothesis of no association in the two-way classification.[11] Gagnon and Rose find that this test strongly rejects the hypothesis that trade volume shares of commodity groups ending in surplus (deficit) are distributed independently of those beginning in surplus (deficit).[12] However, rejection of this hypothesis does not necessarily provide evidence against product cycle or other dynamic effects. In particular, rejecting independence suggests that there is some association between categories in the two years, but it does not say anything about whether there is complete stability or not. In principle this, too, can be tested using a χ^2 test as an approximation,[13] but it requires specific distributional assumptions that make the test complex to implement. Kendall and Stuart (1961) do suggest measures of association based on the χ^2 statistic constructed under the null hypothesis of no association, but they caution that these have no clear probabilistic interpretation. We calculate one of these measures, Cramer's C-statistic, which is a transformation of the χ^2 statistic in a

[11] See, for example, Kendall and Stuart (1961), Chapter 33.

[12] Note that this test is not affected by the distribution of the normalized trade balances being different for the final and initial years because a constant distribution over the time period is assumed, a point that was highlighted above.

[13] The general χ^2 goodness-of-fit statistic is given by $C^2 = \sum_i (O_i - E_i)^2/E_i$, where O and E denote observed and expected frequencies. See Kendall and Stuart, Chapter 30, for a detailed treatment

manner that ensures it lies between zero and one.[14] Alternatively, since the underlying data is numerical, one may abandon the categorization, and directly calculate correlation coefficients between the normalized trade balances for the beginning and the end of the period, that is, the standard Kendall correlation coefficient.[15] We do this via simple regressions of the later period on the earlier period.

The methods discussed so far compare just the beginning and ending years. Gagnon and Rose also employ a method that considers the intervening years. They construct histograms for each economy based on the number of years each commodity runs a surplus. They present results in two forms: the unweighted histogram counts the number of commodities that fall into each of the zero to twenty-nine possible years in surplus and presents this count as a percentage of the total number of commodities; the other histogram weights these commodities by their share of the total normalized dollar volume of trade and presents this percentage. We compute the weighted histograms, since these convey more information.[16]

The histograms consider the intervening years (between 1962 and 1992 in our data) only by compiling frequencies of trade surplus and not by considering the year-to-year sequence of the

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of tests of fit. The test of association used by Gagnon and Rose is a special case of the general χ^2 goodness-of-fit test.

[14] The formula is $C = \left[\frac{c^2}{n \min(r-1, c-1)} \right]^{1/2}$. See Kendall and Stuart (1961), p. 557.

[15] Gagnon and Rose also calculate these correlations and find them to be large and significantly different from zero. Our purpose is to see whether the correlation coefficients are much below one, although no straightforward statistical test is available to test this formally.

[16] We also computed unweighted histograms; these are available on request.

trade balance. Therefore we also offer an original approach to time series examination of the data. Given the stylized facts of the NICs as developing by export-led growth, we search for commodities that change to deficit in later years (from a U.S. perspective). The goal is to highlight those areas where the NICs have apparently obtained a comparative advantage.[17] We employ a somewhat *ad hoc* method and give details of this selection procedure when we present results. We further categorize the selected commodities according to factor intensity, using a scheme devised by Krause (1987). Krause created four groups: natural resource intensive, unskilled labor intensive, technology intensive, and human capital intensive, based on an initial aggregation of the United Nations trade data into 105 commodity groups.[18] Physical capital was dropped as a category because "it is so internationally mobile as to provide little guidance to the location of production."[19] While this procedure is far from perfect,[20] it does provide a useful way of classifying commodities in order to examine and understand changes in the pattern of trade.

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[17] This use of Gagnon and Rose's *NB* statistic alludes to the concept of revealed comparative advantage. A discussion of revealed comparative advantage is beyond the scope of the present paper. The seminal article is Balassa (1965), and Ballance, Forstner and Murray (1987) provide an examination of several measures of revealed comparative advantage. Lee (1995) uses Balassa's approach.

[18] Classification was performed sequentially, beginning with natural resource based goods, which included all commodities in SITC sections 0-4, as well as selected groups from SITC 6 (e.g., leather, plywood, nonferrous metals). 42 commodities out of 105 were in this category. Next, based on a ranking of value added per worker, 11 goods were categorized as unskilled labor-intensive. The remaining commodities were divided into technology-intensive and human capital-intensive categories by selecting goods with the highest ratios of research and development expenditures to value added as technology intensive. 30 commodities were in this group, leaving 22 as human capital intensive. Full details are in Krause (1987), pp. 221-224.

[19] Krause (1987), p. 210. However, this neglects the ex post immobility of capital.

[20] Krause notes, for example, that human capital-intensive goods in his classification include some products such as steel which could be capital intensive under other models. In general we would expect physical capital-intensive goods to be included in Krause's technology-intensive or human

3. Results

A. Two-way tables. Before examining our results, we comment on Gagnon and Rose's two-way tables. They rely on these tables to argue that among both developed and developing economies commodity-specific trade balances are highly persistent. However, their tables do reveal a difference between developed and developing economies. If we add up the percentage of trade volume share that is persistent, the upper left to lower right diagonal elements of Gagnon and Rose's tables, we find that the U.S. and U.K. have 52% and 42%, respectively. The figures for Brazil, Japan,[21] Korea and Turkey are 34%, 30%, 28% and 29%, respectively. This contrast between developed and developing economies motivates, in part, our emphasis on East Asian economies in bilateral trade with the U.S.[22]

The picture that emerges from our two-way tables, gathered as Table I, is broadly consistent with Gagnon and Rose. The *NV* shares that move from surplus to deficit or vice versa are relatively small fractions of total trade volumes. Product cycle or similar dynamic effects appear to be unimportant in overall magnitude. However, one other feature of our tables, also present in Gagnon and Rose's computations for developing economies, stands out, and this

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capital-intensive categories. As long as there is a shift to these categories, we will pick it up in our analysis. The data available do not permit calculation of capital intensities at a disaggregated level. Studies that do divide industries into capital and labor intensive ones typically are quite aggregated. For example, for Taiwan, Wang (1990), classifies basic metals, nonmetal, chemicals, transport and machinery as capital intensive; and paper, textiles and apparel, wood products, electronics, metal products, rubber products and leather as labor intensive.

[21] Note that Japan should be considered a developing country in 1962.

[22] We thank a referee for pointing out this contrast for developing countries in Gagnon and Rose's paper.

feature is related to the earlier observation that trade is more persistent for the U.S. and U.K. than for the developing economies. For our eight economies' bilateral trade, the percentage of trade in balance, according to the one standard deviation cutoff, is much larger in 1962 (1964 for Malaysia and 1966 for Singapore) than in 1992. Thus if one includes trade volume shares that move from balance to surplus or to deficit, the dynamic effects are larger.[23] For example, for Japan, instead of 7.78% of *NV* moving from surplus to deficit, we have 39.46% moving from balance or surplus to deficit.

For every economy, the share of trade volume in balance in the early year is larger than in 1992. Excepting Hong Kong, this is by a factor ranging from two to six. Consider a couple of possible explanations. It may be that the normalization procedure does not sufficiently correct for increases in trade volume over the period. However, this seems implausible, since the normalization results in proportions of exports and imports being calculated for each commodity. Hence, there seems to be increased country specialization with the causes being such factors as reduced trade barriers and lower relative transportation costs. Lower trade barriers and costs

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[23] This remains true after eliminating commodities that are labeled "1962 Balance" because they were not traded in that year. When we adjusted the two-way tables by removing all goods whose 1962 *NV* equals zero (which requires both exports and imports to be zero), the "1962 Balance" row of the tables changed little for most countries. The biggest change occurred for Indonesia: balance to surplus dropped from 33 to 24 *NV*, balance to balance dropped from 8 to 7, and balance to deficit dropped from 35 to 32 (the total volume dropped from 100 to 86). At the other extreme, Japan's "1962 Balance" row did not change. Thus commodities traded in 1992 but not traded in 1962 were not important to overall trade in terms of normalized trade volume. Furthermore, results did not change significantly after altering the 'one standard deviation from zero' rule, by using, for example, a one-half standard deviation rule. Therefore, we did not find that these eight economies have a comparative advantage in 1992 in a significant dollar volume share of goods not traded in 1962, with the slight exception of Indonesia; and the importance of examining commodities that move from balance to surplus or to deficit still holds. The adjusted results are available from the authors. We are grateful to a referee for raising this issue.

could generate effects that might be hard to disentangle from product cycle effects, since changes in trade barriers or transportation costs that favor certain goods could lead to changes in comparative advantage. Another explanation is that including 1962 balanced trade may be overstating the case for dynamics. Changes in trade direction might involve random or small switches in the pattern of trade. Commodities that were in surplus or deficit in 1992 may not have been traded in 1962 and thus misleadingly labeled as in balance. However, allowing for this did not alter the results substantially (see footnote 23).

B. Measures of association. These results can be found in Table I beneath the two-way table results. The standard χ^2 test fails to reject the null hypothesis of independence for only three of the economies (at the 5% level of significance). These three exceptions are Japan, Singapore and Taiwan, but for Japan the value of the computed statistic is very close to the critical value of 9.49. As with the two-way tables, our χ^2 results do not counter those of Gagnon and Rose. However, consider the C-statistic as a measure of association. Recall that the C-statistic lies between zero and one, with the upper bound representing complete association. In the eight cases here, the C-statistic exceeds one half only for Hong Kong and Indonesia, and it is considerably lower for the other six economies. These calculations suggest that there is more change in our sample of economies than would be suggested by Gagnon and Rose's methodology alone.

Additional information is obtained by regressing *NB* for 1992 on *NB* for 1962; the results are reported in Table II. While the regression coefficients are all statistically significant, excluding Malaysia, they are quite small in magnitude except for Hong Kong and, to a lesser extent, Indonesia. Similarly, the correlation coefficients, the square roots of the R^2s, are also small in magnitude except for Hong Kong and Indonesia. This contrasts with Gagnon and Rose's results.

Our regression results support the analysis of the two-way tables in the previous paragraph: the trade pattern appears to change least for Hong Kong and Indonesia, while for the other six economies, there appears to be more significant change.[24] We can explore this change more thoroughly by examining *NB* during the intervening years.

C. Histograms. Histograms of years in surplus, weighted by normalized trade volume shares, appear in Figure I. For Hong Kong, Korea, Taiwan, and Indonesia one can see something of a bimodal breakdown of the composition of trade. These four economies exhibit a marked fraction of trade to be either zero or thirty-one years in surplus, very similar to Gagnon and Rose's histograms. However, note that for even the clearest bimodal breakdown, Hong Kong's, the fraction of trade either zero or thirty-one years in surplus amounts to just half the total dollar volume of trade. According to this measure, persistence in the composition of trade for these four economies is strong but not overwhelming.

The four remaining economies, Japan, Malaysia, Singapore, and Thailand, present a variety of pictures. In each case, there are significant spikes in the histograms between the extremes of zero or thirty-one years. For Singapore in particular the modal number of years in surplus is nineteen, with another spike at ten years. According to the histograms, there is greater change in the direction of trade than in Gagnon and Rose's multilateral trade data.

D. Time series patterns. In order to ascertain more finely the changes in normalized commodity trade balances during the thirty-one years, we looked at the year-to-year time series behavior by proceeding as follows. First, we eliminated commodities for which there was no data

[24] The regression results did not change markedly when we weighted the normalized balances by the trade shares (normalized volumes) of the respective categories. We omit those results here.

for either exports or imports in all the five years 1988 through 1992. Then we focused on possible product cycles or other trade dynamics in one direction only, changes from U.S. surplus to U.S. deficit, for three turning points, 1968, 1978 and 1988. We identified those commodities for which the normalized trade balance was strictly positive in at least one year before 1968, 1978 or 1988**,** respectively, and nonpositive in the following five years. Then we examined the time series graphs of the normalized trade balances for these commodities. In some cases, the graphs showed no clear pattern in the movement of the normalized trade balance. We eliminated these, through an admittedly subjective process of visual inspection. The remaining graphs showed commodities moving from predominantly surplus (for the U.S.) to deficit by 1968, 1978 or 1988. Note that the commodities thus selected need not have remained in deficit indefinitely following the 1968 or 1978 turning points.

This selection process left us with the commodities grouped by our factor intensity measure in Tables III, IV and V. These three tables pertain to the three turning point years respectively and report the normalized trade balance and normalized trade volume shares for the respective commodities selected, for five-year intervals from 1962 to 1992. Time series graphs for the 1988 turning point of the most important commodity for each economy, according to trade volume shares, appear in Figure II. Now we discuss each table in numerical order, that is, chronological order for the three turning points.

Table III shows Taiwan, Japan, Hong Kong and Korea, in that order, had the biggest number of commodities that moved from U.S. surplus to deficit by 1968. These numbers are relatively small, just 24 commodities for Japan, for example, and the *NV* is small though not trivial, judging by 1972 *NV*. Korea has a lower number of commodities than Hong Kong, but

these amount to a higher share of dollar trade volume and concentrate in the technology-intensive category. For Hong Kong the dynamic commodities never reach 5% *NV* throughout the thirty-one-year period. Among the eight economies, Japan, Taiwan, and Korea emerge as the leaders in reversing trade deficits in human capital- and/or technology-intensive commodities with the U.S. All three economies maintain the U.S. deficit for these human capital- and technology-intensive commodities as a group through 1992. Hong Kong, despite having the third most number of commodities, shows a small trade volume share moving to deficit by 1968, and these are spread among all four input factor categories**,** though the human capital-intensive group has the largest share. Indonesia, Malaysia, Singapore and Thailand all have natural resource-intensive commodities that moved to deficit for the U.S., although the number of commodities involved is small, between two and six. Also, only Thailand maintains a U.S. deficit for these natural resource-intensive commodities through 1992. None of these four economies showed a (U.S. surplus to U.S. deficit) reversal in human capital- or technology-intensive commodities.

The 1968 turning point of Table III offers no dramatic changes in the composition of trade with the U.S. The share of dollar trade volume undergoing a change from U.S. surplus to deficit is small for all eight economies; however, Table III does contain several interesting features: 1) Taiwan matches Japan in reversing trade deficits with the U.S., 2) Japan, Korea and Taiwan all reverse trade deficits in predominantly human capital- or technology-intensive goods, not unskilled labor-intensive goods, and 3) Singapore joins Indonesia, Malaysia and Thailand in reversing deficits in natural resource-intensive goods. The picture for 1968 is that of three fairly sophisticated U.S. trade partners, Japan, Korea and Taiwan, four lesser developed economies, Indonesia, Malaysia, Singapore and Thailand, and one partner that stands apart, Hong Kong.

Table IV shows that, for all eight economies, trade volume shares that moved from U.S. surplus to deficit by 1978 have increased. This increase is minimal for Indonesia but remarkable for Singapore and, to a lesser extent, Thailand. Singapore appears to be the big leader in reversing trade share from surplus to deficit vis-à-vis the U.S. However, this large increase is due primarily to one SITC group, "transistors, valves, etc" (7293). This commodity comprises 73% of Singapore's dynamic technology-intensive trade volume shares for the year 1978 (the individual commodity numbers are not shown but are available from the authors). Note that the *NB* for the selected group of technology-intensive commodities reverses again by 1992. Hong Kong, Japan, Korea and Taiwan all expand on surpluses in human capital-intensive goods with Japan leading the group in the share of dollar trade volume. Korea does lose trade volume share in technology-intensive goods, while Japan and Taiwan experience increases. Malaysia and Thailand increase surplus shares in all four categories, although Thailand continues to depend on natural resource- and unskilled labor-intensive goods for surpluses.

The picture that emerges using the 1978 turning point offers no major surprises. Japan stands as a slight leader in terms of the combination of human capital- and technology-intensive goods. These goods remain important in terms of *NV* share of trade through 1992. The four tigers follow Japan, given the qualification of Singapore's high trade volume share in "transistors, valves, etc" (7293), as noted above. These five economies are followed by Indonesia, Malaysia and Thailand.

Table V shows little *relative* change among the eight economies from 1978 to 1988, although important changes occur for individual economies. Japan's U.S.-surplus-to-deficit commodities emphasize both human capital- and technology-intensive goods. Korea, Malaysia,

Singapore and Taiwan's U.S.-surplus-to-deficit commodities emphasize human capital- and technology-intensive commodities relative to their individual natural resource- and unskilled labor-intensive commodities. Singapore's new surpluses again emphasize technology-intensive goods but now rely on several such goods, but no longer including "transistors, valves, etc."[25] Hong Kong again shows a lack of dramatic trade reversals (to a U.S. deficit), although the biggest category for such reversals is human capital-intensive goods. Indonesia and Malaysia show the biggest increases overall in share of new trade volume surpluses, while Thailand still leads both these economies in total *NV* that has switched from US surplus to deficit. Indonesia and Thailand rely on natural resource- and unskilled labor-intensive goods for the new surpluses, while Malaysia relies on unskilled labor-, technology-, and, most of all, on human capital-intensive goods.

The poorest economy in our sample is Indonesia. The greatest growth in share takes place in the final decade, a period of significant trade liberalization by Indonesia. This export growth has come in natural resource-intensive products and, even more so, in unskilled labor-intensive products. The figures for Indonesia present a picture of a resource-abundant economy experiencing recent development as well as trade liberalization and a realization of its comparative advantage.

Malaysia's increase in the human capital-intensive category is mostly due to two commodities, "radio broadcast receivers" (7242), and "sound recorders, phonographs, and parts" (8911) (not shown). The concentration of growth in particular commodities is similar to that

[25] By far the biggest contributor was the group "statistical machines" (7143), making up over half of the overall dynamic trade volume.

noted for Singapore. Both economies are not only geographically close but have also shared a policy of encouraging direct investment by multinational firms. Perhaps these two economies, in their recent experience, come closest to illustrating the operation of the product cycle as conceived in the 1960s, with new products originating in the advanced economy and then production moving offshore under control of the advanced-economy firms.

Several important points arising from Tables III, IV and V deserve emphasis. Consider a comparison of the commodities selected for the three turning points: over the thirty-one-year period no economy moves from reversing trade deficits in natural resource- or unskilled labor-intensive goods to reversing trade deficits in human capital- or technology-intensive goods. Indonesia and Thailand begin by reversing deficits in natural resource- or unskilled labor-intensive goods and end the period by reversing deficits in the same categories. For Indonesia the specific natural resource- or unskilled labor-intensive commodities contained in these groups change from 1968 to 1978 to 1988, and the 1978 and 1988 groups show similar importance in terms of trade volume shares. For Thailand the natural resource- or unskilled labor-intensive commodities contained in these groups are primarily an accumulation from 1968 to 1978 to 1988, and the 1968, 1978 and 1988 groups show increasing importance in terms of trade volume shares. Malaysia ends the period by reversing deficits in unskilled labor-, human capital- and technology-intensive goods fairly equally. Japan and the four tigers, Hong Kong, Korea, Singapore and Taiwan, all begin and end the thirty-one-year period by reversing deficits in human capital- and/or technology-intensive goods. However, one tiger, Hong Kong, ends the period lowest among all eight economies in trade volume share that has shifted from U.S. surplus to deficit. Results for Hong Kong perhaps reflect its role as an entrepot for China's merchandise trade and Hong

Kong's own increasing importance as a trader of financial services instead of goods. Finally, another tiger, Singapore, ends lowest in the number of commodities that shifted from U.S. surplus to deficit, and hence relies on just several technology-intensive goods to generate a relatively large share of dynamic trade volume share.

Therefore, with some qualification, a flying geese pattern appears in terms of reversing trade deficits with the U.S. Japan emerges as only a slight leader by 1978. This slightness might reflect the crudeness of the categorization. As noted, Hong Kong's trade pattern with the U.S. does not exhibit the same kind of dramatic changes. As one might expect, the data suggest that Indonesia, Malaysia and Thailand lag behind the other five economies in terms of changes in trade patterns, and such changes are focused more on natural resource- and unskilled labor-intensive commodities, with some important exceptions for Malaysia, as noted above.

All eight economies show marked increases in the dollar volume share of U.S.-surplus-to-deficit trade over the thirty-one-year period, as measured by the shares of commodities selected using the three turning points. This increase, and the fact that the volume shares for the goods we have picked out for the 1988 turning point are quite large for each of the eight economies suggests that there are significant changes in the pattern of trade between them and the United States. Furthermore, to the extent that much of the change, at least for the richer economies in the group, is concentrated in the technology-intensive category, the evidence might be interpreted as supporting a product cycle view of trade dynamics. However, distinguishing product cycle effects from changing factor proportions effects would mean distinguishing changes in the production process (technology) from changes in the quantity or quality of capital and labor

(inputs).[26] Our data do not afford this possibility. Nevertheless our results can be interpreted as providing solid evidence for changing comparative advantage: trade patterns change in accordance with the evolution of comparative advantage. Our analysis thus updates previous studies, such as those mentioned in the introduction, as well as providing a more disaggregated analysis of the data.[27]

We close this section with two *caveats*. One criticism that can be made of the above exercise is that we are using bilateral data, so the changes we are identifying may simply be one economy displacing another in exporting to the U.S., and the effect we are picking out would not show up in multilateral U.S. trade data. However, we would view this as consistent with product cycle or other dynamic trade theories, since production can migrate successively from the most developed to less and less developed economies in stages. For example, Japanese cars not only displaced domestic American cars in the U.S. market, but also displaced European imports. The latter effect would not show up in multilateral U.S. trade data. A second criticism is that our procedure for selecting dynamic trade pattern commodities is somewhat *ad hoc* and subjective.

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[26] Alwyn Young's (1995) study of East Asian growth supports the changing factor proportions argument, via factor accumulation. While Young does examine the growth in manufacturing exports, his analysis does not rule out product cycle effects. The World Bank (1993) study also emphasizes factor accumulation.

[27] We also considered the factor intensity classification of commodities that persisted in surplus, and these results are available in the working paper version. In general, and with the caution that this is bilateral data, those results suggest that the United States vis-à-vis East Asia appears to have maintained a comparative advantage in natural resource- and technology-intensive commodities but lost this in the case of some human-capital intensive commodities. Also, Japan, Korea, Singapore and Taiwan have gained an advantage in some technology-intensive goods. That particular grouping lends credence to the flying geese pattern for development in Asia (Hong Kong's absence may be due to its role as an entrepot for China), though once again the product vs. process issue must be noted: a country may specialize in simpler process stages only for complex goods.

However, our procedure is actually conservative and should underestimate the number and volume share of such U.S.-surplus-to-deficit commodities.

4. Concluding Remarks

In this paper, we have analyzed disaggregated trade data between the United States and eight Asian Pacific economies and found evidence of significant changes in the pattern of trade over the 1962-1992 period. Changes in trade patterns we have identified are consistent with the Asian Pacific economies moving up the ladder of comparative advantage. Our analysis reinforces the general observation of increasing levels of human capital and the upgrading of technology for seven of these eight Asian economies, Indonesia excepted.

In addition to changing comparative advantage, other economic forces have been at work during this period: changes in transport costs, tariffs or quantitative trade restrictions on various commodities; greater specialization due to economies of scale; or a successful combination of import substitution followed by export promotion. These other explanations are, in some sense, deeper causes of the change in the structure of these economies over time as evidenced in the striking change in trade patterns with the U.S. For policies in particular it is possible to relate our results to what is known about government actions in these countries, as we have indicated in some of our discussion of the individual economy time-series results.

Our results are not surprising, especially as they confirm the oft-discussed importance of trade in East Asian development. Our contribution is to provide a uniform, consistent, disaggregated analysis across the eight Asian-Pacific economies. In addition our conclusions differ from those of Gagnon and Rose, who challenge the notion that a product cycle or other

trade dynamic affects an economically significant fraction of trade. We do not overturn the results for their data. Rather we apply their methods and our own to a data set more likely to contain product cycle or other dynamic trade patterns. In our view, the conclusion is a matter of where and how one looks, and we believe we have improved on previous work in this respect.

This paper is part of a larger project, and there is much that remains to be done. It might be informative to see how our results change after aggregating economies in the region. For example, would dynamic effects disappear when one looks at U.S. trade with these eight Asian Pacific economies as a group, rather than individual bilateral trade? It would also be interesting to look at trade between Japan and the other seven East Asian economies to identify any dynamic patterns in those trade flows. Finally, controlling for changes in such influences as tariff levels could be important in isolating precisely the nature and causes of trade pattern changes. All this remains for future work.

REFERENCES

Balassa, Bela A., "Trade Liberalization and 'Revealed' Comparative Advantage," *The Manchester School of Economics and Social Studies*, v. 33, pp. 99-123, May 1965.

Ballance, Robert H., Helmut Forstner and Tracy Murray, "Consistency Tests of Alternative Measures of Comparative Advantage," *The Review of Economics and Statistics*, v. 69, pp. 157-161, 1987.

Bradford, Colin I., Jr., "NICs and the Next-Tier NICs as Transitional Economies," in Bradford and Branson, 1987.

Bradford, Colin I., Jr., and William H. Branson, ed., *Trade and Structural Change in Pacific Asia*, NBER conference report. The University of Chicago Press, Chicago, 1987.

Carolan, Terrie, Nirvikar Singh and Cyrus Talati, "The Composition of U.S.-East Asia Trade and Changing Comparative Advantage", UC Santa Cruz Working Paper No. 332, September 1995.

Chen, Pochih, Chi Schive and Cheng Chung Chu, "Export Structure and Exchange Rate Variation in Taiwan," Ch. 9 in Takatoshi Ito and Anne O. Krueger, eds., *Macroeconomic Linkage: Savings, Exchange Rates, and Capital Flows*. University of Chicago Press, Chicago, 1994.

Chenery, Hollis, Sherman Robinson and Moshe Syrquin, *Industrialization and Growth: A Comparative Study*, New York: Oxford University Press, for the World Bank, 1986.

Deardorff, Alan V., "Testing Trade Theories and Predicting Trade Flows," Ch. 10 in Ronald W. Jones and Peter B. Kenen, eds., *Handbook of International Economics, Volume 1, International Trade*, North Holland, Amsterdam, 1984.

Gagnon, Joseph E. and Andrew E. Rose, "Dynamic Persistence of Industry Trade Balances: How Pervasive is the Product Cycle?" *Oxford Economic Papers*, v. 47, pp. 229-248, 1995.

Grossman, Gene and Elhanan Helpman, *Innovation and Growth in the Global Economy*. Cambridge, Mass. MIT Press, 1991.

_____, *Technology and Trade*. National Bureau of Economic Research, Cambridge, Mass. NBER Working Paper No. 4926, November 1994.

Hirsch, Seev, *Location of Industry and International Competitiveness.* Clarendon Press, Oxford, 1967.

Kendall, Maurice G. and Alan Stuart, *The Advanced Theory of Statistics, Volume 2*. Hafner Publishing Company, New York, 1961.

Krause, Lawrence B., "The Structure of Trade in Manufactured Goods in the East and Southeast Asian Region," in Bradford and Branson, 1987.

Kuznets, Simon, *Economic Change.* W.W. Norton, New York, 1953.

Leamer, Edward E., and James Levinsohn, *International Trade Theory: The Evidence*. National Bureau of Economic Research, Cambridge, Mass. NBER Working Paper No. 4940, December 1994.

Lee, Jaimin, "Comparative Advantage in Manufacturing as a Determinant of Industrialization: The Korean Case," *World Development*, v. 23, no. 7, pp. 1195-1214, 1995.

Park, Yung Chul and Won-Am Park, "Changing Japanese Trade Patterns and the East Asian NICs," in Paul Krugman, ed., *Trade with Japan: Has the Door Opened Wider?*, NBER Project Report. University of Chicago Press, Chicago, 1992.

Syrquin, Moshe, and Hollis Chenery, "Patterns of Development, 1950 to 1983", World Bank Discussion Paper 41, 1989.

Swagel, Philip, "Product Cycles in Trade Flows: Implications for the Computer Industry," mimeo, March 1993.

Wang, Fang-Yi, "Reconsidering the "East Asian Model of Development." The Link Between Exports and Productivity Enhancement: Evidence from Taiwan, 1950-1987," PhD dissertation, University of California, Los Angeles, 1990.

World Bank, *The East Asian Miracle: Economic Growth and Public Policy*. Oxford University Press, New York, 1993.

Young, Alwyn, "A Tale of Two Cities: Factor Accumulation and Technical Change in Hong Kong and Singapore," in Olivier J. Blanchard and Stanley Fischer, ed., *NBER Macroeconomics Annual 1992.* MIT Press, Cambridge, Mass., 1992.

_____, "The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience," *Quarterly Journal of Economics*, v. 110, n. 3, pp. 641-680, August 1995.

TABLE I

Breakdown of Total 1992 Trade Volume

US-Hong Kong Trade

	1992 Surplus	1992 Balance	1992 Deficit	Total
1962 Surplus	14.80	3.42	0.32	18.54
1962 Balance	20.03	21.34	7.75	49.12
1962 Deficit	0.96	7.26	24.12	32.34
Total	35.79	32.02	32.19	100.00
χ^2	51.6475			
C-Statistic	0.5082			
Number of commodities:				596

US-Indonesia Trade

	1992 Surplus	1992 Balance	1992 Deficit	Total
1962 Surplus	13.66	2.22	0.11	15.99
1962 Balance	29.42	8.65	34.65	72.72
1962 Deficit	0.00	11.29	0.00	11.29
Total	43.07	22.17	34.76	100.00
χ^2	59.2003			
C-Statistic	0.5441			
Number of commodities:				577

US-Japan Trade

	1992 Surplus	1992 Balance	1992 Deficit	Total
1962 Surplus	7.53	9.58	7.78	24.89
1962 Balance	20.04	11.66	31.68	63.37
1962 Deficit	2.05	6.46	3.23	11.74
Total	29.62	27.69	42.69	100.00
χ^2	9.0545			
C-Statistic	0.2128			
Number of commodities:				609

US-Korea Trade

	1992 Surplus	1992 Balance	1992 Deficit	Total
1962 Surplus	7.34	5.77	0.35	13.46
1962 Balance	25.17	17.22	37.99	80.38
1962 Deficit	0.24	1.85	4.07	6.16
Total	32.75	24.84	42.41	100.00
χ^2	12.0729			
C-Statistic	0.2457			
Number of commodities:				601

US-Malaysia Trade

	1992 Surplus	1992 Balance	1992 Deficit	Total
1964 Surplus	4.89	4.88	1.77	11.54
1964 Balance	45.68	10.02	31.75	87.45
1964 Deficit	0.02	0.99	0.00	1.01
Total	50.59	15.89	33.52	100.00
χ^2	12.7432			
C-Statistic	0.2524			
Number of commodities:				577

US-Singapore Trade

	1992 Surplus	1992 Balance	1992 Deficit	Total
1966 Surplus	4.55	7.21	1.16	12.93
1966 Balance	17.27	27.93	35.03	80.22
1966 Deficit	0.00	4.75	2.10	6.85
Total	21.82	39.89	38.29	100.00
χ^2	8.9995			
C-Statistic	0.2121			
Number of commodities:				591

US-Taiwan Trade

	1992 Surplus	1992 Balance	1992 Deficit	Total
1962 Surplus	7.35	7.55	3.68	18.58
1962 Balance	30.21	15.45	31.05	76.71
1962 Deficit	0.38	0.97	3.37	4.72
Total	37.93	23.97	38.10	100.00
χ^2	6.9285			
C-Statistic	0.1861			
Number of commodities:				603

US-Thailand Trade

	1992 Surplus	1992 Balance	1992 Deficit	Total
1962 Surplus	5.70	12.37	2.17	20.24
1962 Balance	26.89	15.51	35.61	78.01
1962 Deficit	0.16	1.33	0.27	1.76
Total	32.74	29.22	38.04	100.00
χ^2	16.6086			
C-Statistic	0.2882			
Number of commodities:				592

TABLE II

REGRESSIONS: NB_{1992} on NB_{1962*}

US-HONG KONG

Constant		0.00495957
Std Err of Y Est		0.98551573
R^2		0.49937433
No. of Observations		596
Degrees of Freedom		594
X Coefficient(s)	0.65334151	
Std Err of Coef.	0.02684049	

US-INDONESIA

Constant		-0.00173485
Std Err of Y Est		1.24105319
R^2		0.18444827
No. of Observations		577
Degrees of Freedom		575
X Coefficient(s)	0.24315530	
Std Err of Coef.	0.02132251	

US-JAPAN

Constant		-0.00030775
Std Err of Y Est		0.97761559
R^2		0.01540721
No. of Observations		609
Degrees of Freedom		607
X Coefficient(s)	0.13898679	
Std Err of Coef.	0.04509677	

US-KOREA

Constant		0.00037769
Std Err of Y Est		0.82326069
R^2		0.018036
No. of Observations		601
Degrees of Freedom		599
X Coefficient(s)	0.06174005	
Std Err of Coef.	0.01861364	

US-MALAYSIA, *NB(1964)

Constant		0.00019333
Std Err of Y Est		1.22834791
R^2		0.00217281
No. of Observations		577
Degrees of Freedom		575
X Coefficient(s)	0.01994541	
Std Err of Coef.	0.01782485	

US-SINGAPORE, *NB(1966)

Constant		0.00019041
Std Err of Y Est		1.53446782
R^2		0.00575479
No. of Observations		591
Degrees of Freedom		589
X Coefficient(s)	0.06633348	
Std Err of Coef.	0.03592585	

US-TAIWAN

Constant		-0.00211731
Std Err of Y Est		0.86245596
R^2		0.02236921
No. of Observations		603
Degrees of Freedom		601
X Coefficient(s)	0.08164677	
Std Err of Coef.	0.02201729	

US-THAILAND

Constant		0.00012839
Std Err of Y Est		1.16909846
R^2		0.00820013
No. of Observations		592
Degrees of Freedom		590
X Coefficient(s)	0.04135359	
Std Err of Coef.	0.01872357	

TABLE III

1968 Dynamic Trade Commodities

	Hong Kong							Indonesia						
# Commodities	13							6						
Year	1962	1967	1972	1977	1982	1987	1992	1962	1967	1972	1977	1982	1987	1992
Natural Resource NB	-0.11	-0.02	-0.16	-0.21	-0.09	0.18	0.29	0.01	-0.42	0.00	-0.01	0.02	0.02	0.18
Natural Resource NV	0.37	0.28	0.16	0.15	0.11	0.20	0.17	0.00	0.21	0.00	0.01	0.01	0.02	0.11
Unskilled Labor NB	-0.11	-0.04	-1.01	-2.17	-0.55	-0.84	-0.34	0.12	0.02	0.00	0.01	0.12	0.01	-0.09
Unskilled Labor NV	0.78	0.29	0.72	1.28	0.53	0.63	0.42	0.06	0.02	0.00	0.00	0.07	0.01	0.20
Human Capital NB	0.28	-0.39	-1.00	-2.93	-3.70	-4.16	-4.41							
Human Capital NV	0.33	0.51	0.78	2.13	2.64	2.49	2.70							
Technology NB	0.15	-0.12	-0.28	-0.77	-0.29	-0.12	-0.75							
Technology NV	0.13	0.24	0.30	0.62	0.41	0.27	0.51							
SUM NV	1.61	1.32	1.95	4.18	3.68	3.59	3.79	0.06	0.23	0.00	0.01	0.08	0.03	0.31

	Japan							Korea						
# Commodities	19							9						
Year	1962	1967	1972	1977	1982	1987	1992	1962	1967	1972	1977	1982	1987	1992
Natural Resource NB	0.02	-0.41	-0.17	-0.06	0.00	0.00	0.02	-0.08	-0.04	-1.08	-0.71	-0.04	0.08	0.19
Natural Resource NV	0.09	0.25	0.09	0.04	0.01	0.02	0.02	0.08	0.04	0.57	0.37	0.08	0.08	0.11
Unskilled Labor NB	0.02	-0.21	-0.51	-0.16	-0.11	-0.13	-0.10							
Unskilled Labor NV	0.04	0.19	0.39	0.20	0.14	0.15	0.18							
Human Capital NB	0.23	-2.68	-14.44	-24.59	-29.03	-29.94	-24.62	0.41	-0.32	-0.82	-2.11	-2.35	-1.19	-1.69
Human Capital NV	0.61	2.08	8.07	13.68	15.22	16.14	15.46	0.21	0.20	0.42	1.06	1.19	1.01	0.93
Technology NB	0.47	0.00	-1.03	-0.91	-1.16	-2.35	-2.94	-0.33	-0.74	-0.55	-1.35	-0.66	2.78	-5.73
Technology NV	0.25	0.38	0.90	0.84	0.99	1.46	1.81	0.24	1.19	6.78	7.55	5.61	6.27	9.22
SUM NV	0.99	2.90	9.45	14.76	16.36	17.76	17.46	0.53	1.43	7.78	8.98	6.87	7.36	10.26

TABLE III (Cont.)

1968 Dynamic Trade Commodities

	Malaysia							**Singapore**						
# Commodities	3							2						
Year	1964	1967	1972	1977	1982	1987	1992	1966	1967	1972	1977	1982	1987	1992
Natural Resource NB	0.10	-1.91	-1.96	-0.39	-0.24	0.00	0.09	0.01	-0.04	-0.68	0.06	0.00	0.00	0.01
Natural Resource NV	0.17	1.03	1.00	0.20	0.12	0.01	0.06	0.00	0.04	0.36	0.04	0.03	0.01	0.01
Unskilled Labor NB														
Unskilled Labor NV														
Human Capital NB														
Human Capital NV														
Technology NB														
Technology NV														
SUM NV	0.17	1.03	1.00	0.20	0.12	0.01	0.06	0.00	0.04	0.36	0.04	0.03	0.01	0.01

	Taiwan							**Thailand**						
# Commodities	24							4						
Year	1962	1967	1972	1977	1982	1987	1992	1962	1967	1972	1977	1982	1987	1992
Natural Resource NB	0.00	0.00	-0.01	0.05	-0.04	-0.03	-0.02	0.03	-0.36	-2.11	-7.40	-4.67	-7.64	-5.09
Natural Resource NV	0.00	0.00	0.01	0.07	0.03	0.04	0.01	0.02	0.22	1.06	3.70	2.37	4.32	3.17
Unskilled Labor NB	0.17	-0.12	-0.48	-0.45	-0.24	-0.38	-0.71	0.05	0.08	-3.93	-4.26	-5.71	-5.08	-4.57
Unskilled Labor NV	0.09	0.11	0.30	0.33	0.34	0.43	0.54	0.09	0.25	2.07	2.14	2.87	2.54	2.31
Human Capital NB	0.30	-1.87	-13.53	-9.77	-4.35	-3.57	-0.33							
Human Capital NV	0.15	1.32	8.99	6.70	3.28	2.35	1.17							
Technology NB	0.31	-1.29	-2.75	-2.28	-2.54	-1.78	-1.83							
Technology NV	0.16	0.90	1.58	1.64	1.70	1.61	1.39							
SUM NV	0.40	2.33	10.88	8.74	5.35	4.43	3.11	0.11	0.47	3.13	5.84	5.23	6.87	5.48

TABLE IV

1978 Dynamic Trade Commodities

	Hong Kong							**Indonesia**						
# Commodities	27							17						
Year	1962	1967	1972	1977	1982	1987	1992	1962	1967	1972	1977	1982	1987	1992
Natural Resource NB	0.18	0.18	-0.12	-0.25	-0.35	-0.05	0.16	0.02	-0.42	0.00	-0.53	-2.90	-12.64	-9.01
Natural Resource NV	0.85	0.36	0.19	0.27	0.35	0.43	0.44	0.02	0.22	0.03	0.33	1.47	6.35	5.28
Unskilled Labor NB	-0.74	-0.04	-0.77	-0.92	-0.88	-1.54	-0.78	0.31	4.04	0.07	-0.09	-1.58	-10.97	-33.28
Unskilled Labor NV	0.51	0.17	0.46	0.52	0.51	0.89	0.51	0.15	2.03	0.08	0.07	0.81	5.49	16.81
Human Capital NB	1.19	1.11	-1.47	-7.71	-8.29	-11.41	-10.13							
Human Capital NV	1.11	1.64	2.25	6.33	6.08	6.92	6.60							
Technology NB	0.24	-0.03	-0.21	-1.28	-1.67	-1.85	-0.75							
Technology NV	0.18	0.43	0.59	1.25	1.42	1.56	1.61							
SUM NV	2.65	2.60	3.49	8.36	8.36	9.79	9.15	0.17	2.26	0.11	0.40	2.28	11.84	22.09

	Japan							**Korea**						
# Commodities	38							45						
Year	1962	1967	1972	1977	1982	1987	1992	1962	1967	1972	1977	1982	1987	1992
Natural Resource NB	0.14	0.10	0.06	0.02	-0.03	-0.07	-0.18	0.04	0.04	-1.14	-0.94	-0.46	-0.07	0.25
Natural Resource NV	0.09	0.06	0.03	0.05	0.02	0.05	0.10	0.14	0.10	0.64	0.50	0.35	0.30	0.33
Unskilled Labor NB	-2.05	-1.05	-0.57	-0.29	-0.25	-0.13	-0.23	0.04	0.05	-0.12	-0.54	-0.37	-0.39	-0.48
Unskilled Labor NV	1.08	0.73	1.05	0.29	0.21	0.16	0.28	0.06	0.07	0.16	0.30	0.32	0.41	0.45
Human Capital NB	1.07	-2.35	-15.42	-24.91	-33.96	-35.67	-27.27	2.53	0.88	-3.94	-10.73	-14.48	-11.52	-10.02
Human Capital NV	1.08	2.59	9.34	14.40	18.34	19.93	17.99	1.29	0.86	2.56	5.82	8.13	6.68	6.12
Technology NB	7.48	2.55	-0.57	-3.90	-7.04	-8.12	-9.03	0.35	-0.22	-0.24	-1.79	-1.08	-1.01	-0.30
Technology NV	4.22	4.36	4.59	3.94	5.51	5.94	6.78	0.18	0.72	0.60	1.04	0.87	0.77	0.77
SUM NV	6.48	7.74	15.02	18.69	24.08	26.09	25.15	1.67	1.76	3.95	7.66	9.67	8.16	7.67

TABLE IV (Cont.)

1978 Dynamic Trade Commodities

	Malaysia							**Singapore**						
# Commodities	21							27						
Year	1964	1967	1972	1977	1982	1987	1992	1966	1967	1972	1977	1982	1987	1992
Natural Resource NB	0.67	-1.03	-1.54	-0.60	-0.66	-0.69	0.06	0.04	0.06	0.00	-0.05	-0.06	-0.07	-0.03
Natural Resource NV	0.67	1.00	0.82	0.35	0.36	0.42	0.26	0.03	0.04	0.00	0.03	0.03	0.04	0.06
Unskilled Labor NB	1.43	0.26	-0.27	-0.79	-1.52	-4.72	-4.07	1.13	0.94	-1.38	-1.40	-2.67	-2.12	-0.46
Unskilled Labor NV	0.74	0.23	0.46	0.52	0.83	2.45	2.30	0.57	0.47	1.53	1.27	1.78	1.54	0.77
Human Capital NB	0.30	0.26	0.51	-2.04	-0.83	-3.95	-18.23	1.35	0.85	-10.23	-8.92	-13.50	-8.93	-6.30
Human Capital NV	0.16	0.13	0.28	1.20	0.44	1.99	9.34	0.67	0.43	6.41	6.96	7.43	4.99	3.77
Technology NB	1.21	1.41	1.69	1.29	-3.84	-3.12	-5.97	4.78	3.48	-15.52	-18.51	-29.18	-4.03	2.30
Technology NV	0.61	0.71	1.81	0.69	2.77	3.00	5.24	2.39	1.74	31.53	35.61	31.11	22.40	19.90
SUM NV	2.17	2.07	3.36	2.77	4.40	7.86	17.15	3.66	2.68	39.48	43.86	40.35	28.97	24.50

	Taiwan							**Thailand**						
# Commodities	46							47						
Year	1962	1967	1972	1977	1982	1987	1992	1962	1967	1972	1977	1982	1987	1992
Natural Resource NB	-7.17	-0.08	-0.01	0.04	-0.22	-0.03	0.04	0.15	-10.94	-2.22	-9.74	-15.66	-13.55	-9.08
Natural Resource NV	3.63	0.05	0.08	0.13	0.17	0.17	0.15	0.24	5.79	1.25	5.29	8.20	8.12	5.55
Unskilled Labor NB	0.02	0.01	-0.35	-0.59	-1.16	-2.44	-3.13	1.22	1.20	-10.07	-13.30	-17.88	-22.06	-19.70
Unskilled Labor NV	0.21	0.15	0.31	0.54	0.78	1.50	1.78	0.78	0.91	5.71	7.27	9.81	11.54	10.99
Human Capital NB	1.49	-0.96	-13.70	-11.39	-7.76	-6.18	-4.33	-0.39	0.05	-0.10	-0.67	-0.19	-0.34	-0.90
Human Capital NV	0.82	1.95	9.95	8.22	5.79	5.23	4.07	0.34	0.06	0.13	0.41	0.15	0.23	0.64
Technology NB	0.92	-0.87	3.96	-6.53	-8.32	-4.30	-3.44	0.23	0.03	0.00	0.07	-0.97	-0.30	0.00
Technology NV	0.46	4.77	8.20	7.25	7.36	6.84	5.62	0.12	0.02	0.06	0.04	0.56	0.28	0.13
SUM NV	5.13	6.92	18.54	16.14	14.10	13.74	11.62	1.47	6.77	7.15	13.01	18.71	20.17	17.31

TABLE V

1988 Dynamic Trade Commodities

	Hong Kong							Indonesia						
# Commodities	35							43						
Year	1962	1967	1972	1977	1982	1987	1992	1962	1967	1972	1977	1982	1987	1992
Natural Resource NB	-0.01	0.06	-0.03	0.34	-0.20	-0.23	-0.35	0.08	0.03	0.01	0.12	-1.22	-11.27	-10.91
Natural Resource NV	0.43	0.11	0.07	0.37	0.31	0.34	0.38	0.05	0.04	0.04	0.18	0.75	5.73	5.54
Unskilled Labor NB	0.62	0.25	-1.26	-2.11	-0.82	-2.13	-1.12	0.20	3.38	0.25	0.01	-1.48	-11.63	-39.56
Unskilled Labor NV	1.16	0.48	1.07	1.47	0.88	1.45	1.05	0.10	1.71	0.17	0.12	0.85	6.06	20.27
Human Capital NB	1.36	1.18	-1.34	-7.60	-8.16	-11.79	-10.54	0.39	0.48	0.08	0.12	0.04	-0.10	-1.12
Human Capital NV	1.18	1.64	2.20	6.24	6.09	7.28	7.02	0.19	0.24	0.06	0.06	0.03	0.08	0.78
Technology NB	0.60	0.88	0.61	-1.29	-0.47	-1.41	-2.11	0.10	0.15	-0.45	0.12	0.07	0.07	-0.70
Technology NV	0.45	0.77	0.90	1.32	1.46	1.29	1.75	0.05	0.07	0.28	0.06	0.04	0.04	0.45
SUM NV	3.22	3.00	4.24	9.40	8.74	10.36	10.20	0.40	2.07	0.55	0.42	1.67	11.90	27.04

	Japan							Korea						
# Commodities	41							55						
Year	1962	1967	1972	1977	1982	1987	1992	1962	1967	1972	1977	1982	1987	1992
Natural Resource NB	0.01	0.03	0.05	0.02	-0.03	-0.08	-0.20	5.29	0.04	1.47	1.68	-0.21	-0.08	-0.06
Natural Resource NV	0.03	0.02	0.03	0.06	0.04	0.07	0.12	2.65	0.06	0.82	1.03	0.12	0.07	0.05
Unskilled Labor NB	0.00	-0.14	0.01	-0.05	-0.10	-0.12	-0.16	0.03	0.11	-0.61	-0.55	-0.46	-0.62	-0.92
Unskilled Labor NV	0.04	0.15	0.10	0.12	0.10	0.10	0.13	0.11	0.18	0.50	0.37	0.48	0.68	0.77
Human Capital NB	0.81	-1.98	-14.99	-24.24	-33.18	-34.85	-26.79	2.36	1.00	-1.87	-8.42	-11.71	-23.54	-15.15
Human Capital NV	1.01	2.31	8.91	13.84	17.61	18.89	16.82	1.09	0.52	1.10	2.78	5.70	9.84	5.40
Technology NB	12.37	3.25	1.29	-3.55	-5.56	-11.76	-18.75	1.50	2.54	1.69	0.80	4.52	-4.40	-5.43
Technology NV	7.54	6.76	6.68	7.15	11.09	14.43	20.03	0.75	2.24	1.42	3.84	5.78	7.05	8.23
SUM NV	8.62	9.25	15.71	21.17	28.83	33.50	37.11	4.60	2.99	3.84	8.03	12.08	17.64	14.44

TABLE V (Cont.)

1988 Dynamic Trade Commodities

	Malaysia							Singapore						
# Commodities	39							21						
Year	1964	1967	1972	1977	1982	1987	1992	1966	1967	1972	1977	1982	1987	1992
Natural Resource NB	0.73	-1.05	-1.05	-0.21	-0.13	-0.74	-0.31	-0.01	0.00	0.00	0.00	0.09	-0.04	-0.01
Natural Resource NV	0.61	0.80	0.59	0.22	0.08	0.39	0.17	0.01	0.00	0.00	0.00	0.08	0.03	0.01
Unskilled Labor NB	3.29	2.07	0.70	-0.28	-1.82	-6.65	-7.27	1.13	0.94	-0.19	-0.98	-2.48	-1.81	-0.47
Unskilled Labor NV	1.67	1.14	0.62	0.68	1.19	3.62	4.14	0.57	0.47	0.65	1.01	1.56	1.35	0.68
Human Capital NB	0.65	0.42	0.92	-1.85	-1.17	-8.53	-20.89	1.94	1.45	-10.87	-5.72	-12.74	-9.06	-6.93
Human Capital NV	0.33	0.21	0.48	1.27	0.64	4.29	10.72	1.01	0.82	6.62	4.84	7.37	5.16	4.39
Technology NB	2.11	1.83	3.01	2.08	-4.19	-4.84	-8.24	3.32	2.84	3.98	-3.93	-12.60	-21.41	-43.95
Technology NV	1.05	0.91	1.51	1.24	3.58	4.38	7.05	1.66	1.42	5.70	6.87	13.53	32.11	33.47
SUM NV	3.67	3.06	3.20	3.40	5.49	12.68	22.08	3.25	2.71	12.97	12.72	22.53	38.64	38.56

	Taiwan							Thailand						
# Commodities	64							76						
Year	1962	1967	1972	1977	1982	1987	1992	1962	1967	1972	1977	1982	1987	1992
Natural Resource NB	0.04	0.03	0.15	0.21	-0.06	-0.10	-0.18	0.39	0.16	-1.83	-8.03	-13.81	-15.71	-10.40
Natural Resource NV	0.03	0.03	0.09	0.21	0.11	0.14	0.20	0.36	0.40	1.14	4.38	7.17	8.16	5.54
Unskilled Labor NB	0.11	-0.16	-0.19	-0.16	-1.01	-2.56	-4.20	2.35	2.26	-6.35	-10.42	-16.24	-25.66	-25.65
Unskilled Labor NV	0.13	0.22	0.30	0.38	0.79	1.61	2.34	1.39	1.44	4.60	6.58	9.35	13.52	14.48
Human Capital NB	3.27	1.90	-0.99	-2.34	-5.08	-6.93	-6.24	1.14	0.29	0.16	0.12	0.12	-1.14	-1.54
Human Capital NV	1.69	2.31	3.50	7.73	5.45	4.82	5.07	0.57	0.15	0.08	0.08	0.19	0.81	1.37
Technology NB	6.05	4.71	1.13	1.17	-1.04	-5.36	-20.39	3.39	1.82	0.62	0.09	0.24	-2.38	-8.15
Technology NV	3.03	4.81	5.57	6.28	7.56	12.23	17.34	2.23	0.97	0.51	0.67	0.62	1.65	4.68
SUM NV	4.88	7.36	9.46	14.60	13.91	18.79	24.94	4.55	2.96	6.34	11.71	17.33	24.13	26.08

FIGURE I

NV-Weighted Histograms

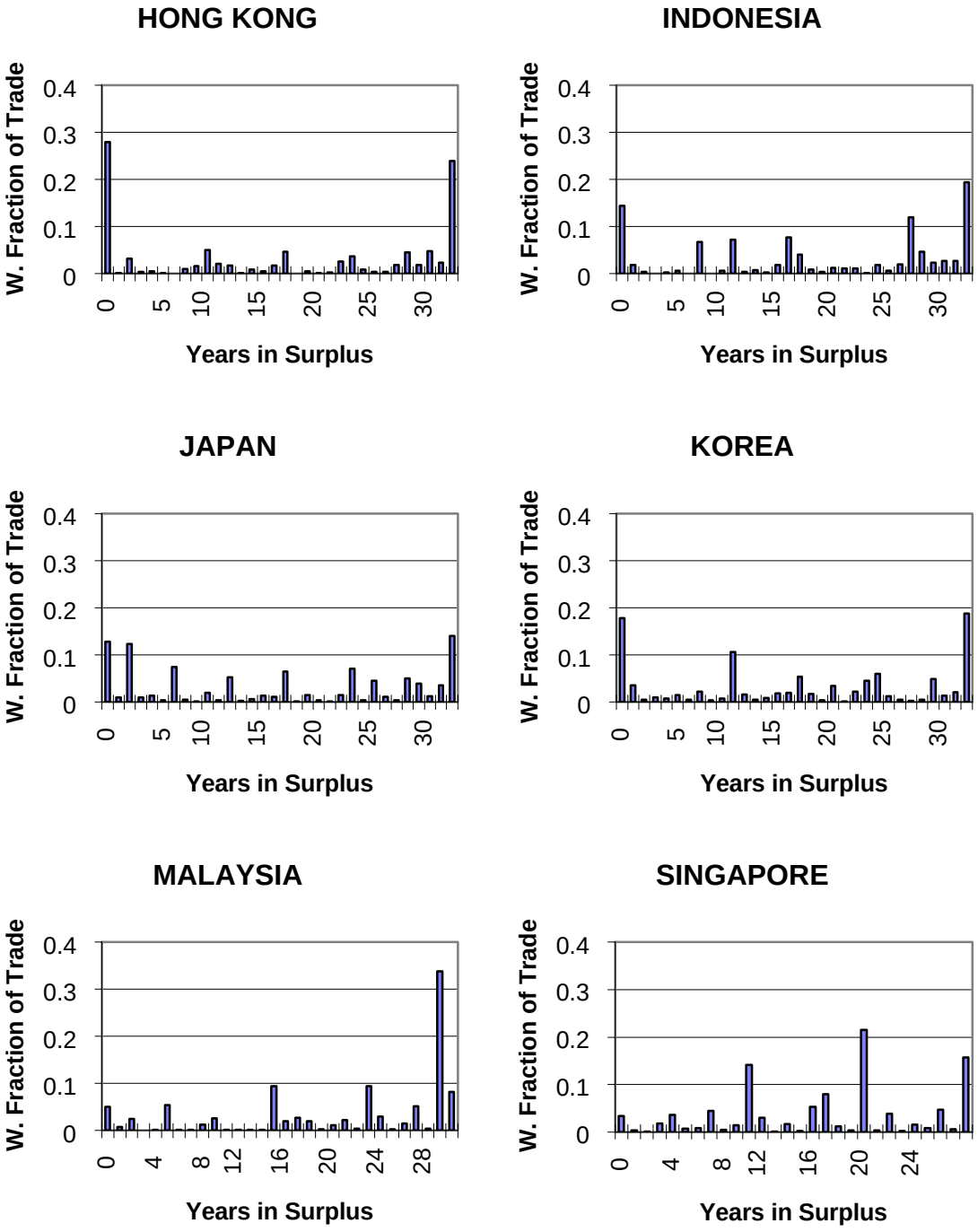


FIGURE I
(Continued)

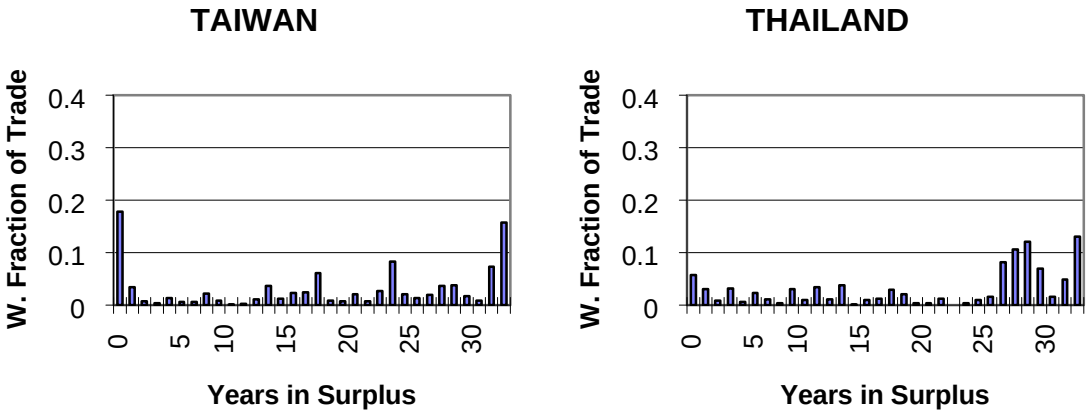


FIGURE II

1988 Surplus-to-Deficit Time Series *NB* Graphs

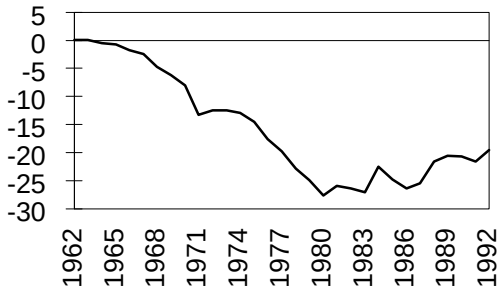
HONG KONG

8641 WATCHES,MOVEMENTS,CASES

INDONESIA

6312 PLYWOOD

JAPAN



7321 PASS MOTOR VEH EXC BUSES

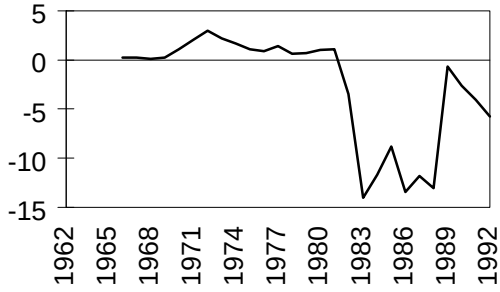
KOREA

7143 STATISTICAL MACHINES

MALAYSIA

7249 TELECOMM EQUIPMENT NES

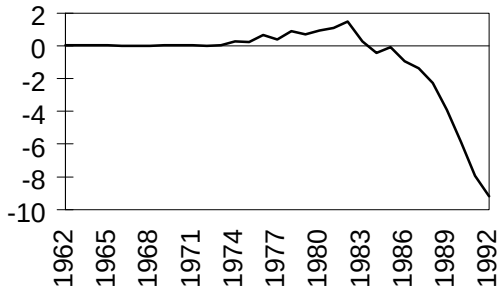
SINGAPORE



7149 OFFICE MACHINES NES

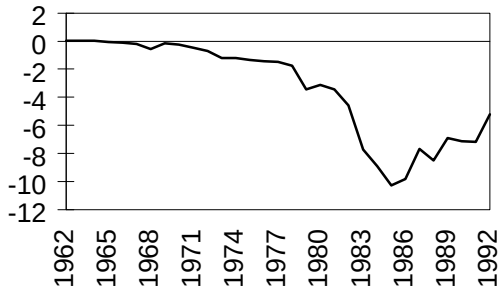
FIGURE II
(Continued)

TAIWAN



7143 STATISTICAL MACHINES

THAILAND



0320 FISH ETC TINNED,PREPARED

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