

# Structures, Policies and Economic Growth: Evidence from Japan \*

DEMETRI P. TSANACAS and RATHIN BASU

## Introduction

This paper examines the growth process in Japan by computing the deviation from proportionate growth of individual sectors using I-O tables for 1965, 1975 and 1985. The hypothesis is that the remarkable rate of Japanese growth can be explained by differences in the rate of change of value added by individual sectors and that these different rates of growth can be attributed to Japanese economic policies, but with particular emphasis on the high rate of domestic saving.

The importance of trade as an avenue for development, and the strong correlation between export growth and economic growth, have been the subject of extensive research and dialogue among politicians and economists. The discussion has been especially intense for Japan, since the Japanese economic miracle cannot be fully explained by the factor endowment theory or the technological gap, or human skills, or innovation theory but only by a mixture of all these theories together.

Part I of this paper addresses the factors that influence the allocation of economic activity, especially technology. Part II presents

---

□ Ferrum College, Division of Business and Economics, Ferrum, Va. 24088 (USA)

\* The authors are grateful to Peter H. Gray and to an anonymous referee for helpful comments on an earlier draft, and to Joy Gardner for word-processing assistance.

the model which is used to decompose Japanese growth and summarizes the findings of the previous application of that model. Part III presents and analyzes the results for the 1965-1985 period. Part IV summarizes the findings and offers conclusions.

## Part I

The reallocation of economic activity over the past 40 years has been influenced by national growth as well as by changes in comparative advantage resulting from the international diffusion of technology and knowledge. This reallocation has had a profound impact on the size of the production and the trade coefficients at the aggregate as well as the industry level. The structural metamorphosis at home has led to changes in the composition and the direction of foreign direct investment (FDI).

Clearly, not all countries have participated equally in this process. The causes of the intercountry differences have been identified by Chenery and others as being:

- (a) variation in overall rates of growth;
- (b) variation in initial factor proportions and in their rates of change;
- (c) differences in the response of demand to growing income;
- (d) differences in trade patterns and in capital flows;
- (e) differences in information flows.

Countries with large populations, large domestic markets and a diversified resource base would realize a transformation in their economies at an earlier stage without the need for a strong international component. The importance of domestic demand as a key determinant of competitive advantage has been emphasized extensively by Michael Porter (1990). Countries lacking the base for primary export would rely on a specialization in manufacturing exports to enhance their transformation. The Japanese transformation was the consequence of a large domestic market and a strong international sector. The various phases of industrial restructuring and the corresponding phases of FDI have been advanced by Ozawa (1982, 1990, 1991). Specifically, Ozawa has linked FDI to industrial up-

grading and industrial shedding of activities in which Japan could no longer exploit its competitive advantage at home.

Technology, broadly defined as any kind of economically useful knowledge, has been an essential ingredient and a catalyst of economic growth and comparative advantage. According to Harry G. Johnson (1970) there are two alternative approaches to the question of the influence of technology on the allocation of economic activity: the macroeconomic and the microeconomic. The reallocative microeconomic approach is concerned with the rational responses of a nation to a given technological change stimulus or to given resource weaknesses, and the specification of optimizing policies, while the macroeconomic approach is concerned with change itself, the cost and the opportunity presented by the change, and the overall process which may be stimulated or inhibited by government policies and by social institutions.

The spectacular growth achieved by the Japanese economy in response to outside microeconomic pressure, the need and desire of the nation to succeed and to implement technological change, and the intensity of the central governments' involvement in macroeconomic policy offer a unique combination of Harry Johnson's two approaches. Especially important to the Japanese success are the levels of domestic and international saving. Following the uses-resources flow of funds format proposed by Gray and Gray (1989), domestic savings ( $S_D$ ) produce increasing net worth and increasing domestic investment ( $I_D$ ), while the trade balance ( $X - M$ ) is determined by international saving ( $S_I$ ) and international investment ( $I_I$ ). Total savings have stimulated domestic and international investment  $S = I_D + I_I$ .

Much of the trade balance in the current account is attributed to the macroeconomic consequences of major differences in the total long-term savings rate in the U.S., Japan and the EEC and their effect on the dollar/yen rate of exchange. Table 1 reports the substantial negative trade balance of the U.S. and the EEC, and the increasing positive trade balance of Japan. The Japanese have taken full advantage of this favorable situation and enhanced their international position.

TABLE 1

TRADE BALANCE  
(millions of \$)

|             | U.S.A.  | EEC    | JAPAN |
|-------------|---------|--------|-------|
| 1950 - 1953 | 3553    | -4250  | -683  |
| 1959 - 1961 | 4474    | -2913  | -718  |
| 1969 - 1971 | 949     | -6720  | 1903  |
| 1974 - 1976 | -7103   | -26030 | -2065 |
| 1979 - 1981 | -38761  | -62023 | -3203 |
| 1982 - 1983 | -51341  | -38265 | 13628 |
| 1984 - 1985 | -128010 | -23085 | 39894 |
| 1986 - 1987 | -162475 | 4315   | 81227 |

Source: Unctad, 1988 Handbook of International Trade and Development Statistics.

A sustained positive trade balance might be explained by an undervalued home currency which provides the domestic firms with a competitive edge *vis-à-vis* import-competing firms and foreign firms and it enhances their profit margins, while reducing the profit margins of their competitors. Domestic firms are thus given the opportunity to invest the internally generated funds in competitiveness-enhancing activities such as R&D, new product technologies, new capital and information networks. Japanese firms have taken full advantage of the undervalued yen and have increased both their competitiveness and their foreign market shares.

In the current study we will attempt to measure the influence of technology at the macro and the micro level by analyzing the production coefficients of the various sectors of the economy, especially in manufacturing. The international spread of a given stock of technology and its impact on manufacturing can be attributed to four sets of factors:

- (a) difference in the growth of GNP;
- (b) variation in the income elasticity of demand;
- (c) changes in international specialization;
- (d) R&D expenditure.

## Part II - Model

The separation of the effects of income growth from all other influences on manufacturing output is based on a model and variations of that model developed by Chenery, Shishido and Watanabe. The industrialized effect is calculated in the following equation:

$$\Delta V_m = V_m^T - V_m^0 = m^0 (Y^T - Y^0) + \Delta m Y^T$$

where

$V_m$  = value added in manufacturing

$Y$  = GNP

$m = V_m/Y$

The first term  $m^0 (Y^T - Y^0)$  is the growth effect, while  $\Delta m Y^T$  is an industrialization effect.

A further disaggregation of the industrialization effect into specific sectors is achieved through the solution of the model.

$$X_i + M_i = C_i + I_i + E_i + \sum a_{ij} X_j \quad (i = 1 \dots n) \quad (1)$$

$$Y = \sum V_i = \sum v_i x_i \quad (2)$$

$$\sum E + F = \sum M_i \quad (3)$$

$$X_i = \sum r_{ij} (D_j + T_j) \quad (j = 1 \dots n) \quad (4)$$

where

$Y$  = GDP

$F$  = capital inflow

$X$  = production in sector  $i$

$C$  = public and private consumption

$I$  = investment use

$E$  = exports

$M$  = imports

$T$  =  $E - M$

$D$  =  $C + I$

$V$  = value added in sector  $i$

$a$  = input of commodity  $i$  per unit of output of commodity  $i$

$v$  = ratio of value added to production in sector  $i$

Equation (1) is the basic equation for a Leontief system.

Equation (2) is the national accounts identity defining GDP from the production site.

Equation (3) represents the balance of payments constraint for an economy with a net inflow of capital.

Equation (4) is the standard solution for a Leontief model in which the exogenous elements are internal demand (C + I) and net trade (exports - imports).

The application of this model requires the separation of each element into: expansion proportional to GDP plus a deviation from proportional growth in output in sector *i* from period 1 to period 2 and from period 2 to period 3.

The deviation is defined:

$$\delta X^{12} = X_i^2 - X_i^1 \text{ where } 1 = Y_2/Y_1 \quad (5)$$

Deviations in the other elements of (1) could be written in the same manner. Their substitution into equation (4), the deviation of output from proportional growth, is given.

$$\delta X^{12} = \sum_j r_{ij}^2 (\delta D_j^{12} + \delta T_j^{12} + \lambda S_j^{12}) \quad (6)$$

The deviation from proportional growth in each sector is expressed as a function of the change in composition of demand, the change in net trade and the effects of changes in input coefficients. The last element is the Leontief "technological change".

The application of the model developed by Chenery, Shishido and Watanabe to the Japanese data for the 1914-1953 period yielded the results shown in Table 2. These results indicate the following developments in the Japanese economy during this period, as summarized by these authors.

In the early part of the 1914-1953 period, Japan had all the characteristics of an underdeveloped country, but by the end of the period had achieved industrial output levels far in excess of the norm for the prevailing per capita income level of \$200. This deviation has been attributed to the limited natural resource endowment of the country which necessitated growth strategies that would overcome these limitations. The route taken by Japan was to expand its trade by importing raw materials, adding value, and exporting finished and semi-finished goods. This strategy proved so successful that by 1954 the country achieved trade levels that were comparable to those

of an advanced country. Actually, the Japanese growth rate in this period is an integral extension of a century of development, the root of which can be traced to the emergence of a mercantile class during the latter part of the Tokugawa Shogunate.<sup>1</sup> In contrast to conventional demand-generated industrialization, Japan's path to industrialization was supply-fueled. Thus, the rise in import-substitution, the substitution of manufactured for primary products, and changes in technology all formed part of this supply-induced growth.

TABLE 2

RELATIVE IMPORTANCE OF CHANGES IN FINAL DEMAND AND TRADE \*  
1914-1935 and 1935-1954  
(billions of yen)

|                       | Direct and Indirect Effects of Deviations in: |       |         |       |         |       |                 |       |
|-----------------------|---|-------|---------|-------|---------|-------|-----------------|-------|
|                       | Final Demand                                  |       | Exports |       | Imports |       | Net Deviations* |       |
|                       | (1)   | (2)   | (3)     | (4)   | (5)     | (6)   | (7)             | (8)   |
|                       | 14-35   | 35-54 | 14-35   | 35-54 | 14-35   | 35-54 | 14-35           | 35-54 |
| Agriculture           | -926  | 50    | 170     | -268  | -100    | 397   | -859            | 179   |
| Mining                | 96  | -43   | 45      | -48   | -133    | 62    | 8               | -29   |
| Food                  | -466  | 123   | 46      | -86   | -29     | 8     | -449            | 45    |
| Textiles              | 382   | -16   | 715     | -807  | 29      | 93    | 1127            | -730  |
| Other Finished Goods  | 632   | -113  | 138     | -81   | -1      | 44    | 840             | -150  |
| Intermediate Products | 534   | -271  | 443     | -280  | 82      | 535   | 1059            | -15   |
| Services              | -110  | 378   | 383     | -451  | -45     | 152   | 228             | 79    |
| Total                 | 3149  | 994   | 1940    | 2021  | 419     | 1291  | 5508            | 4306  |

The "net deviation" from proportional growth is the sum of columns (1), (3) and (5) for 1914-1935, and of columns (2), (4) and (6) for 1935-1954.

\* Modification of Table 1: Chenery, H.B., Shishido, S. and Watanabe, T., "The Patterns of Japanese Growth, 1914-1954", *Econometrics*, 30 (Jan. 1962), p. 112.

<sup>1</sup> Adopting this type of strategy does not guarantee success. Success depends on the strength of the central government, its ability to work effectively with business in the integration of new technologies, and the entrepreneurial spirit that combines the profit motive with strong economic nationalism.

### Part III - Analysis of the Japanese Economy 1965-1985: Results

Chenery, Shishido and Watanabe had only the 1952 input-output table to work with. This table, and extrapolated data for preceding periods up to 1914, had been used by the authors in developing their results. The present study, however, was able to utilize input-output tables for the years 1955, 1965, 1975 and 1985 published in Uno (1988). These tables were used to calculate the separate effects on output of the four autonomous deviations: domestic demand, exports, imports, and technological change.

#### *Developments in Production and Trade (1955-1985)*

The study by Chenery, Shishido and Watanabe rings down the curtain at the end of 1954 on an economy in which national income was seventeen percent above its 1935 level and per capita income had actually decreased relative to the 1914-1935 period. The second period saw changes in the composition of production, intended to accommodate a substantial decrease in exports, the loss of supplies of raw materials from erstwhile colonies, and the transformation from an economy geared towards war to one that was adjusting to peace-time requirements. This study follows up on these developments over the 1955-1985 period.

The nature of growth over the 1965-1985 period and its causes are summarized in Tables 3 to 6, in which the results from the original 36 sector tables have been aggregated to seven. These results represent the response of the Japanese society to the challenges of a changing economic environment and reflect its success in internalizing global factors and in externalizing domestic strengths. The growth rates would not have been possible without a set of structures suitable and conducive to high growth (a small government sector, strong private sector domestic investment, a high rate of domestic saving, an infrastructure suitable for business needs, etc.), and the proper mix of government policies. These policies (fiscal, monetary, industrial, commercial and trade) were very active and

interdependent compared to Western economies. The Japanese government realized very early that "strategic trade policies" (Krugman 1986) can conceivably raise national welfare by enabling economic units to capture economic rents (current and future) as well as through positive technological spillovers to upstream and downstream industries.

#### *Growth in Domestic Final Demand*

According to Chenery, Shishido and Watanabe, there was an increase in domestic final demand at the end of 1953, relative to 1914, that was 2.895 times that of 1914. This increase persisted in subsequent ten-year periods, so that the ratio of domestic final demand in 1965 to domestic final demand in 1955 is seen to increase to 3.688. There is a substantial increase in domestic final demand in the next ten-year period, with the ratio of domestic final demand in 1975 to that in 1965 found to be 9.29. At the end of the third decade in 1985, however, the lowest rate of increase in domestic final demand over the domestic final demand ten-years prior to it, in 1975, is observed, with the corresponding ratio being 1.999.

We thus find that, following a spurt in the domestic final demand following the war and the recovery of the economy, there is a drop in the rate of increase in domestic final demand.

Some detail regarding the changes in the components of domestic final demand that gave rise to the overall changes observed can be seen from Table 3, which shows the deviation from proportional demand that occurred in the broadly aggregated sectors shown therein. It may be seen from the table that in 1965 there was greater than proportionate growth in domestic final demand in mining, and for finished goods. There was also a greater than proportionate increase in demand for intermediate goods. In contrast, growth in demand relating to the agriculture, food, and textiles sectors was less than proportionate.

These results would appear to be in conformity with the relative income inelasticity of demand for food and agriculture, in contrast to the nature of demand for services, finished consumer goods and durable goods.

TABLE 3

GROWTH IN DOMESTIC FINAL DEMAND  
(deviation from proportionate growth)  
(billions of yen)

| Sector                  | 1965     |    | 1975     |    | 1985     |    |
|-------------------------|----------|----|----------|----|----------|----|
|                         |          | %  |          | %  |          | %  |
| Agriculture             | -659.459 | 48 | -28816.9 | 61 | -6591.52 | 33 |
| Mining                  | 3082.846 | 54 | 209.8137 | 51 | 1033.832 | 25 |
| Food                    | -1559.04 | 38 | -25612.2 | 41 | -5558.07 | 17 |
| Textiles                | -27.1779 | 37 | -11019.0 | 60 | -4958.99 | 30 |
| Other Finished Products | 9952.298 | 95 | -4942.30 | 29 | 8218.670 | 32 |
| Intermediate Products   | 14467.58 | 5  | -11319.3 | 22 | -3486.80 | 18 |
| Services                | 17268.77 | 2  | 41767.63 | 22 | 8335.875 | 33 |
| Total                   | 42525.82 |    | -39732.1 |    | -3007.01 |    |

The data for 1975 indicate that, although domestic final demand increased by 9.29 times over the level in 1955, this growth was not reflected proportionately in all sectors. The major portion of this growth took place in the service sector while the mining sector continued to show strong demand. All the other sectors, however, grew less than proportionately.

In 1985, the data indicate that much of the increase in domestic demand was due to greater than proportionate final demand increases within mining, service, and finished product sectors. Demand in the food, agriculture, textile and intermediate product sectors continued to grow less than proportionately. The less than proportionate growth is attributed to severe labor shortages in Japan and to industrial shedding through FDI of those products in which Japan had lost its comparative advantage (Ozawa, 1991).<sup>2</sup> Most of these activities, especially in textiles and intermediate goods, were shifted to various Asian NICs. Thus, examination of the results for the three decades indicates that there was positive but uneven growth in domestic final demand in each period relative to the previous one. The rate of growth in the agriculture, food and textile sectors was less than proportionate with the change in final demand, whereas the service sector showed greater than proportionate growth, as did finished products. Much of the impetus for growth that came from domestic

<sup>2</sup> FDI by Japanese MNCs surged following the strengthening of the yen against the dollar after the Plaza agreement in 1985.

final demand thus seems to have been directed at the service and finished goods sectors. The slower growth of agriculture and food processing was a continuation of a trend seen in the 1953 table. These trends are expected to continue as Japanese consumer individualism and the diversification and sophistication of tastes and preferences continue, especially in light of the swollen liquidity and the accumulated wealth by the Japanese consumer.

#### *Patterns of Growth in Exports and Trade*

Examination of the data regarding exports (Table 4) indicates that, beginning in 1965, export growth took off again, following a decline in all sectors in 1953 (as indicated in Table 2, compiled by Chenery, Shishido, and Watanabe). Growth was not proportional in all sectors, in 1965, with only the exports of intermediate goods, finished goods and the mining sector showing greater than proportionate growth. However, this picture had changed by 1975, with positive export growth deviation in all sectors, the greatest extent of growth occurring in the finished products and intermediate goods sectors. The growth rate in exports is likely to be the result of an undervalued yen, the extensive industry targeting by the Japanese MITI, the ability of the Japanese industries to produce high quality price-competitive products, and the overall government policy to secure employment in manufacturing through export expansion. Government policy can have a direct effect on the international competitiveness of its industries. Quoting from Milberg and Gray (1992, p. 65):

... international differences in government policies and institutional frameworks can affect the competitiveness of national industries and deliberate measures can be construed as a variant of commercial policy ...

Japanese firms have benefitted from the deliberate action of the MITI to "tinker creatively" (Yamamura 1986) and have increased their market share. The exemption of certain industries from antitrust restrictions and the increased efficiency in R&D resulting from the industrial cooperation have been pointed out as two of the major achievements of the MITI.

TABLE 4

GROWTH IN EXPORTS  
(deviations from proportionate growth)  
(billions of yen)

| Sector               | 1965     |     | 1975     |     | 1985     |     |
|----------------------|----------|-----|----------|-----|----------|-----|
|                      |          | %   |          | %   |          | %   |
| Agriculture          | -432.209 | 44  | 20899.26 | 55  | 12790.61 | 27  |
| Mining               | 127.2030 | 505 | 53270.92 | 159 | 28021.47 | 44  |
| Food                 | -123.503 | 36  | 12954.58 | 41  | 10879.92 | 15  |
| Textiles             | -987.155 | 23  | 854.2096 | 44  | 4702.563 | 28  |
| Other Finished Goods | 1332.943 | 54  | 114209.1 | 2   | 72508.73 | 20  |
| Intermediate Goods   | 574.5505 | 7   | 177403.8 | 7   | 96226.87 | 42  |
| Services             | -1028.48 | 11  | 306811.0 | 15  | 186367.5 | .03 |
| Total                | -536.650 |     | 686402.9 |     | 411497.7 |     |

The undervalued yen not only provided Japanese firms with a competitive cost advantage which has led to increases in market share, it also enhanced their non-cost position (such as quality and reliability of their products) which has enabled them to increase global market share.

#### The Pattern of Growth in Imports

The results of the analysis of imports is shown in Table 5. Positive deviations in imports indicate import substitution in the relevant sector. Thus, in 1965, import substitution was not a dominant force since there are few sectors with positive results. This appears to be the continuation of a situation that existed in 1955. The post-war recovery period and the establishment of its manufacturing base is likely to have made import substitution an inappropriate strategy at this time. However, by 1985, because of the increased technological sophistication that made Japan a leader in many high-tech industries, it was no longer dependent on the impact of technology. It had also shifted from the "import and copy" mode of the 50s, 60s and early 70s to become a leading technological actor in its own right. As a result, the proportion of imports as a percentage

of imports changed significantly in the 1980s. Another factor that changed import levels was the change in oil prices in the early 1970s. This had created large levels of imports, as seen in the 1977 figures (negative) in Table 5. By the 1980s, however, the economy had adjusted to this price and developed efficiencies that reached its oil needs from the levels of 1970s (Uno, p. 79). This helped in further reducing imports. This appears to be in accordance with the trend in other relevant indicators such as the disproportionately large current account surplus enjoyed by Japan. The current account surplus can be attributed to the macroeconomic consequences of the differences in total national savings rate in the United States and Japan and their effect on the yen/dollar rate of exchange. A long lasting current account surplus is capable of generating a vicious circle of international competitive gains for the EEC and the United States – a virtuous circle for Japan (Gray and Lundan 1992). *Ceteris paribus*, a surplus on current account implies a weaker national currency than would exist with balanced current account: a weaker currency provides a competitive edge for Japanese firms in competition with imports and in foreign markets and enhances their profitability. Many Western governments (including the United States) have attributed this low growth rate in imports to a series of structural import impediments that close the Japanese market to foreign products and to the intricate interrelations of the Japanese industrial system, especially the restraints that the *Keiretsu* (Japanese trading corporations) impose on imports (Lawrence 1991) and the perceived difficulty of establishing export outlets in Japan.

PATTERNS OF CHANGE IN IMPORTS  
(deviation from proportionate growth)  
(billion of yen)

TABLE 5

| Sector               | 1965     |     | 1975     |     | 1985     |    |
|----------------------|----------|-----|----------|-----|----------|----|
|                      |          | %   |          | %   |          | %  |
| Agriculture          | 1343.110 | 23  | 525.4512 | 91  | 8719.059 | 30 |
| Mining               | -482.869 | 78  | -24741.1 | 12  | 14161.38 | 15 |
| Food                 | 265.0668 | 15  | -2053.02 | 62  | 5300.667 | 20 |
| Textiles             | 47.61393 | 48  | -4329.73 | 78  | 1874.309 | 30 |
| Other Finished Goods | -401.592 | 102 | -29769.1 | 138 | 17672.49 | 61 |
| Intermediate Goods   | -260.858 | 15  | -59875.1 | 19  | 31911.19 | 33 |
| Services             | -82.7257 | 48  | -111856  | 22  | 65583.01 | 2  |
| Total                | 427.7469 |     | 232099   |     | 145222.1 |    |

(+) indicates import substitution.

Table 6 presents total sales of Japanese foreign manufacturing affiliates in multinationals. A high proportion of exports to industrialized regions from the Asian region were intra-firm.<sup>3</sup> These data reinforce Kreinin's (1988) evidence: Japanese MNCs have been using offshore sourcing and international (intra-firm) trade on a global basis. The much lower intra-industry trade in Japan than in Europe and North America is evidence of discrimination in trade and confirms the difficulty of establishing marketing networks in Japan.

TABLE 6

SALES OF FOREIGN MANUFACTURING AFFILIATES OF JAPANESE MNCs, 1988 \*  
(billions of yen)  
(Percentage intra-firm trade shares in parentheses)

| Producing Region | Destination Region |               |               |               |               | Total *        | Share (%) |
|------------------|--------------------|---------------|---------------|---------------|---------------|----------------|-----------|
|                  | Domestic           | Intra-Region  | Japan         | EC            | U.S.          |                |           |
| Asia             | 1752<br>(8.9)      | 409<br>(20.1) | 506<br>(76.5) | 146<br>(50.5) | 328<br>(58.1) | 3203<br>(27.8) | 30        |
| EC               | 1142<br>(19.0)     | 371<br>(19.0) | 18<br>(n.a.)  | <sup>b</sup>  | 13<br>(15.8)  | 1563<br>(18.5) | 15        |
| United States    | 3863<br>(3.1)      | 99<br>(12.2)  | 111<br>(n.a.) | 17<br>(59.5)  | <sup>c</sup>  | 41.6<br>(3.5)  | 40        |
| Other            | -                  | -             | -             | -             | -             | 1628           | 15        |
| Total            | -                  | -             | -             | -             | -             | 10500          | 100       |

\* Adapted from Gray and Lundan, "Japanese Multinationals and the Stability of the GATT System", unpublished paper, 1992.

<sup>a</sup> The total includes the rest of the world; the share of intra-firm trade is computed from the five regions and does not allow for intra-firm trade in the rest of the world.

<sup>b</sup> Sales within the EC are given as "domestic"; "intra-region" denotes "other Europe".

<sup>c</sup> Sales within the United States are given as "domestic"; "intra-region" denotes Canada.

n.a. = not available

Source: UNCTC (1991, pp. 44-46).

### Growth and Development in Technology

The immediate post-war period was a time of recovery and re-establishment of industry in Japan. It was also a period when old technology was being replaced or new technology was being obtained. This is reflected in the greater than proportionate levels of

<sup>3</sup> Gray and Lundan (1992) have pointed out that much of this trade can be better explained in terms of the economies of common governance.

growth attributable to improved technology. The undervalued yen provided Japanese firms with the opportunity to invest more intensively in competitiveness-enhancing activities such as R&D in product and process technology and technologically up-to-date physical plants. Advances in factory automation, robotization and computerization provided Japanese firms with a cost advantage initially and a quality advantage afterwards. Thus, in 1965, it can be observed (Table 7) that this was the case in all sectors with the exception of agriculture and food processing.

In 1975, however, we see that the extent of growth attributable to improved technology was less than proportionate in all sectors, indicating that this was a time when there were constraints on innovation. Since this was immediately following the 1973 oil crisis, the explanation might lie in the effects of the crisis. As Uno has noted, "the 1975 input-output table, therefore, represents the structure of the economy immediately after the Oil Crisis, and time was too short for any significant change in input structure to take place".

However, this adjustment and significant changes in technology appear to have taken place by 1985, when it is evident that improved technology had contributed to greater than proportionate growth in all sectors of the economy with the exception of agriculture and textiles.

Government policy was especially important in enhancing the international competitiveness of its industries. Milberg and Gray (1992) have concentrated on the importance of mandated investment expenditure (MIE) on international competitiveness. Specifically, they have pointed out that government policies can affect both the efficiency of a firm's mandated investment expenditure (minimum cost for maintaining market share) and the flow of funds available to finance these expenditures, thus directly increasing the international competitiveness of the firm. The undervalued yen has been a key contributing factor either to a lower rate of MIE or to a higher profit rate for Japanese firms. In both cases Japanese firms have taken full advantage of this opportunity and have invested these funds into additional R&D, new cost-cutting technologies and other non-cost factors such as quality, brand loyalty, etc. Other contributing factors are the ability of the MITI to carry out R&D projects, the ability of Japanese industry to integrate technology to the production processes, and the highly qualified, highly skilled labor force.



TABLE 7

PRODUCTION FUNCTION COEFFICIENT CHANGES IN TECHNOLOGY  
(Deviations from proportionate change in outputs)

| Sector               | 1965     |    | 1975     |     | 1985     |    |
|----------------------|----------|----|----------|-----|----------|----|
|                      |          | %  |          | %   |          | %  |
| Agriculture          | -3593.02 | 45 | -34560.4 | 60  | -3533.61 | 41 |
| Mining               | 2616.498 | 79 | -33943.6 | 60  | 2943.090 | 23 |
| Food                 | -1692.71 | 4  | -11754.2 | 14  | 538.8493 | 13 |
| Textiles             | 8849.882 | 89 | -30601.6 | 249 | -874.881 | 8  |
| Other Finished Goods | 11908.97 | 84 | -69865.9 | 21  | 13079.58 | 20 |
| Intermediate Goods   | 12483.89 | 45 | -156424  | 30  | 1542.568 | 47 |
| Services             | 13406.83 | 20 | -95996.4 | 75  | 11355.45 | 4  |
| Total                | 43980.34 |    | -433146  |     | 25051.04 |    |

### Summary of the Results

Japan, unlike many other industrialized countries, has successfully adjusted to external global forces and has capitalized on domestic strengths to achieve the growth rates that have been presented in this paper. Both the structure and the policies of Japan appear to deviate a great deal from the patterns of Western economies to enable researchers to explain the difference by using a single established economic theory. The success could be explained by using a mixture of neoclassical Schumpeterian theories of innovation and adjustment, and Keynesian/neo-Keynesian theories of aggregate demand management. A single theory alone would be unable to explain the complexity of the Japanese economic system. This paper has decomposed the growth of the Japanese economy and offered brief explanations as to the reasons for that growth. The analysis of the results indicates that, in 1965, there were about equal contributions to growth from final demand and improved technology, with lesser levels of contribution from import substitution. Exports, on the other hand, had a less than proportionate increase overall. In contrast, in 1975, most likely as a result of the oil crisis, final domestic demand, as well as import substitution and technology change, contributed less than proportionately to growth. It was the export sector that made the difference at this time, with every sector contributing greater than proportionately to growth by a large margin. This trend in exports continued in 1985 when it was joined by import substitution which is

found to have increased greater than proportionately in every sector. The increased friction between Japan and its major trading partners in the late 1980s resulted in a shift in focus from an export-led growth strategy to one in which FDI plays a dominant role (Gittelman and Dunning 1991). This new strategy is based on the establishment of "regional core networks". In addition to circumventing protectionist measures, this led to an increased export activity by Asian affiliates of Japanese firms of products which contain imports of intermediate goods from Japan. These affiliates own and operate mainly Japanese equipment.

The above results quantitatively confirm what has been stated elsewhere: much of Japan's growth came from trade. This growth was fueled by an undervalued yen and by successful creative "industrial tinkering" (Yamamura 1986). However, this study also highlights the major role played by import substitution and technological change in such growth. There may be lessons to be learned from these findings for the Western economies, especially in the light of recent discussions regarding the setting up of a "technology consortium" between government and industry, which have been supported by President Clinton. The rising real income of the Japanese consumer and the increased demand for new and improved products is having a pronounced effect on inward innovation. In fact, Japan is becoming a major initiator of the product cycle. This pressure on the domestic industry will not only improve but also stimulate its international competitive advantage, further enhance the Japanese market share in upscale products and increase intra-industry trade in manufactured goods.

## REFERENCES

- BALASSA, BELA (1978), "Exports and economic growth: further evidence", *Journal of Development Economics*, Vol. 5, No. 2, pp. 181-189.
- CAVES, R. and JONES, R. (1973), *World Trade and Payments: An Introduction*, Little Brawn, Boston, Massachusetts.
- CHENERY, H.B., SHISHIDO, S. and WATANABE, T. (1962), "The patterns of Japanese growth, 1914-1954", *Econometrics*, 30, pp. 98-139.
- EADS, GEORGE C. and KOZO, YAMAMURA (1987), "The future of industrial policy" in Kozo and Yasuba (eds.), *Political Economy of Japan*, Vol. 1, Stanford University Press, Stanford, California.
- GITTELMAN, MICHELLE and JOHN H. DUNNING (1991), "Japanese multinationals in Europe and the United States: some comparisons and contrasts", in Michael M. Klein and Paul J. Wolfens (eds.), *Multinational Enterprises in the New Europe and Global Trade*, Springer, New York, New York.
- GRAY, H. PETER and GRAY, JEAN M. (1988-89), "International payments in a flow-of-funds format", *Journal of Post Keynesian Economics*, Vol. 11, No. 2.
- GRAY, H. PETER and LUNDAN, SARIANA (1992), "Japanese multinationals and the stability of the GATT system" unpublished paper, Rutgers University, Newark, New Jersey.
- JOHNSON, H.G. (1962), *Money Trade and Economic Growth*, Allen and Unwin, London, pp. 99-103.
- JOHNSON, H.G. (1970), "The state of theory in relation to empirical analysis" in R. Vernon (ed.) *The Technology Factor in International Trade*, NBER, New York, New York.
- KREININ, MORDECHAI E. (1988), "How closed is the Japanese economy? Additional evidence", *The World Economy*, 11, pp. 529-542.
- KRUGMAN, PAUL R., ed. (1986), *Strategic Trade Policy and the New International Economies*, MIT Press, Cambridge, Massachusetts.
- LAWRENCE, ROBERT Z. (1991), "Efficient or exclusionist? The import behavior of Japanese corporate groups", *Brookings Papers on Economic Activity*, No. 1, pp. 311-330.
- MARSHALL, A. (1919), *Industry and Trade*, Macmillan, London.
- MILBERG, WILLIAM and GRAY, H. PETER (1992), "International competitiveness and policy in dynamic industries", in this *Review*, No. 180, pp. 59-80.
- OHLIN, B. (1967), "Reflections in contemporary international trade theories" in *Interregional and International Trade* (2nd rev. ed.), Harvard University Press, Cambridge, Massachusetts.

- OZAWA, TERUTOMO (1982), "A Newer Type of Foreign Investment in Third World Resource Development", *Rivista Internazionale di Scienze Economiche e Commerciali*, Vol. 29, No. 12, December.
- OZAWA, TERUTOMO (1991), *Journal of World Trade Law*, Vol. 25, No. 1, February.
- PORTER, MICHAEL (1990), *The Competitive Advantage of Nations*, Free Press, New York, New York.
- SATO, K. (1982), "Japan's saving and internal external macroeconomic balance" in K. Yamamura (ed.), *Policy and Trade Issues of the Japanese Economy*, University of Washington Press, Seattle, Washington.
- UNO, K. (1989), *Measurement of Services in an Input-Output Framework*, Elsevier Science Publishers B.V., Amsterdam, Holland.
- VOGEL, E. (1979), *Japan as Number One: Lessons for America*, Harvard University Press, Cambridge, Massachusetts.
- YAMAMURA, KOZO (1986), "Caveat emptor: the industrial policy of Japan", in Paul R. Krugman (ed.), 1986.