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INTERNATIONAL COMPARATIVE ANALYSIS OF ECONOMIC GROWTH: TRADE LIBERALIZATION AND PRODUCTIVITY

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I. IDENTIFYING THE ISSUES

MODERN economic growth, a phenomenon first experienced by Britain in the eighteenth century, has been experienced by a number of countries in the course of the twentieth century. According to Maddison's estimates [25], the world's GDP continued to grow at an average annual rate of 3 per cent in the first eighty-seven years of this century. Since 1950, in particular, many developing countries, along with advanced capitalist countries, have been registering high economic growth. But they have not posted high growth rates uniformly. The rates have varied, and according to the United Nations [33], the growth rate gap has been persistently widening instead of closing (Fig. 1).

These international income disparities exist not only between advanced industrial countries and developing countries but also among developing countries. These gaps are particularly conspicuous between the Asian region that entered a rapid economic growth phase in the early 1970s and the Latin American region whose economy has stagnated since the mid-1970s. Figure 1 shows the trends of average national incomes per capita (in the PPP equivalent) and coefficients of variation (standard deviation / mean) of Asian countries,[1] Latin American countries,[2] and OECD member countries.[3] In terms of average national income per capita, the figure clearly presents a contrast between the briskly advancing Asian countries with their growth in income per capita accelerating in the 1980s on the one

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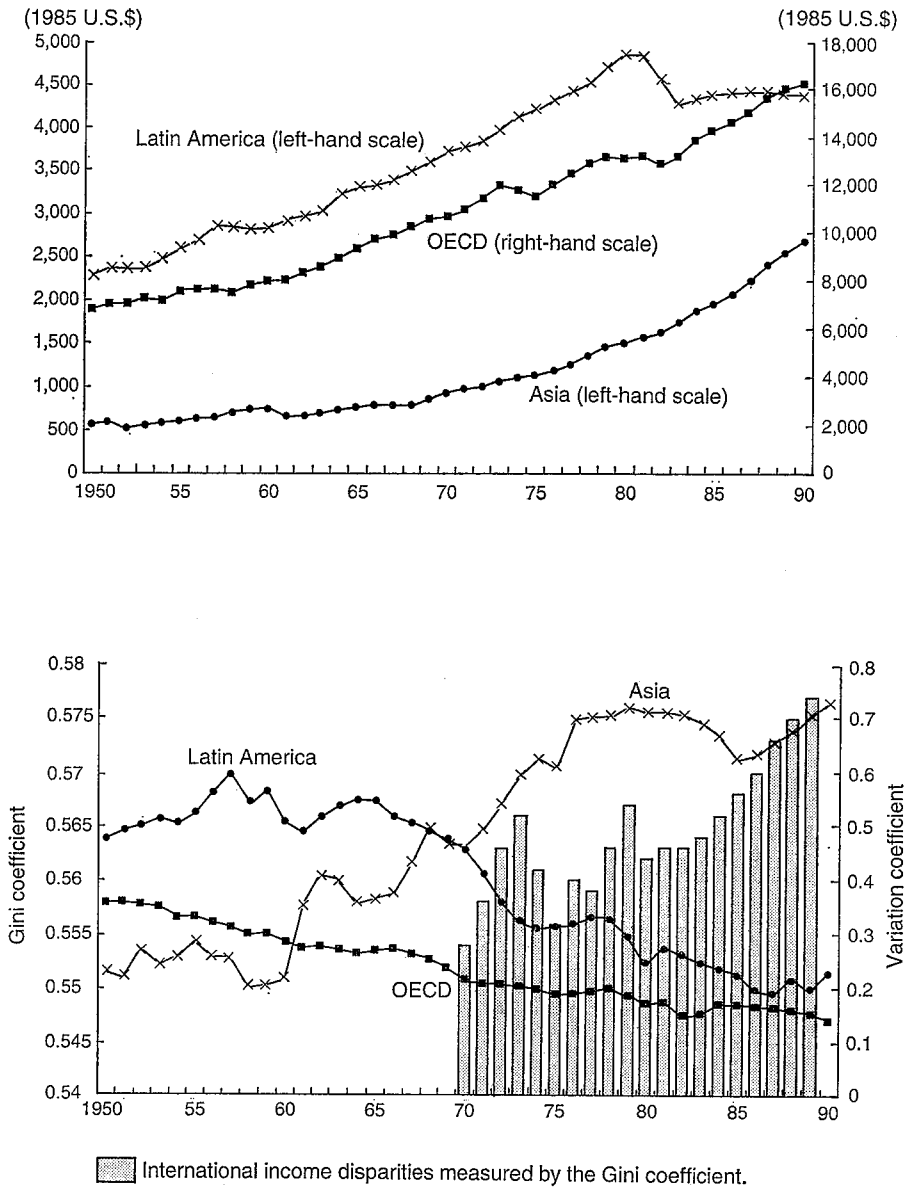
1 The following nine Asian countries are dealt with in this paper: China (CHN), India (IND), Indonesia (IDN), Republic of Korea (KOR), Malaysia (MYS), Philippines (PHIL), Singapore (SGP), Taiwan (TWN), and Thailand (THA).

2 The following seven Latin American countries are dealt with in this paper: Argentina (ARG), Brazil (BRA), Chile (CHL), Colombia (COL), Mexico (MEX), Peru (PER), and Venezuela (VEN).

3 The following twelve OECD countries are dealt with in this paper: the United States (USA), Australia (AUS), Belgium (BEL), Canada (CAN), Germany (DEU), Finland (FIN), France (FRA), United Kingdom (GBR), Greece (GRC), Japan (JPN), Norway (NOR), and Sweden (SWE).

Fig. 1. Trend of GDP per Capita and Its Distribution



Source: [33].

hand and the stagnant Latin American countries on the other. It can also be observed from the coefficients of variation that dispersion has grown over time among Asian countries while it has tended to diminish among Latin American countries as well as among OECD countries. This shows that national economic growth has varied among Asian countries though the region as a whole is experiencing rapid growth.

The issue of diversity in economic growth performance has attracted the academic attention of a number of researchers who have already undertaken a large amount of research. They have pointed out aspects of government economic policies, particularly trade policies, as an important factor having generated growth rate dispersion. While high-performing Asian economies (HPAEs) which have followed a relatively neutral export-oriented trade policy have been able to enjoy the benefits of a virtuous cycle—increases in exports, imports, and investment and a rise in productivity—, Latin American countries and other Asian countries which opted for import substitution policies oriented toward the domestic markets, have been trapped in a vicious cycle characterized by inflation, stagnant exports, imports, and investment, and slow productivity growth. These two sharply contrasting growth patterns cannot be explained totally by trade policy differences. But it is sufficiently clear that the basic orientation of trade policy—export-oriented or import-substituting—makes a significant difference in economic growth.

The purpose of this paper is to statistically verify whether or not trade policy has had a significant impact on economic growth diversity in Asia and Latin America. A number of research papers are available on the relationship between trade policy and economic growth. This paper intends to make a contribution to the existing stock of knowledge by (1) comparing total factor productivities (TFP) between countries and between points in time using comparable long-term data and (2) analyzing policy changes over time and country variations using unified trade policy indices.

Section II will analyze factors responsible for growth gaps between Asian and Latin American countries using a growth accounting method, and thus point out the importance of TFP. Section III will deal with government policies focusing on trade policies in order to show that the governments of the two regions followed diametrically opposed policies in the 1980s. Section IV will examine theoretically the relationship between trade policy and TFP and make an empirical analysis to show that the effects of trade policy differ in accordance with the stage of development of the economies concerned. Section V presents this study's conclusions and provides prospects for future development.

II. INTERNATIONAL COMPARISON OF ECONOMIC GROWTH AND PRODUCTIVITY

In this section, factors of economic growth between Asian and Latin American countries in the 1970s and 1980s are compared in order to explain why growth rate and income level gaps arose between these two groups of countries which followed different growth patterns. The growth accounting method is used for

this comparison.[4]

A. *Growth Accounting Analysis*

Differentiating nominal GDP by time produces equation (1) from the point of factor contributions.

$$\frac{d\ln P_{GDP}}{dt}+\frac{d\ln GDP}{dt}=V_L\left(\frac{d\ln W_L}{dt}+\frac{d\ln L}{dt}\right)+V_K\left(\frac{d\ln W_K}{dt}+\frac{d\ln K}{dt}\right), \tag{1}$$

where

P_{GDP} = GDP deflator,[5]
GDP = GDP in real terms,
W_L = labor prices,
W_K = capital prices,
V_L = labor share in value added,
V_K = capital share in value added, and
t = time.

The growth rate of TFP as defined by the ratio of total output to total input is given by:

$$\frac{d\ln TFP}{dt}=\frac{d\ln GDP}{dt}-V_L\frac{d\ln L}{dt}-V_K\frac{d\ln K}{dt}. \tag{2}$$

Therefore, the growth rate of GDP is given by:

$$\frac{d\ln GDP}{dt}=V_L\frac{d\ln L}{dt}+V_K\frac{d\ln K}{dt}+\frac{d\ln TFP}{dt}, \tag{3}$$

which can be broken down into three factors: (1) labor contribution, (2) capital contribution, and (3) TFP contribution.[6]

It is possible to analyze factors of inter-regional (inter-country) GDP differentials in a similar manner.[7] The TFP differential between regions (countries) is obtained by:

$$\frac{d\ln TFP}{dk}=\frac{d\ln GDP}{dk}-V_L\frac{d\ln L}{dk}-V_K\frac{d\ln K}{dk}, \tag{4}$$

where k represents a country. Also, the GDP differential between regions (countries) is given by:

$$\frac{d\ln GDP}{dk}=V_L\frac{d\ln L}{dk}+V_K\frac{d\ln K}{dk}+\frac{d\ln TFP}{dk}, \tag{5}$$

[4] Ikemoto [17] did a pioneering study on developing countries using this method.
[5] This deflator reflects post-indirect tax GDP.
[6] Factor analysis of the price (cost) is also possible in the same manner. See Kuroda, Kawai, and Shimpo [22].
[7] This method has been frequently applied since Jorgenson and Nishimizu [20] first used it to compare Japan and the United States.

which can be broken down into the same three factors as in equation (3).[8]

The above method is a factor decomposition of GDP growth (differential) based on the definition of accounting. This analysis can be linked to the optimal behavior of producers. Assuming linear homogeneity of production function and producers' profit optimization behavior, the TFP growth (differential) rate represents a shift of production function. However, in general a perfect market and linear homogeneity of production function as well as the stability of macro production function cannot be assumed. TFP calculated as the residual certainly must include a variety of elements other than technical change. Other such elements enumerated in the existing studies include: (1) qualitative improvements in labor and capital input (e.g., improvement of educational level and changes in the vintage of capital stock), (2) economies of scale, (3) imperfect product and factor markets, (4) quasi-fixity due to the immobility of factors of production, and (5) X-inefficiency due to government regulations.

B. *Diversity in Growth Patterns and Productivity*

In conducting growth accounting analysis of Asian and Latin American countries in the 1970s and 1980s, comparable long-term data (1950–90) were compiled for twenty-eight countries, nine in Asia, seven in Latin America, and twelve OECD countries. In estimating the growth and differential rate of TFP, a general formula[9] without imposing the strong assumptions of production technology was used.[10]

Figure 2 shows the results of GDP growth factor analysis for Asian and Latin American countries in the 1970s and 1980s. In this figure, Asian and Latin American countries are arranged in the order of growth rate from 1960 through 1990. The columns show the shares contributed by the three factors (labor, capital, and TFP from bottom to top) to GDP growth. Their total corresponds to the GDP growth rate shown by the line connecting the tops of the columns.

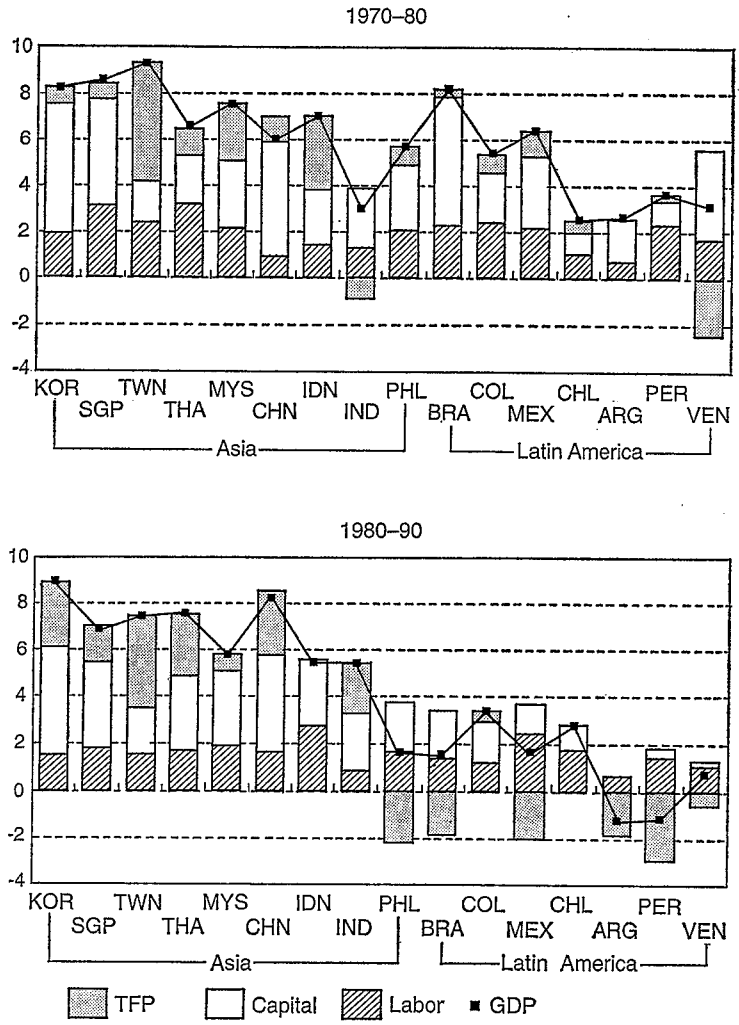
Two features stand out concerning GDP growth rates. The first is the sharp contrast between Asian and Latin American countries. In the 1970s, the GDP growth rate of Asian and Latin American countries, with the exceptions of India, Brazil, Colombia, and Mexico, reached 5 per cent per annum. In the 1980s, however, while all Asian countries, except the Philippines, either maintained their previous growth rates or showed accelerated growth, the rates for all Latin American countries fell, with the growth rates for Argentina and Peru registering minus values. The second feature is the various growth patterns among Asian

[8] In this case, too, factor analysis on a price (cost) basis is possible.

[9] The temporal and inter-country differentials of TFP are calculated with a translog index. When comparing three or more countries, a slight modification of indices is required in order to maintain consistency. See Caves, Christensen, and Diewart [5].

[10] In most international comparative studies, several estimation methods based on Cobb-Douglas-type production-function parameters (Solow residual, Mankin residual, and Bhalla residual) are used. This is due to limited data availability. But in this study, I have sufficient data about capital stock, and I thought it would be better to use a non-parametric estimation method which does not assume theoretically and empirically poorly equipped production functions. See Edwards [10] and Fisher [12].

Fig. 2. Growth Factor Analysis of Asian and Latin American Countries

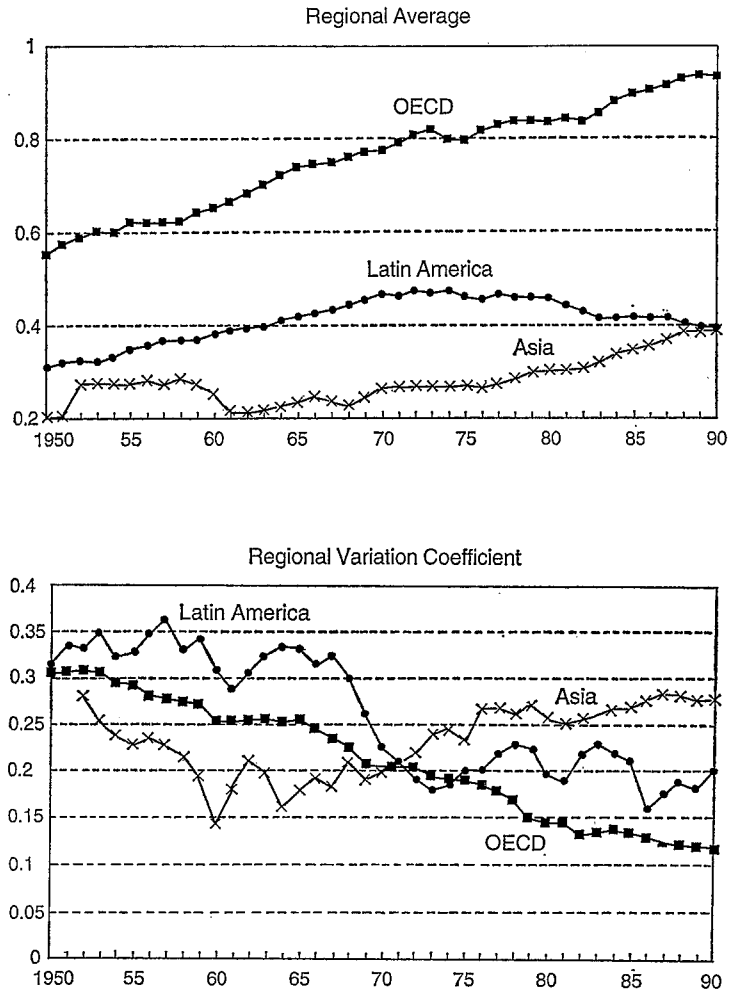


Sources: Calculated by the author based on [31] [36, various issues] and others.
Note: The scale shows average annual growth rates.

countries. The GDP growth rate for India and the Philippines dipped to 4 per cent while the others enjoyed a high growth rate. Moreover the Philippines in the 1980s remained low.

When examining explanatory factors for these growth differentials, it was found that the contributions of capital accumulation and TFP differed greatly among countries while the contribution of labor was about the same for all countries. It has

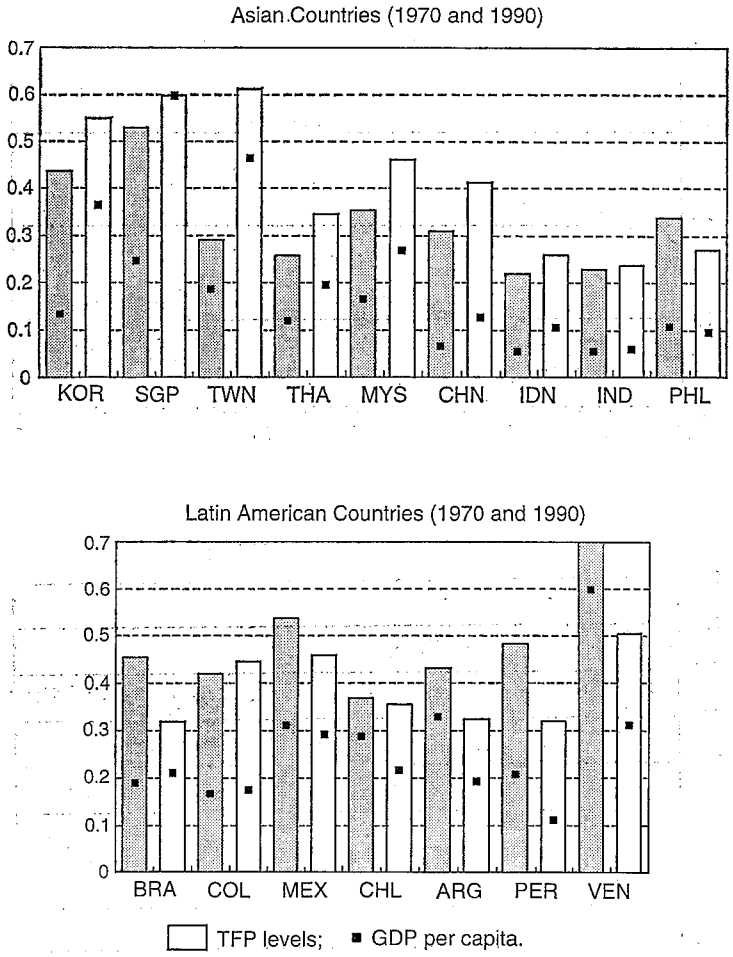
Fig. 3. Level and Distribution of TFP



Sources: Calculated by the author based on [31] [36, various issues] and others.

been said in existing studies that factor input is very important in explaining inter-country production variation [7] and that capital accumulation, in particular, is the most important element in explaining rapid growth for developing countries [27] [6]. There is no denying that capital accumulation was an important factor that explains the sustained growth of Asia and the stagnation of Latin America in the 1970s and 1980s. However, TFP is also an important factor explaining the contrasting growth pattern between Asia and Latin America. In the 1980s, the

Fig. 4 Comparison of TFP Levels and Levels of GDP per Capita



Sources: Calculated by the author based on [31] [36, various issues] and others.

element of TFP growth was of positive important in Asian countries such as the Republic of Korea, Singapore, Taiwan, Thailand, China, and India but was negative in Latin America, particularly in Brazil, Mexico, Argentina, and Peru.

C. *International Comparison of TFP Levels*

When comparing economic growth patterns of the countries, the stage of income level differentials are as important as income growth rate differentials. A few past studies found productivity differentials important in explaining income-level differentials. International productivity differentials are measurable by inter-country

TFP differentials as defined above by equation (4). When comparing productivity among countries, it is necessary to have some comparable national account data sets. In this analysis, such data have been taken from Summers and Heston [31]. Productivity differential indices were made taking U.S. productivity as 1 and converted into annual TFP levels using the TFP growth rate of each year.

The trend of regional productivity levels is shown in Figure 3. The trend of the average productivity level and of the regional coefficients of variation show that the average productivity level of Asian countries rose steadily after 1970 to reach the Latin American average in 1990. During the same period, however, the inter-country differentials in Asia increased. Meanwhile, Latin American countries saw their productivity uniformly rise from the mid-1960s through the mid-1970s resulting in the narrowing of inter-country disparities. But after 1975 they suffered from declining average productivity which eventually dropped to the level of the early 1960s.

Figure 4 shows the change over time of the TFP levels in Asian and Latin American countries. In this figure, the columns represent TFP levels and the dots GDP per capital, both indicating individual country levels as against 1 for the United States in each year. In Asia, the so-called NIEs, such as Korea, Singapore, and Taiwan, rapidly raised their TFP level to 60 per cent of the U.S. level (90 per cent of Japan's level) by 1990, while Thailand, Malaysia, and China attained a 40 per cent level. Meanwhile the TFP indices remained low for India and Indonesia. The Philippines showed a relative decline in its TFP index. Latin American countries, except for Colombia, suffered a relative decline in productivity. For this reason, most of them showed lower productivity than Asian countries by 1990. In 1970 most of the Latin American countries had higher productivity than their Asian counterparts.

III. TRADE POLICY AND ECONOMIC GROWTH

A. *Trade Policy and Economic Growth*

The persistent disparity in economic growth has attracted the theoretically attention of many researchers as a counter example of the neoclassical growth model introduced by Solow [30]. This is because the neoclassical model posited that the growth rates of all countries will converge in the long term if they have the same consumer preferences, the same production technology, and the same technological progress. Though some studies corroborated this convergence among developed countries,[11] most past data indicate that the income disparities between developed countries and developing countries as well as among developing countries themselves have tended to expand. The importance of government economic policies is often pointed out as a cause for this dispersal of growth rates.[12]

Government economic policies promoted in developing countries are categorized into policies for (1) the provision and improvement of human resources and material infrastructure, (2) abolition of price regulation on the domestic market,

[11] See Baumol [3] and Baumol and Wolff [4].
[12] See Barro [1], Barro and Sala-i-Martin [2], Mankiw et al. [26].

(3) stability of macroeconomic policies, (4) liberalization of domestic financial transactions, and (5) liberalization of trade and capital operations. Many studies are now available on the relationship between these policies and economic growth. The IMF report [18], for instance, argues that countries with stable macroeconomic policies, liberalized trade policies, and the least financial distortions (positive real interest rates) are more likely to enjoy rapid capital formation and TFP increase, and thus to achieve higher growth than other countries. Among many policy instruments, trade policy and capital liberalization policy are considered the most important ones conducive to long-term economic growth.[13]

Trade and capital liberalization influences the product and factor markets of developing countries in various ways. Removal of trade barriers through liberalization certainly increases exports and imports on the product market, and stimulates the inflow of foreign funds and foreign direct investment (FDI). These are some of the direct effects of liberalization. More important than these, however, are the indirect effects from externalities and interindustry flow. But whether these effects are significantly large and sustained depends on whether increases in trade and direct investment lead to improvement in productivity. If an increase in trade due to trade liberalization and an expansion of the capital market due to capital liberalization are conducive to higher productivity, product demand will certainly increase on the domestic and overseas markets, and investment demand will also rise on the capital market with more foreign funds flowing in and the marginal efficiency of capital rising further. The increase in exports and imports as well as investment can be expected to bring about a multiplier effect on national income. Studies by Maddison and other researchers on quantitative economic history as well as more recent works by Levine and Renelt [24] identified a virtuous cycle of economic growth involving such key variables as exports-imports, direct investment, capital formation, productivity, and national income. In this study trade expansion is considered a key factor inviting the rise of a virtuous cycle.[14]

B. *Trade Policies and Economic Growth in Asian and Latin American Countries*

Asian and Latin American countries with sharply contrasting economic growth patterns seem to have followed diametrically opposite trade policies. In this section, their trade policies will be classified into a number of categories which will be used to examine the change in their trade policies over time as well as the relationships between their trade policies and economic growth.

[13] For instance, Fukuda and Toya [13] say that contrary to the result of Mankiw et al. [26], the convergence thesis does not apply when human resources are regulated, but the validity of the thesis is statistically confirmed when the export-import ratio is controlled.

[14] If the major motive power for growth is the development of knowledge and the progress of technology as Maddison [25] pointed out, knowledge transfer and increased incentives for technological development brought about by trade expansion will not only spur knowledge-rich equipment investment but also will lead to sustained capital accumulation if only to avoid a decline in capital profitability, and thus will bring about sustained economic growth. Trade liberalization policies and open markets may thus be an important factor introducing the virtuous cycle of economic development.

Table I gives several indices of economic achievement and indices related to trade policies. Table II provides a picture of the changes in trade policies of the countries concerned. There are a number of methods and indices used to categorize trade policies. Here, trade policies are categorized based on the rate of contribution of import substitution (X_{IS}) and that of export demand (X_{EP}) to the GDP growth rate. X_{IS} and X_{EP} are obtained through the following equation:

$$X_{IS}=(1-\bar{S}_{EX})\frac{\dot{d}}{d}\Big/\frac{\dot{GDP}}{GDP}, \quad X_{EP}=\bar{S}_{EX}\frac{\dot{EX}}{EX}\Big/\frac{\dot{GDP}}{GDP}, \tag{6}$$

where $S_{EX}=EX/GDP$ and $d=1-IM/(CP+CG+IP)$; CP = consumption expenditure, CG = government expenditure, and IP = gross private domestic capital formation.

In Table II, the trade patterns of the sampled countries are classified into nine groups based on the rates of contribution of export demand and import substitution; the contribution rates are each subdivided into three brackets. The further to the right a country is in the table, the higher the contribution of exports; similarly, the higher a country is, the heavier the dependence on imports. Thus, the countries at the bottom-left corner follow inward-oriented policies; conversely, the countries located at the top-right corner are those with large exports and imports, and which follow outward-oriented policies. Asian countries are placed on the left side and Latin American countries on the right side of each cell. This table brings out several points. First it indicates a clear linkage between economic growth and trade patterns. The Asian countries which experienced rapid growth in the 1980s (Singapore, Taiwan, Korea, Thailand, and Malaysia) are all located at the top-right corner, meaning that they have been outward-oriented, while stagnant Asian countries (India and Indonesia) are located at the bottom-left corner, meaning that they have been inward-oriented. Latin American countries are all inward-oriented, either in the small import-export category (Argentina and Peru) or in the small import category (Mexico, Brazil, Chile, and Colombia). It can also be seen from the table that the high growth NIEs were not originally export-oriented. With the exception of Singapore, they were inward-oriented in the 1950s and 1960s, but shifted in stages to an outward-oriented position during the 1970s and 1980s. The third thing that emerges from this table is that there are countries like the Philippines which opted for outward-oriented policy but suffered from slow growth.

These trade policy categories are based merely on observed trade patterns, and they do not mean linkages between the achievement and the implementation of direct policy instruments such as tariff policy and foreign exchange policy. It is however highly possible that countries with successful export achievement are those governments followed outward-oriented policy instruments. In order to identify such linkages, the trade patterns with a series of trade policy indicators will be compared. Table I gives three indices: the Leamer index based on trade dependence (*open*) [23], the Doller index based on the domestic/world price difference (*pdifw*) [8], and average tariff rate (*rtaxm*), and Greenaway's index

TABLE I

ECONOMIC GROWTH RATES AND TRADE POLICIES

		GDP (%)	*TFP* (%)	*Ip* (%)	*EX* (%)	P_{GDP} (%)	*open* (%)	*Leamer*	*pdifw*	*Doller*	*fdi/ip* (%)	*rtaxm* (%)	*WDR87*
Asian countries:													
KOR	1970–80	8.3	0.7	27.2	16.8	18.4	58.9	1.234	0.625	0.933	1.4	7.2	4
	1980–90	8.9	2.8	12.8	9.5	5.1	71.4	1.228	0.742	1.009	0.4	7.7	
SGP	1970–80	8.6	0.7	4.7	4.7	5.1	302.3	1.526	1.037	1.148	12.7	1.4	4
	1980–90	6.8	1.6	8.6	8.8	1.7	362.4	1.625	1.014	1.064	24.4	0.6	
TWN	1970–80	9.3	5.1	18.9	13.6	7.5	86.8	1.097	0.624	0.770	−1.6	10.2	
	1980–90	7.4	3.9	12.1	9.0	2.7	97.4	1.177	0.779	0.927	2.7	6.4	
THA	1970–80	6.5	1.2	8.6	8.3	6.2	42.8	1.175	0.459	0.785	2.2	15.8	3
	1980–90	7.5	2.6	13.2	11.8	3.4	58.1	1.393	0.420	0.722	3.9	11.6	
MYS	1970–80	7.6	2.5	4.6	6.8	4.9	87.8	1.644	0.667	0.940	11.8	9.8	3
	1980–90	5.8	0.7	10.3	9.4	1.6	117.9	1.830	0.590	0.810	10.9	6.0	
CHN	1970–80	6.0	1.1	4.8	7.7	−0.3	9.1	0.433	0.480	0.900		13.2	
	1980–90	8.3	2.8	11.0	10.9	5.8	22.8	1.016	0.220	0.456	1.0	13.1	
IDN	1970–80	7.0	3.1	9.6	8.0	35.5	41.8	1.753	0.515	1.089	3.8	8.7	2
	1980–90	5.5	−0.1	2.8	1.3	8.4	47.9	1.753	0.426	0.849	1.7	3.9	
IND	1970–80	3.0	−0.9	7.7	5.5	13.0	12.1	0.719	0.483	1.089	−0.0	42.4	1
	1980–90	5.4	2.1	3.4	5.1	70.3	16.0	0.826	0.393	0.931		59.2	
PHL	1970–80	5.7	0.8	3.0	6.2	7.5	45.8	1.134	0.468	0.802	0.7	16.2	2
	1980–90	1.6	−2.2	6.5	3.1	7.9	51.8	1.044	0.460	0.866	3.2	13.0	

TABLE I (Continued)

		GDP (%)	*TFP* (%)	*Ip* (%)	*EX* (%)	P_{GDP} (%)	*open* (%)	*Leamer*	*pdifw*	*Doller*	*fdi/ip* (%)	*rtaxm* (%)	*WDR87*
Latin American countries:													
BRA	1970–80	8.2	0.4	4.6	8.6	11.4	17.0	0.894	0.692	0.929	4.5	11.6	3
	1980–90	1.5	−1.9	2.5	6.2	14.9	17.3	0.718	0.639	0.899	2.7	5.4	
COL	1970–80	5.3	0.8	9.3	5.1	31.3	29.9	0.966	0.545	0.857	1.5	10.5	2
	1980–90	3.4	0.4	4.0	5.5	284.3	28.7	0.800	0.532	0.896	6.1	13.5	
MEX	1970–80	6.4	1.1	1.4	7.3	17.5	17.3	0.769	0.638	0.796	3.6	8.9	2
	1980–90	1.6	−2.1	10.6	6.6	24.8	28.2	1.048	0.542	0.726	3.7	6.1	
CHL	1970–80	2.5	0.5	8.0	8.9	129.9	39.3	1.015	0.769	1.072	−1.1	9.6	3
	1980–90	2.8	−0.1	4.8	5.0	20.5	55.8	1.264	0.646	1.030	5.7	9.5	
ARG	1970–80	2.6	0.1	4.7	4.2	78.4	18.3	0.620	1.167	1.427	0.6	17.7	1
	1980–90	−1.2	−1.6	1.4	5.3	395.2	22.0	0.595	0.871	1.222	8.0	13.4	
PER	1970–80	3.7	0.3	1.6	2.7	20.6	35.8	1.083	0.666	1.003	1.3	12.3	1
	1980–90	−1.1	−3.0	0.3	−0.7	233.9	31.2	0.790	0.585	1.031	0.4	15.1	
VEN	1970–80	3.1	−2.4	−9.5	−7.6	10.4	46.8	1.107	0.718	0.720	−1.0	7.0	
	1980–90	0.7	−0.6	1.8	2.1	19.3	46.2	0.842	0.730	0.840	0.3	19.7	

Sources: Calculated by the author based on [36, various issues] and others.

Notes: 1. The following have been used as indicators of economic growth: the average annual growth rates of *GDP, TFP, Ip* (gross private domestic capital formation), *EX* (export), and P_{GDP} (GDP deflator).

2. The following have been used as indicators of trade policy: *open* (rate of dependency on trade), *Leamer* (Leamer's openness index), *pdifw* (price level as against 1 for the world average), *Doller* (Doller's openness index), *fdi/ip* (share of direct investment in private investment), *rtaxm* (tariff rate), and *WDR87* (Greenaway's openness index).

3. Regarding the *WDR* index, 4=strongly outward-oriented, 3=moderately outward-oriented, 2=moderately inward-oriented, and 1=strongly inward-oriented [34, p. 83].

TABLE II

CHANGING TRADE PATTERNS

	Exports small	14%	40%		Exports large
Imports large		BRA6	KOR6, TWN6	ARG7	MYS5
−15%		ARG8, PER8			KOR7, SGP7, TWN7 SGP8, TWN8, THA8, MYS8, PHL8
	IND5 THA6 IND7	ARG6 MEX7, VEN7	THA7, PHL7	COL7, PER7	MYS7 KOR8
−1%					MEX8, BRA8, CHL8 VEN8
	KOR5, TWN5, THA5 IND6	BRA7	PHL5 PHL6		MYS6
Imports small	IDN8, IND8		CHN8	COL8	

Source: Compiled by the author.

Notes: 1. The acronyms in the table follow the World Bank's abbreviation method.
2. The affixed figures designate decades (8 is for the 1980s).

used in the World Bank's *World Development Report, 1987* (*WDR*87) [34]. The Leamer and Doller indices need to be used carefully when making international comparisons as they allow a large margin of estimation errors. But even with this shortcoming, it is significant that these two indicators largely correspond to trade pattern variations though some mismatches are found. Korea, Singapore, and other countries whose trade policies were oriented toward export promotion show high Leamer figures. Their Doller figures are close to 1. This shows that these countries were following more open and neutral policies than were other countries. By contrast, the Leamer indices read low and the Doller indices deviate greatly from 1 for India, Argentina, Brazil, and other countries with import substitution policies. This means that these countries had more closed and more skewed policies than the above-mentioned Asian countries. Also, scrutiny of the relationship between the indirect indicators based on trade patterns and the direct trade policy indicators corroborates that there is a significant correlationship and that the former do reflect trade policy variations.

IV. TRADE AND CAPITAL LIBERALIZATION POLICY AND PRODUCTIVITY

The effectiveness of trade policy for developing countries depends on whether it is accompanied by productivity improvement. In this section, the relationships between trade-capital liberalization and productivity change are examined theoretically and empirically.

A. *Relationship between Trade-Capital Liberalization and Productivity Change*

Trade and capital liberalization influences productivity through various channels. At the level of individual enterprises, abolition of official regulations on the product market because of trade-capital liberalization can bring about productivity growth through (1) allowing enterprises to achieve economies of scale by taking advantage of market expansion, (2) enabling them to absorb technologies and knowledge through their participation in foreign markets, through importation of products incorporating advanced foreign technologies, and/or through foreign-invested ventures, (3) pressuring them to reduce X-inefficiency in order to cope with competition from foreign enterprises, and (4) forcing them to refrain from rent-seeking behavior. At the market level, trade and capital liberalization (5) spreads higher productivity through interindustry transaction "spillover effects," (6) helps achieve efficient resource allocation as the national price level comes close to the international price level, (7) enables the country to import advanced capital goods as its exports expand removing foreign exchange constraint, all these leading to an increase in productivity. Over the long-term such dynamic benefits as (8) learning effects and (9) "externality in R&D" [14] will be brought about. On the other hand, trade and capital liberalization can also have a negative impact on productivity. A sharp increase in imports in the wake of liberalization, by forcing adjustment in human and material capital, may lower plant operation rates and generate sunk costs, which mean the lowering of productivity. Productive efficiency may also drop in situations where foreign enterprises display their

overwhelmingly strong competitiveness and exercise their monopoly power over the domestic market. Many empirical studies have been done on the relationships between trade-capital liberalization and productivity, and there are papers that provide general surveys of the existing studies.[15] From these studies it can be said that (1) while trade expansion certainly has the effect of accelerating economic growth, it is not clear whether this leads to improved productivity, and (2) that while trade policy is considered the most important policy tool for the industrialization of developing countries, export promotion policies are superior to import substitution policies as a means of stimulating economic growth.

B. *Model*

In the following analysis, a basic model is introduced to statistically elaborate the relationship between the variation of TFP growth rates and trade policies. This model uses as explanatory variables not only the trade policy indicators (X_{IS}, X_{EP}) but also the benefits of late starters and the stability of macro policies, both which are factors influencing the rates of TFP change in significant ways.[16]

$$\ln\frac{TFP_{k,t}}{TFP_{k,t-1}} = a_0 + a_{GAP}\ln\frac{TFP_{US,t}}{TFP_{k,t-1}} + a_P\ln\frac{P_{k,t}}{P_{k,t-1}} + a_{OPEN}OPEN_{k,t} + \varepsilon_{k,t}, \tag{7}$$

where

$TFP_{k,t}$ = TFP level of country k in period t,
$TFP_{US,t}$ = TFP level of the United States in period t,
$P_{k,t}$ = price level in country k in period t,
$OPEN_{k,t}$ = trade indicator of country k in period t, and
$\varepsilon_{k,t}$ = errors.

In the above equation, the second term on the right side is the one related to the benefit of late starters. The larger the gap at a given time between a country's productivity and that of the United States which has the world's highest productivity, the larger the benefit of technological transfer through trade and capital investment [9] [16]. Other conditions assumed constant, the technological gap coefficient represents the speed of catch-up. If this coefficient takes a positive value, it means that the technological levels of the countries concerned are converging. If it takes a negative value, the levels are diverging. The third term indicates the effect of instability in macro policies. It has been noted that some of the Asian and Latin American countries with lower GDP and TFP growth rates have suffered from drastic inflation coupled with currency instability despite their outward-oriented policies. This suggests that instability in macroeconomic policies may negatively influence economic growth and productivity change. Kormendi and Meguire [21] and Fisher [12] as well as other authors have pointed out the importance of

[15] Representative studies in this area are those by Pack [28], Jen [19], Tybout [32], Harrison [15], Rodrik [29], and Edwards [10].

[16] The vintage of capital stock is also an important explanation variable, but I cannot estimate it because of insufficient capital-stock-age data for developing countries.

stability in macro policies. In this study, inflation rate is used as the typical proxy variable for macro policy instability. Assuming other conditions remain constant, the effects of inflation reduce TFP growth; therefore its coefficient would be negative. The fourth term relates to trade policies, and taken into consideration here are the factor of import substitution effects (X_{IS}), the factor of export promotion effects (X_{EP}), and the ratio of foreign direct investment to domestic capital formation, the last being the factor indicating the degree of capital liberalization. The coefficient would be positive if either import substitution or export promotion contributes to productivity enhancement. This coefficient would also be positive where increased foreign direct investment accompanying capital liberalization leads to higher productivity.[17]

C. *Results of the Analysis*

The effects of trade policy on productivity will now be investigated based on the above basic model using a database which pools 1950–90 micro data for the previously mentioned twenty-eight countries. The samples will be divided into several groups in order to test the robustness of the model and to verify several hypotheses. The estimation results from this model are given in Table III.

Looking first at the basic model, an examination of the estimation results shows that the inflation rate indicating the degree of instability of macro policies has a significantly negative effect on productivity while the effect of the advantage for late starters has a positive effect. This shows that the productivities of the countries under study tend to converge if the conditions of trade policies and macro policies are constant.

Such results were expected. But it is necessary to check further for the effects of trade policies. The estimation results show that export promotion policies do have a significantly positive effect on TFP, but import substitution policies do not. It can also be concluded that an increase in FDI, rather than being favorable, has a rather negative effect on productivity, and that these conclusions are not altered even if other variables from the basic model is dismissed. Many other studies in this area have established the merits of export promotion policies. But why does an increase in FDI not contribute to productivity? Possible reasons are that FDI leads to oligopoly and that technologies transferred are labor-intensive and not the most advanced. It is also possible that there is a latent period before foreign investment brings about productivity increase. In this respect, it would have been better to have taken the stock-basis share of foreign capital instead of the flow-basis share. There are also statistical problems. The test statistics concerning heteroskedasticity defined by White show that the hypothesis of identical disturbance cannot be accepted in any cases on Table III. This heteroskedasticity indicates the existence of omitted variables, and the estimation results may have biases due to this.

[17] This specification may cause some biased estimation from the simultaneous equation bias. From the Granger's causality test, the effects of the trade policy variable (X_{IS}, X_{EP}, and X_{FDI}) and inflation on TFP growth are significant, but the opposites are insignificant. This means the simultaneous bias should be small.

TABLE III

RESULTS OF ESTIMATIONS FROM BASIC AND REGIONAL MODELS

	Constant	T_{GAP}	GP_{GDP}	X_{IS}	X_{EP}	X_{FDI}	NUM, R^2	$DW, White$
Checking the basic model:								
1	0.01007			−0.07089	0.24494	−0.00109	763	1.411
	7.067			−0.838	4.594	−4.683	0.076	27.075**
2	0.00713	0.00432		−0.07362	0.24720	−0.00117	763	1.406
	3.812	1.421		−0.873	4.695	−4.979	0.078	57.597**
3	0.00849	0.00853	−0.02399	−0.07615	0.21408	−0.00099	763	1.498
	4.628	2.698	−5.009	−0.953	4.100	−3.954	0.145	153.925**
Regions and terms:								
OECD	0.01122	0.04159	−0.18648	−0.04632	0.21208	−0.00031	387	1.767
	4.155	7.351	−5.699	−0.395	2.672	−1.334	0.366	53.965**
1950–70	0.00909	0.04323	−0.12791	0.01789	0.19006	−0.00085	183	1.704
	2.668	6.305	−2.675	0.091	1.558	−1.647	0.323	28.805
1970–80	0.01419	0.04805	−0.24284	−0.38844	0.10509	0.00075	72	1.484
	2.059	3.288	−3.707	−1.719	0.806	0.843	0.346	43.005**
1980–90	0.00827	0.03970	−0.18702	0.14559	0.26604	−0.00020	132	1.460
	2.652	3.553	−3.471	0.984	2.203	−0.696	0.211	34.162*
Asia	0.00386	0.00591	−0.02870	0.20026	0.37391	−0.00133	222	1.340
	0.378	0.763	−0.614	2.401	5.340	−3.334	0.128	49.661*
1950–70	0.00866	−0.00957	0.06903	0.39360	0.63624	−0.00012	77	1.361
	0.412	−0.517	1.536	2.936	3.922	−0.143	0.164	26.385
1970–80	−0.00474	0.00971	0.02609	0.31938	0.43650	−0.00125	46	1.621
	−0.211	0.552	0.559	1.247	2.833	−1.097	0.193	18.753

TABLE III (Continued)

	Constant	T_{GAP}	GP_{GDP}	X_{IS}	X_{EP}	X_{FDI}	NUM, R^2	$DW, White$
1980–90	0.00508	0.01674	−0.19589	0.07763	0.30401	−0.00151	99	1.311
	0.428	1.654	−2.456	0.665	3.263	−3.056	0.249	32.606*
Latin America	−0.04979	0.08336	−0.02662	−0.59640	0.39972	−0.00102	154	1.878
	−2.903	4.207	−4.881	−2.608	1.885	−1.343	0.340	73.374**
1950–70	−0.11913	0.17549	−0.08437	−0.90279	0.20489	0.00047	38	1.830
	−3.159	3.846	−4.830	−1.989	0.512	0.350	0.459	17.783
1970–80	−0.00368	0.02876	−0.05280	−0.89956	1.09110	−0.00207	39	1.579
	−0.134	0.721	−2.183	−2.724	2.893	−1.375	0.485	22.588
1980–90	−0.08801	0.11374	−0.02474	−0.43148	0.22951	−0.00144	77	2.004
	−4.032	4.279	−4.146	−1.806	0.686	−1.151	0.303	33.284*
Income levels (in 1985 U.S.$):								
1–999	0.05844	−0.03660	0.01675	1.08000	0.54770	0.00292	44	2.243
	1.416	−1.257	0.369	2.080	2.616	2.643	0.169	8.253
1,000–1,999	−0.01277	0.01068	0.00021	0.21317	0.50831	−0.00031	93	1.224
	−0.568	0.545	0.006	1.620	2.339	−0.367	0.067	24.948
2,000–3,999	−0.02131	0.04725	−0.02841	−0.76596	0.12238	−0.00095	157	1.395
	−1.376	2.964	−5.379	−3.118	0.901	−1.425	0.378	56.719**
4,000–7,999	−0.00363	0.03762	−0.03108	−0.16073	0.15510	−0.00206	183	1.609
	−0.451	2.957	−3.847	−1.491	2.058	−4.250	0.211	30.480
8,000–	0.01177	0.03251	−0.16695	0.09538	0.15878	−0.00062	288	1.575
	5.252	5.361	−5.043	0.930	2.203	−2.308	0.232	91.699**

TABLE III (Continued)

	Constant	T_{GAP}	GP_{GDP}	X_{IS}	X_{EP}	X_{FDI}	NUM, R^2	$DW, White$
Asian countries:								
KOR	−0.09235	0.15061	−0.14622	0.06895	0.49352	−0.00405	28	2.204
	−2.460	2.453	−1.422	0.294	3.699	−0.722	0.424	
SGP	−0.19568	0.27158	−0.04078	0.27385	0.28021	0.00053	15	1.529
	−2.655	2.409	−0.266	3.556	2.898	0.831	0.714	
TWN	−0.03733	0.05213	−0.06886	0.21516	0.68227	0.00193	22	1.765
	−2.040	3.299	−1.230	0.853	3.947	2.485	0.836	
THA	−0.05928	0.05121	−0.04021	0.05239	0.55631	−0.00162	35	1.166
	−1.573	0.528	−0.248	0.113	1.254	−0.287	0.053	
MYS	−0.11518	0.13458	0.29521	−0.02450	0.21977	−0.00100	26	1.573
	−2.776	3.112	5.335	−0.100	1.237	−0.864	0.532	
CHN	−1.02600	0.92589	1.21880	1.13130	−0.59849	0.07467	11	1.512
	−7.053	7.428	2.637	1.532	−1.078	13.112	0.688	
IDN	−0.19776	0.13481	0.12367	0.23016	0.17115	0.00134	20	2.007
	−1.412	1.355	2.183	0.753	0.733	0.856	0.437	
IND	−0.24110	0.16892	−0.12804	0.86747	−0.31228	−0.00589	31	2.129
	−2.215	2.318	−1.174	1.315	−0.192	−0.050	0.187	
PHL	−0.02474	0.02370	−0.14366	0.35010	0.72898	0.00081	34	1.580
	−0.538	0.503	−1.138	1.753	2.060	0.565	0.311	

TABLE III (Continued)

	Constant	T_{GAP}	GP_{GDP}	X_{IS}	X_{EP}	X_{FDI}	NUM, R^2	$DW, White$
Latin American countries:								
BRA	−0.18369	0.22141	−0.03747	−1.71280	0.26304	−0.00053	29	1.603
	−2.711	3.229	−4.217	−3.202	0.449	−0.135	0.423	
COL	−0.44933	0.51263	0.18042	−0.69489	0.80809	−0.00386	20	2.732
	−5.958	6.243	2.577	−1.927	3.743	−3.465	0.746	
MEX	−0.05428	0.12554	−0.06094	0.30482	0.56566	−0.00370	20	2.717
	−1.434	1.742	−1.802	1.074	0.587	−0.770	0.137	
CHL	−0.17832	0.21234	−0.05617	−1.27210	−0.30452	−0.00448	20	2.074
	−2.608	3.284	−5.645	−5.929	−0.763	−5.376	0.889	
ARG	−0.28495	0.33500	−0.03639	−1.08710	−0.34792	−0.00004	29	1.322
	−3.085	3.303	−3.474	−5.910	−0.670	−0.029	0.590	
PER	−0.33470	0.49030	−0.07640	−1.48460	1.51080	0.00156	20	1.982
	−2.528	2.926	−4.939	−1.795	2.723	0.597	0.617	
VEN	−0.09908	0.16970	−0.07430	−0.16303	−0.01551	−0.00194	16	1.603
	−2.749	2.819	−1.212	−1.800	−0.038	−0.562	0.415	

Notes: 1. T_{GAP}=TFP gap, GP_{GDP}=growth rate of GDP deflator NUM=sample size, R^2=adjusted R-squared, DW=Durbin-Watson statistics, and $White$=the test statistics for heteroskedasticity; ** represents the 5 per cent level and * the 10 per cent level, meaning that at these levels the hypothesis of identical disturbance is discarded.

2. Values t in the lower columns are estimated by the heteroskedastic-consistent estimates of the standard errors.

This being the case, the second step was taken. The samples by region and by period of time were grouped and again treated statistically. This was to check the robustness of the basic model. This grouping altered the heteroskedasticity, but it also had the effect of seriously lowering the significance of some of the explanatory variables. Also, some coefficients, though still statistically significant, came to have values that were largely different than before. Concerning macro-policy instability, the effects of trade policies have changed after the grouping process, but it still has a negative value. While import substitution policies show no positive effects on productivity in the previous results, the new analysis shows that they had a positive effect for Asia in the 1960s but had no such effect for Latin America throughout the entire period. The effect of a technology gap has significantly positive values for OECD countries throughout the period, but ceases to be significant for Latin America in the 1970s and for Asia in the 1960s and 1970s. The technological catch-up speed however became faster throughout the period, the fastest being for OECD countries, followed by Latin America and Asia. Estimation from the basic model itself shows that export promotion policies had a significantly positive impact on the TFP of most Asian and Latin American countries and that import substitution policies had differing degrees of significantly negative impact on the TFP of most Latin American countries. When the other conditions are held constant, the TFP of all the countries is in the direction of convergence, but the pace of convergence largely differs among countries.

The trade policy effects and catch-up effects are unstable among regions and at different points in time. A hypothesis explaining this is the presence of threshold levels. The third step of this examination is to test this hypothesis. To test the presence of threshold income levels, the data were divided into five brackets by income level (using GDP per capita evaluated on the basis of PPP in 1985 U.S. dollars). The catch-up and trade policy effects were then checked for each of the groups. The five income brackets are respectively: less than U.S.$1,000, U.S.$1,000–1,999, U.S.$2,000–3,999, U.S.$4,000–7,999, U.S.$8,000 or more. There are clear contrasts in the effect of trade policy and catch-up pattern among the income levels. For low-income countries at their early stage of development, not only export promotion policies, but also import substitution policies and an increase in FDI positively influence TFP, but as their income levels rise, the positive effects of import substitution policies and FDI cease. In the later stage of development at the high income level, TFP shows a significant tendency toward convergence. But at the lower-income levels, the tendency is not toward convergence but rather toward divergence. In other words, the countries at the early stage of development do not follow the pattern of TFP convergence through productivity catch-up by dint of the advantage of late starters. At that stage, import substitution policies may contribute toward improving productivity. This means that infant industry protection as typified by import substitution is effective at the early stage of economic development as it spurs productivity increase, but its efficacy is lost as the economy develops further. In some cases, the continuation of import substitution policies can have negative effects.

Most of the Asian countries that developed rapidly adopted import substitution policies in the 1950s and 1960s and switched to export promotion policies in the

1970s and 1980s as their income levels rose. This is considered an effective policy sequence for raising productivity and accelerating economic growth. In contrast, Latin American countries which had attained fairly high national income levels because of their economic growth in the 1960s and 1970s continued to follow inward-oriented import substitution policies. This is considered to be one of the reasons why their productivity and growth rates failed to improve. These variations in the effects of policy as countries move into different stage of development can be explained by the degree of a country's development and the capacity at which its national product and factor markets are functioning. It may be argued therefore that liberalization-first policies disregarding market maturity are not necessarily effective.

V. CONCLUSIONS

From the above examination, several conclusions can be drawn. First, not only capital accumulation but also productivity change are important in explaining the diversity of growth patterns among developing countries. The major element explaining the contrast in growth patterns between Asian and Latin American countries is the difference in productivity change. Second, differences in trade policy are an important factor in explaining the disparities in growth rates of developing countries. The importance of trade policy can be seen in the high growth in the 1980s of the Asian countries which followed outward-oriented policies which contrasted with the low growth of some Asian and most Latin American countries which adhered to inward-oriented trade policies. But productivity is the key that decides whether or not a country's shift to an outward-oriented trade policy can lead to sustained economic growth. Third, trade policy can work positively or negatively on productivity through several routes. In this analysis, a model was used, which takes into consideration not only trade policies but also the productivity gap and macro policy instability as factors possibly influencing TFP-measured productivity. The model relied on an international macro pool database. From the analysis, it was concluded that though export promotion policies certainly works positively for productivity, import substitution policies and liberalization of FDI can work positively or negatively depending on the country it is applied to as well as the stage of that country's development. Effective trade policy differs from country to country in accordance with its stage of development.

The above conclusions provides some implications about how trade policy should be applied to developing countries. The Asian NIEs certainly make a powerful case in favor of liberalization policies since they developed extremely rapidly in the 1970s and 1980s under outward-oriented policies. But trade liberalization is not a panacea. If it is introduced at an early stage of economic growth, it will show negative, rather than positive, aspects. In the early stage of development, infant-industry protection policies can be more effective. In fact, the Asian NIEs followed inward-oriented import substitution policies in the 1950s and 1960s. Recently, it seems the World Bank has come to share this view, too. Since publication of *The East Asian Miracle* [35], the World Bank has slightly modified its basic policy orientation away from its traditional "market friendly"

approach. The bank has recognized the importance of not only "market friendly" policies (stability of the macro economy, infrastructure building, investment in human resources, secure financial systems, limited price restriction, acceptance of foreign technology) but also selective intervention policies (low-interest rates, policy-guided finances, selective industrial buildup, and export-oriented trade policies).

The analysis in this study has room for improvement. Here, the inter-relationships between the consequences of trade liberalization and productivity on an ad hoc basis were analyzed. In other words, an indirect method was adopted, which does not specify through which route a particular policy change has contributed to productivity increase. For a more direct and theoretically polished analysis, a study needs (1) to introduce a more rigorous theoretical formulation concerning liberalization and changes in productivity and (2) to apply a general equilibrium method involving both product and factor markets.

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