Trade Structure, FTA and Economic Growth: Implications to East Asia

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Abstract

What is the relationship between trade and economic growth? Does trade positively affect economic growth? Due to the ambiguity of the relationship between trade and growth, the empirical relationship remains open (Rodriguez & Rodrik 2001, Baldwin, 2003). This paper introduces "trade structure" variables, borrowing from the recent paper of Lederman and Maloney (2003), and applying them to the relationship. Dynamic panel estimation for the data of 66 countries during 1991-2001 is used to verify the validity and robustness of the relationship. Trade structure variables that represent Heckscher-Ohlin model and Product Differentiation model respectively show strong evidence of positive effects on growth. Free trade agreement/area (FTA) also enhances economic growth. East Asia shows a different relationship between trade and growth, compared to the world, and a weaker role of FTA in its growth.

Key Words: Trade Structure, FTA, SCP paradigm, Dynamic Panel Estimation
JEL Classification: F11, F14, F43

I. Introduction

What is the relationship between trade and economic growth? Does trade positively affect economic growth? Is that growth import-led or export-led? The conventional wisdom for the questions is that the growth is export-led and has a positive impact of trade.

Despite of a number of multi-country empirical studies, however, the relationship remains ambiguous. Recently, Baldwin (2003) and Rodriguez and Rodrik (2001) showed that they could not identify any robust positive relationship between trade and growth based on previous studies. Rodriguez and Rodrik borrowed data from the authors of the most significant of recent researches, including Dollar (1992), Ben-David (1993), Sachs and Warner (1995) and Edwards (1998), and repeated the same empirical tests. They only identified methodological problems of the papers and found little evidence that trade is significantly associated with economic growth. Lawrence and Weinstein (1999) also showed import-led growth rather than export-led growth.

The ambiguous result of the relationship between trade and growth comes due to two main aspects. One is that most previous research uses different definition of *trade*: it sometimes refers to *trade openness* but other times to the *trade volume*. Rodriguez and Rodrik showed that the confusion of the concept of trade generates many methodological problems. The other is that the empirical estimation attempts all failed to isolate the *pure* impact of trade on economic growth. In most researches, the measures of trade, either in trade openness or trade volume, are heavily contaminated with other influences arising from such as exchange rate systems, monetary and fiscal policies, and other non-trade factors. Although some researches show a positive relationship between trade (trade volume in particular) and growth as in Frankel and Romer (1999), general consensus is that *trade* in openness or volume seems to be no guarantee of faster economic growth.

As such, Rodriguez and Rodrik (2001) and Baldwin (2003) concluded, “the challenge of identifying the connections between trade and economic growth is one that still remains before us” and “because of the ambiguity of the relationship between trade and growth, the empirical relationship remains as open one.” Recent Lederman and

Maloney (2003) is the very one that searches for an empirical relationship between trade and growth responding to the Rodriguez and Rodrik, and Baldwin.

This paper attempts to take a new look at the relationship between trade and growth. It introduces *trade structure* variables, borrowing from the spirit of Lederman and Maloney, instead of *trade*. Dynamic panel estimation for the data of 66 countries during 1991-2001 is used to verify the validity and robustness of the relationship. Particular attention is given to the role of institutional trade structure variable, namely free trade agreement or area (FTA), in the trade-growth relationship. Then same estimations are attempted for the East Asia.

The paper is organized as follows: In next section, we review three trade models that link trade to economic growth of an economy. Six trade structure variables that represent each of the different trade models are introduced. In section III, we conduct the empirical analysis. The model, data and empirical results are discussed in this section. Section IV concludes the paper.

II. Trade Structure and Growth

1. Use of Trade Structure

We introduce *trade structure* to investigate the relationship.[1] Use of trade structure can eliminate any confusion arising from the definition of trade. The notion of trade can be identified as a structure, conduct or performance variable. Trade openness deals more or less with the trade policies; thus it will be a conduct variable. Trade volume is an outcome of trading behavior; it will be a performance variable. Capital-labor ratio of a country, for example, will be a trade structure variable as it characterizes the trade pattern of the country.

Borrowing the "SCP (structure-conduct-performance) paradigm" framework of Industrial Organization literature, we can eliminate aforementioned two problems: The

[1] Following Lederman and Maloney (2003), this paper also takes as trade analogue to the recent empirical works that look the impact of financial structure on economic growth. That means it investigates the impact of trade structure on economic growth.

application eliminates any confusion on the definition of the trade; it also precludes the contamination with other influences, as trade structure can be more easily isolated from other economic variables. In particular, if we use the SCP paradigm and assume that trade liberalization policy or trade openness (that is, trade conduct variable) and trade volume (that is, trade performance variable) are embedded in trade structure, we may be able to isolate the impact of trade on growth from other non-trade structure variables arising from exchange rate, monetary and fiscal policies, and other macroeconomic policies.

As such, all the conduct variables such as export-oriented vs. import-substituting trade policies or liberalization vs. protection measures and performance variables such as export vs. import volumes are nested in the trade structure variable. The introduction of trade structure is a parallel effort to the recent booming researches that look at the impact of financial structure on growth.

2. Three Models Linking Trade to Growth

There are three theories that relate trade structure to economic growth. Each of theories represents a different channel that explains the way of trade structure affecting productivity or growth of an economy.

The first channel is found in a dynamic Rybczynski theorem. In a Ricardian or Heckscher-Ohlin model, an increase in the endowment of one factor causes a more than proportionate increase in the output of the commodity using that factor relatively intensively and an absolute decline in the output of the other commodity. When we assume the abundant factor to be capital, the Rybczynski theorem suggests so-called ultra-biased growth along the capital expansion path. At the same time, the capital-intensive sector has higher productivity, as the economy has comparative advantage in capital-intensive products (Heckscher-Ohlin theorem), which it exports (Ricardian theory). That shows a dynamic efficiency coming from continuous resource reallocations of capital into the production and export of capital-intensive commodities.

The second channel can be found in the Product Differentiation Model. This Krugman and Helpman model explains the trade pattern under increasing returns. The model with product differentiation provides a rationale of how intra-industry trade occurs.

The product differentiation assumes that trade is undertaken in imperfect competition and under the presence of economics of scale. As such, the model relates trade (here, intra-industry trade) to the economies of scale: The more they trade, the bigger is the economies of scale effects. The increase of the scale effect engenders productivity increase and thereby economic growth of the country.

The third channel locates in Endogenous Growth Model. According to this model, the relationship between trade and growth is straightforward. Trade and foreign direct investment increases knowledge spillovers across countries. The spillovers increase productivity of physical capital as well as human capital. The enhancement of the productivity of endogenous growth factors can be further expanded with additional R&D, or learning-by-doing effect. In the model, trade or investment first affects the productivity of those endogenous growth factors then to the growth of economy.

3. Trade Structure Variables

This paper incorporates following five *trade structure* variables. Each of them corresponds to one of the above three channels.

The first trade structure variable reflects the Ricardian or Heckscher-Ohlin type of trade-growth relationship. A new trade structure variable, calling it Heckscher-Ohlin variable, is defined by the ratio of exports of capital-intensive goods to exports of labor-intensive goods divided by capital-labor ratio, that is $(X_K / X_L)/(K/L)$. This measure reflects H-O type of economic growth by looking at the export and import performances with respect to factor endowment structure. We anticipate a positive sign to growth if there is an H-O type of growth engendered through resource reallocation efficiency along the dynamic Rybczynski expansion path.

The second variable related to the H-O type of growth is the ratio of export of primary goods to GDP. This measure tests so-called “Sachs-Warner (1995) assertion” or “Dutch Disease” that explains the detrimental effect of resource abundance on growth.

A trade structure variable that reflects Krugman-Helpman type of trade-growth relationship is the third variable. We introduce the intra-industry trade variable to identify the relationship. Grubel-Lloyd IIT measure reflects K-H type of economic growth that

comes from economies of scale effects. That is, the intra-industry trade of differentiated product enhances scale effects, thereby engendering growth.

The fourth trade structure variable reflects the growth effect in the endogenous growth model. We use the ratio of foreign direct investment (FDI) to trade to reflect the relative composition of investment to trade. This measure is to identify the knowledge spillover effects through investment (FDI). The FDI becomes particularly relevant for technology diffusion as global protection of intellectual property have been strengthened.

In addition, following the result of the Lederman and Maloney, we use an export concentration measure, the export Herfindahl index, to identify the competitive structure of trade and the degree of inter-industry specialization of the country. This measure is a mirror image of industrial structure of the country, and captures whether a concentrated export structure retards economic growth or not. The measure can also encompass the type of competition arising from trade expansion, thereby relating *trade competition* to economic growth: Darwinian versus Schumpeterian growth path.

Finally, besides above five variables we introduce a new trade structure variable, namely free trade agreement or area (FTA) variable. This variable reflects an institutional trade structure of countries.

In sum, we use six trade structure variables: H-O variable; Natural resource abundance variable; K-H variable (IIT); FDI- Trade variable; Export concentration variable; FTA variable.

III. Empirical Analysis

1. Estimation method

In this section, we present a formal model to estimate the effect of trade structure on economic growth. Most empirical work on economic growth focuses on the relationship between trade flows and the rate of economic growth, based on estimation using cross sectional regressions. In the presence of country specific effects, however, this specification may induce substantial bias by the correlation of unobserved country-specific factors and the variables of interest.

In the following analysis of the trade structure on economic growth, we used a dynamic panel data model. The dynamic model has been used in the existing empirical studies including Lederman and Maloney (2003). Heckman (1981) provides detailed discussion of estimation of dynamic models. To control for unobserved heterogeneity, we use a dynamic model with fixed effects. The lagged endogeneity can be corrected by first differencing and using second and third lags as instruments, as suggested by Arellano and Bond (1991). Given the large number of observations in the sample and the large variation in unobserved country specific effects, the widely used linear generalized method of moments (GMM) estimator provides substantial computation advantages.

Following the spirit of existing work on the empirics of economic growth, we begin with a basic specification:

$$\dot{y}_{it} = \alpha + \beta Z_{it} + \gamma X_{it} + F y_{it-1} + \varepsilon_{it} \qquad (1)$$

where $\dot{y}_{it}$ is the log difference of per capita GDP of country i in period t, X_{it} is the vector for conditioning variables for initial income, term of trade and real exchange rate, among others. Z_{it} is the particular trade variable of interest. The β coefficient shows the effects of trade variable on economic growth.

The basic problem faced in the estimation of this model is that this specification cannot control for unobserved heterogeneity. The unobserved effects tend to persist over time, therefore ignoring these effects of unobserved individual effects (heterogeneity) creates serially correlated with the error term, ε_{it}. If these are not properly controlled, the estimates are clearly inconsistent. Heckman (1981) indicates that this is a problem of spurious state dependence in the empirical literature on labor market participation. A proper test for dependence should control for the unobserved individual specific effects.

To control for this unobserved heterogeneity, we consider a simple linear regression model with fixed effects:[2]

[2] There is still debate whether the random or fixed effects approach is the more appreciate in the dynamic framework. One of criteria is based on the nature of the sample. If the whole population is represented in the sample, fixed effects is the more appreciate choice.

$y_{it} = \alpha + \beta\, Z_{it-1} + F\, y_{it-1} + u_{it}$,

$u_{it} = \eta_i + \varepsilon_{it}$ is usual 'fixed effects' decomposition of the error term.

Duo to its computational ease, this model is useful to avoid the problem of unobserved heterogeneity. A problem arises, however, with fixed effects treatment. The within estimator (least squares after transforming the variables to deviations from means) is inconsistent because the within transformation induces a correlation of order 1/T between the lagged dependent variable and the error term.[3] To address this problem, we first difference the equation to remove the fixed effects, and then to estimate with instrumental variables, using the values of the dependent variable lagged two or more periods. This treatment leads to consistent estimates.[4] Thus, we estimate the linear dynamic models in first differences, using Z_{it-2}, Z_{it-3}, y_{it-2} and y_{it-3} as instruments, as:

$$\Delta y_{it} = \beta\, \Delta Z_{it-1} + F\, \Delta y_{it-1} + \Delta \varepsilon_{it} \qquad (2)$$

To allow the use of lagged differences of y_{it} as instruments in the equation (2), the condition of $E(u_{it}\Delta u_{i,t-1}) = 0 \quad for \quad t = 4,5,...,T$ is satisfied. This condition relates directly to the absence of serial correlation in ε_{it}, therefore under this condition the efficiency could be improved. In contrast to the non-linear restrictions, we allow this model to satisfy a linear condition, $E(u_{it}\Delta y_{i,t-1}) = 0 \quad for \quad t = 4,5,...,T$. This provides a consistent estimator under heterogeneity.

2. Data

Factor Abundance: The trade structure regression in Tables 1 and 2 use Human-Capital-to-Labor ratio and Capital-to-Labor ratios from Hall and Jones (1999). This data is available for 123 countries. To construct human capital, we rely on Barro and Lee

[3] See Wooldridge (2001) for mare details.

(2000) data for ratio of population with at least secondary education over population with at most primary education. The data on international testing of students in mathematics and science are from Barro and Lee (2000). We sum the two scores and divide the sum by its mean of 1000. Changes in capital to labor ratios are calculated using Penn World Tables 6.0 data for sum of durable goods capital and non-residential construction capital.

Factor Intensive Exports: Trade data for each country comes from UN COMTRADE database. This database is mapped into SITC classifications. To construct a ratio of a country's capital-intensive goods to labor-intensive good exports, we use Romalis (2002)'s factor intensity for each industry. However, his database uses 4-dight U.S. SIC classifications. For this, our data is mapped from SITC into SIC classifications using a concordance maintained by Jon Haveman.

Terms of Trade: We directly take the ratio of the overall import and export price from the World Tables. The disadvantage of this measure is that it also reflects changing prices of trade with third countries – countries that are not part of the 67 countries for which we also have output and endowment data (Table 1 provides the complete list of countries). To address this disadvantage, we construct another terms of trade index that is consistent with the set of countries that we use in our dataset. As in Baxter and Kouparitsas (2000), we construct for each country an aggregate import price P_{it}^{M} with countries export prices. We combine the export prices of the other 66 countries from which a country imports with the shares of these countries in total imports to construct a fixed-base geometric-means price index.

GDP Per Capita at PPP: World Bank World Development Indicators CD-ROM for 2002. Penn World Tables 6.1 for earlier years.

Natural Resource Exports: The primary exports comprise the commodities in SITC sections 0, 1, 2 (excluding 22), 3, 4 and 68.

[4] See Hsiao (1986) and Arellano and Bond (1991) for in more details.

Intra-Industry Trade: We construct a Grubel-Lloyd index of IIT. Krugman (1979) argues that scale economics arising from intra-industry trade are thought to lead to more rapid productivity gains and hence faster growth. The IIT is constructed trade data disaggregated at 4-digit SITC from UN COMTRADE dataset. The index is defined as:

$$IIT = 1 - \frac{\sum_{i}^{n} | X_i - M_i |}{\sum_{i}^{n} (X_i + M_i)}$$

Export Concentration: We construct an Export Herfindahl index using export data disaggregated at 4-digit SITC. The index ranges from zero to one and increase with concentration. The index is defined as:

$$H = \sum_{i}^{n} \left[\frac{x_i}{\sum_{i}^{n} x_i} \right]^2 ,$$

where *i* is a particular product and *n* is the total number of products.

FTA: We construct an FTA index. The FTA index of a country is measured from the ratio of the sum of FTA partner countries' GDP to the GDP of the country. For example, if country A has FTAs with country B and C, the FTA index of country A is the ratio of the sum of GDPs of A, B and C divided by its own GDP that is the GDP of A. When a country has no FTA, the FTA index remains 1.

3. Results

3.1. The World

The empirical strategy is to introduce the trade variable of interest first to a set of controlling variables and then to progressively add new variables. The basic controlling

set includes the log of initial GDP of the period and the degree of openness. The second conditioning set is a capital accumulation that includes the share of investment in GDP and a log of years of schooling, which is the preferred measure of the stock of human capital. Next, we add growth in terms of trade as a possible channel to growth. Finally, we include the stability of the real exchange rate over the period as a measure of macro stability of particular importance to the trade sector.

Tables 1 and 2 show the fixed effect panel regression and dynamic panel estimation results respectively, and Table 3 reports the estimation results after combining with our trade variables. The tables report the coefficient and significance level on the particular trade variable in regression containing the control variables.

In both the fixed effect panel and dynamic panel regression, natural resource abundance variable is negatively correlated with growth, but the coefficients are insignificant. This variable shows a significant and negative relationship to economic growth once combined with the other H-O variable. We confirm Sachs-Warner's significant negative impact of resource on growth. In all regressions, the H-O variable, $(X_K / X_L)/(K/L)$, is positive and significantly correlated with growth. This result confirms that there are substantial growth effects by resource reallocation efficiency.

For both regression techniques, export concentration has significantly negative effects on growth. This result is broadly consistent with the findings of recent empirical literature. In particular, intra-industry trade shows positive impacts on growth, as predicted by theory. This result suggests that countries with more IIT also tend to have more product differentiation. This induces higher productivity growth. FDI/Trade has a positive impact on growth, but taken together with other structural variables, its impacts are dispensed into other variables. This result implies that FDI/Trade is a relevant trade structure variable that has an effective impact on growth but its impact cannot be correctly assessed. The FTA index shows significant positive effect on growth in all estimations. The variable remains very robust to the additions of conditioning variables.

3.2. The East Asia

Now we apply the same estimation for the data of 9 East Asian countries: China, Japan, Korea, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore and Thailand. Table 4 and 5 show the dynamic panel estimation results of East Asian case that correspond to the Table 2 and 3 respectively.

In Table 4, all coefficients are significantly smaller than those in case of the world. With the smaller coefficients, all the regression show weaker t-values as well. This result suggests that the relationship between the trade structure and growth in East Asia is not as strong as in the world. Most variables are unable to explain the relationship. Only the capital accumulation variable turns out to be significant for the economic growth. This can be seen by visual from the Figures 1a~1e: Most outliers or extreme values in the plotting are from East Asian countries.

The full regression results shown in the Table 5 are also rather weak. The H-O variable is surprisingly insignificant in explaining the growth of East Asian countries.. This means that the growth of East Asian countries did not follow the Heckscher-Ohlin type or dynamic Rybczynski type of growth. An interesting phenomenon is shown from the significant IIT variable that is different from our conjecture. The IIT is supposed to be significant for the trade between developed countries. In fact, the product differentiation type of trade structure was important factor in explaining the East Asian economic growth. The impact of FTA remains also very weak in East Asia: this may perhaps reflect the loose trade integration of ASEAN free trade area.

Factor input variables are turned out to be important in East Asian case. Natural resources, capital accumulation and years of schoolings are all very significant in explaining the growth. Table 5 shows high t-vales for the variables. The result shows us that the East Asians' economic growths are fundamentally factor inputs driven ones. It may remind us the famous debate between Young-Amsted versus Krugman on where the growths of East Asian economies come from: factor-inputs or productivity growth. While our result does not identify whether the inputs increase engender an endogenous type of growth or a simple one-time quantity increase, our results could have an important implications to the debate.

IV. Conclusion

The conclusion drawn from our empirical analysis is that economic growth can be well explained by *trade structure* variables that are free from definition and separation problems. In the empirics, the estimating equations have the goodness of fit of about 0.4, showing a relatively significant relationship between trade structure and growth. In addition, the dynamic panel estimation for the data of 66 countries during 1991-2001 verified strong validity and robustness of the relationship.

While natural resource abundance variable was not significant to growth by itself, but once combined with the other H-O variable, it shows a significantly negative impact on economic growth. Our empirical result confirms the so-called Dutch Disease hypothesis.

In particular, the H-O variable, $(X_K / X_L)/(K/L)$, explains economic growth well, showing that neoclassical resource reallocation efficiency enhances growth.

Export concentration has a negative effect on growth. This result reflects that focusing on a few exports retard growth. However, with a jump in logic, we can reinterpret the result to reflect a Darwinian path of the relation between trade competition and growth rather than a Schumpeterian one. In other words, monopolistic rents do not accelerate economic growth, whereas trade competition does.

Intra-industry trade shows positive impacts on growth as predicted by theory. This measure reflects the K-H type of economic growth that comes from economics of scale effects.

Trade structure variables that represent Heckscher-Ohlin model and Product Differentiation model respectively show strong evidence of positive effects on growth.

Although the endogenous growth model variable, FDI / Trade has a positive impact on growth by itself, once combined with other structural variables its impacts are dispersed into other variables. This result implies that FDI / Trade is a relevant trade structure variable that effectively affect to growth. However, in order to assess its impact correctly, we need to introduce a new model, equation or theoretical rationale.

The impact of FTA in the relationship between trade structure and economic growth is that an FTA strongly enhances growth. While the results are relevant in the

global economy, it does not apply to East Asian region. In East Asia, the effect of FTA seems very weak although the estimated sign remains right. It perhaps reflects the loosest trade integration in AFTA.

Finally, this research is an attempt to open up a new look for the relationship between trade and growth. There are, however, many problems remain to make this study complete and consistent. In particular, a new model that incorporates the effect of FDI on growth are needed. Further robustness analysis for the stability of equation and the robustness of the relationship of trade structure to growth will also be needed.

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Table 1

Estimates of Trade Structure Regression (1): Fixed Effect Panel

	(1)	(2)	(3)	(4)	(5)	(6)
	NRX / GDP	(Xk/Xl)/(K/L)	FDI / Total Trade	Exp Herfindahl	IIT Index	FTA
Basic Controlling	-0.15	1.1	0.31	-3.86	3.68	0.08
+	(-0.56)	(1.97)**	(1.24)**	(-2.66)***	(2.44)***	(1.80)*
Capital Accum.	-0.03	1.12	0.22	-4.26	2.59	0.07
+	(-0.10)	(2.28)**	(0.91)	(-2.91)***	(2.06)***	(1.66)*
Growth in TOT	-0.03	1.14	0.26	-4.31	2.95	0.07
+	(-0.10)	(2.33)***	(1.06)**	(-2.90)***	(2.22)***	(2.32)***
Macro Stability	-0.02	1.16	0.36	-4.33	2.54	0.09
	(-0.07)	(2.68)***	(1.43)**	(2.86)***	(2.87)***	(1.98)**
R2	0.42	0.46	0.43	0.36	0.46	0.41

Table 2

Robustness Estimation for Trade Structure Regression: Dynamic Panel Estimator

	(1)	(2)	(3)	(4)	(5)	(6)
	NRX / GDP	(Xk/Xl)/(K/L)	FDI / Total Trade	Exp Herfindahl	IIT Index	FTA
Basic Controlling	-1.44	1.61	1.04	-2.33	2.93	0.08
+	(-0.98)	(1.90)*	(1.91)**	(-2.69)***	(2.66)***	(1.86)*
Capital Accum.	-1.08	0.89	1.07	-3.13	5.59	0.07
+	(-0.76)	(1.13)**	(2.04)***	(-2.90)***	(2.16)***	(1.67)*
Growth in TOT	-1.38	1.01	1.16	-3.37	2.73	0.21
+	(-0.97)	(1.17)*	(2.21)***	(-2.12)***	(1.93)**	(2.85)***
Macro Stability	-1.25	0.64	0.8	-2.27	2.55	0.23
	(-0.89)	(1.73)**	(1.51)**	(-1.89)**	(2.12)***	(3.09)***

Notes:

(1) The dependent variable is the per capita GDP growth rate.

(2) Basic controlling includes the log of initial GDP of the period and a degree of openness.
Capital Accumulation includes the share of investment in GDP and log of years of schooling.
Macro Stability is the deviation of the real exchange rate over the period.

(3) t-statistics in parentheses.

(4) ***, ** and * denote significance at the 1%, 5% and 10% respectively.

Table 3
Estimated Effects of Trade Structure on Growth: 1991 - 2000
Countries: 66

Dependent variable: GDP per capita growth rate					
	(1)	(2)	(3)	(4)	(5)
constant	3.82	3.47	7.23	6.87	7.05
	(2.34)***	(1.99)**	(1.19)*	(1.12)*	(1.14)
NRX/GDP	-0.29	-0.26	-0.32	-0.33	-0.35
	(-3.32)***	(-2.84)***	(-3.31)***	(-3.16)***	(-4.64)***
(Xk/Xl)/(K/L)	0.10	0.12	0.14	0.16	0.10
	(1.99)**	(2.23)***	(2.51)***	(2.83)***	(2.27)***
Herfindahl	-3.87	-3.80	-3.72	-3.51	-1.14
	(-2.77)***	(-2.67)***	(-2.62)***	(-2.42)***	(-6.47)***
IIT index	1.48	1.23	1.39	1.47	1.13
	(2.93)***	(2.41)**	(2.67)***	(2.76)***	(1.96)**
FTA					0.11
					(2.09)**
Basic controlling					
initial GDP	0.01	0.00	0.01	0.00	0.01
	(0.38)	(0.00)	(0.36)	(0.16)	(0.16)
openness	0.25	0.25	0.29	0.34	0.19
	(1.97)**	(1.72)**	(1.94)**	(2.25)***	(1.89)**
Capital Accum.					
inv / GDP		1.47	0.35	0.20	0.06
		(2.39)***	(2.00)***	(0.54)	(0.16)
schooling		0.27	0.26	0.40	0.93
		(2.93)***	(1.87)**	(1.26)**	(5.10)***
Terms of trade			-0.97	-0.96	-0.92
			(-0.77)	(-0.75)	(-1.01)
Macro Stability				0.05	0.06
				(2.38)***	(1.62)
R2	0.34	0.38	0.38	0.42	0.39

Notes:
(1) Macro Stability is the deviation of the real exchange re over the period.
(2) t-statistics in parentheses.
(3) ***, ** and * denote significance at the 1%, 5% and 10% respectively.

Table 4

Estimates of Trade Structure Regression for East Asian Countries: Dynamic Panel Estimator

	(1)	(2)	(3)	(4)	(5)	(6)
	NRX / GDP	(Xk/Xl)/(K/L)	FDI / Total Trade	Exp Herfindahl	IIT Index	FTA
Basic Controlling	-0.55	0.94	0.09	-0.30	0.37	0.05
+	(-0.99)	(1.60)	(1.69)*	(1.98)**	(1.85)**	(1.04)
Capital Accum.	-0.38	0.11	0.04	-0.32	0.34	0.03
+	(-0.66)	(1.85)**	(1.74)**	(1.99)**	(2.62)***	(1.80)*
Growth in TOT	-0.28	0.10	0.03	-0.27	0.39	0.08
+	(-0.57)	(1.47)	(0.51)	(-1.48)	(1.62)	(1.69)*
Macro Stability	-0.32	0.13	0.02	-0.31	0.42	0.09
	(-0.63)	(1.80)*	(0.21)	(-1.67)*	(1.74)*	(1.16)

Notes:

(1) The dependent variable is the per capita GDP growth rate.

(2) Basic controlling includes the log of initial GDP of the period and a degree of openness. Capital Accumulation includes the share of investment in GDP and log of years of schooling. Macro Stability is the deviation of the real exchange rate over the period.

(3) t-statistics in parentheses.

(4) ***, ** and * denote significance at the 1%, 5% and 10% respectively.

Table 5
Estimated Effects of Trade Structure on Growth: 1991 - 2000
East Asian Countries

	Dependent variable: per capita GDP growth rate				
	(1)	(2)	(3)	(4)	(5)
constant	1.55	1.93	1.96	1.10	1.53
	(3.54)**	(2.63)***	(2.70)***	(1.64)**	(2.99)***
NRX/GDP	-0.15	-0.13	-0.12	-0.10	-0.18
	(-4.14)***	(-3.50)***	(-3.19)***	(-2.74)***	(-4.12)***
(Xk/Xl)/(K/L)	0.01	0.02	0.02	0.02	0.08
	(0.47)	(0.88)	(0.97)	(1.05)	(0.49)
Herfindahl	-0.10	-0.18	-0.11	-0.14	-0.17
	(-2.28)***	(-0.23)	(2.04)***	(-1.11)	(-2.64)***
IIT index	0.14	0.17	0.16	0.16	0.17
	(1.98)**	(2.21)**	(2.04)**	(2.08)**	(1.76)**
FTA					0.06
					(0.14)
Basic controlling					
initial GDP	1.82	0.91	0.81	1.01	0.93
	(0.95)	(0.25)	(0.98)	(0.76)	(0.87)
openness	1.00	0.17	0.17	0.17	0.19
	(3.88)***	(2.58)***	(0.57)	(0.57)	(2.32)***
Capital Accumulation					
inv / GDP		0.12	0.12	0.10	0.09
		(2.46)***	(2.49)***	(2.01)**	(2.11)***
schooling		2.61	2.62	2.56	2.04
		(4.58)***	(4.56)***	(4.38)***	(2.52)**
Terms of trade			-0.00	-0.00	-0.06
			(-0.09)	(-0.02)	(-0.81)
Macro Stability				0.02	0.05
				(1.52)	(0.67)
R2	0.26	0.32	0.36	0.34	0.33

Notes:
(1) Macro Stability is the deviation of the real exchange re over the period.
(2) t-statistics in parentheses.
(3) ***, ** and * denote significance at the 1%, 5% and 10% respectively.

Table A1
Data Definitions and Sources

Variables	Definition	Sources
Real GDP	Real GDP (constant 1995 US $)	Penn-World Tables 5.6 (PWT 5.6)
Growth Rates		PWT 5.6 and WDI
NRX / Total Exports	Primary exports / total exports	UN COMTRADE
NRX / GDP	Primary exports / GDP	WDI and UN COMTRADE
Capital	Sum of (1) durable goods capital, and (2) non-residential construction capital	PWT 5.6
Labor	Total Population	PWT 5.6
Human Capital	Ratio of population with at least secondary education over population with at most primary education.	Barro and Lee (2000)
FDI / Export	Total foreign direct investment / export	WDI and World Investment Report 2001
K / L	Capital / Labor	PWT 5.6 and Hall and Jones (1999)
H / L	Human Capital / Labor	PWT 5.6 and Hall and Jones (1999)
Openness		The Global Competitiveness Report
Terms of Trade	Export price index / import price index	WDI
Exchange Rate		WDI
Export Herfindahl	Herfindahl index of export value	UN COMTRADE
Grubel-Lloyd IIT index	Grubel and Lloyd intra industry trade index	UN COMTRADE
FTA index	RTA member countries' total GDP/GDP	PWT 5.6 and WTO
Land	Total area	CIA, The World Factbook 2001

Table A2
Descriptive Statistics

Variables	Obs	Mean	Std Dev	Min	Max
GDP Per Capita growth rate	660	1.769151	3.28489	-9.03962	12.24528
Log of GDP	660	24.97712	2.039943	19.19356	29.7807
NRX / Total Exports	660	0.4141033	0.2832948	0.0248581	0.9786932
NRX / GDP	660	0.0818288	0.067043	0.0017833	0.2625844
Degree of Openness	660	6.101744	0.7468041	4.1	7
FDI / Total Imports	660	0.5089458	0.4793321	0.0052611	2.574147
K-intensive Exp / L-intensive Exp	660	21.7881	67.51831	0.1177968	605.2437
Years of Schooling	660	7.139535	2.483385	2.5	12
Export Herfindahl	660	0.119469	0.1056026	0.0134701	0.8769317
Grubel-Lloyd IIT index	660	0.3663459	0.2112287	0.0283517	0.8349289
Log of FTA index	660	1.618581	1.904858	0	7.20826

Table A3
Country List

	Country	Code		Country	Code
1	Algeria	DZA	34	Jordan	JOR
2	Argentina	ARG	35	Kenya	KEN
3	Australia	AUS	36	Korea, Rep.	KOR
4	Austria	AUT	37	Malaysia	MYS
5	Bolivia	BOL	38	Mauritius	MUS
6	Brazil	BRA	39	Mexico	MEX
7	Canada	CAN	40	Nepal	NPL
8	Chile	CHL	41	Netherlands	NLD
9	China	CHN	42	New Zealand	NZL
10	Colombia	COL	43	Nicaragua	NIC
11	Congo, Rep.	COG	44	Norway	NOR
12	Costa Rica	CRI	45	Pakistan	PAK
13	Denmark	DNK	46	Panama	PAN
14	Dominica	DMA	47	Paraguay	PRY
15	Ecuador	ECU	48	Peru	PER
16	Egypt, Arab Rep.	EGY	49	Philippines	PHL
17	El Salvador	SLV	50	Poland	POL
18	Finland	FIN	51	Portugal	PRT
19	France	FRA	52	Romania	ROM
20	Germany	DEU	53	Senegal	SEN
21	Greece	GRC	54	Singapore	SGP
22	Guatemala	GTM	55	Spain	ESP
23	Honduras	HND	56	Sri Lanka	LKA
24	Hong Kong, China	HKG	57	Sweden	SWE
25	Hungary	HUN	58	Switzerland	CHE
26	Iceland	ISL	59	Thailand	THA
27	India	IND	60	Trinidad and Tobago	TTO
28	Indonesia	IDN	61	Turkey	TUR
29	Ireland	IRL	62	United Kingdom	GBR
30	Israel	ISR	63	United States	USA
31	Italy	ITA	64	Uruguay	URY
32	Jamaica	JAM	65	Venezuela, RB	VEN
33	Japan	JPN	66	Zimbabwe	ZWE