Do Japanese Foreign Direct Investment and Trade Stimulate Agricultural Growth in East Asia? Panel Cointegration Analysis

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1. Introduction

The most important issue in economic studies is how to promote countries' growth, since growth can have many impacts on their economies. Foreign direct investment (FDI) and trade are often seen as important catalysts for economic growth. FDI is an important vehicle for technology transfer from developed countries to developing countries and FDI could also promote growth by providing additional employment in a labor surplus economy. International trade is also recognized as an instrument of economic growth, since trade facilitates more efficient production of goods and services by shifting production to more competitive. Even though past studies show that FDI and trade have a positive impact on growth, the observed growth in such studies was the overall growth of the economy. There was, however, little specific focus on growth in the agricultural sector, which is the most important and significant sector in developing counties. East Asia is said to be the most dynamic economic development region, however the agriculture sector has been ignored as a possible catalyst for promoting economic growth. Even though agricultural gross domestic product (GDP) only accounts for a small proportion of total GDP, the labor force in this sector represents a high proportion of the total labor population (Table1). In order to help the many people who rely on this sector it is important to understand what factors help to stimulate growth in this sector.

Japanese FDI has played a vital role in economic development in East Asia for many decades. According to statistical data of the Ministry of Finance, the number of Japanese multinational enterprises (MNE) investing in East Asian countries from 1987 to 2003 was 952, with a value of $3.5 billion (Table 2). It is generally understood that Japanese FDI helps to accelerate growth by increasing local employment and enhancing productivity via technology transfers and spillover effects (Urata and Kawai, 2000), but there have not yet been any studies to confirm this argument. Therefore, in order for the host countries to make the proper policies towards Japanese FDI, it is necessary to investigate these impacts empirically.

The purpose of this paper is to examine the factors that contribute to the growth of the agricultural sector in East Asian countries, by particularly focusing on Japanese FDI[1] and international trade as the catalysts for growth.

2. Literature Review of FDI, Trade and Growth

A number of studies have discussed how inward FDI can contribute to the growth of a host country's economy (e.g. Balasubramanyam, 1996; Borenstein, 1999; Buckley et al, 2002; Carkovic et al, 2005; Choong, 2004; Kosempel, 2004; de Mello, 1999). In general, these studies argue that the impact of FDI by multinational enterprises (MNEs) on growth is complex. First, through capital accumulation in a recipient economy, FDI is expected to be growth-enhancing by encouraging the incorporation of new inputs and foreign technologies into the production function of the host economy. Second, FDI improves the efficiency of locally-owned host country firms via contract and demonstration effects, and their exposure to fierce competition. Last and most importantly, FDI is believed to be a leading source of technological change and human capital augmentation in developing countries. Technological progress takes place through a process of "capital deepening" in the form of new varieties of knowledge-based capital goods. It also proceeds via specific productivity-increasing labor training and skill acquisition promoted by MNEs.

In addition, international trade has long been considered as a catalyst for growth. Most literatures suggest that trade contributes to economic growth largely by opening access to intermediate inputs, amplifying the learning-by-doing process, and expanding the size of global

[1] Although other sources of FDI may also have an impact on growth, in this paper we will only consider Japanese FDI, for two reasons. First, in terms of the growing idea for regional integration in East Asia, we are interested to see if Japanese FDI has an impact on agricultural growth and can enhance regional integration. Second, no data is available for inward FDI in the agricultural sector of East Asian countries, or it is only reported on a BOP basis, and so we need to use outward data, which only Japan provides.

market (Edwards, 1993: Frankel and Romer, 1996; Krishna et al., 2003). The effect of trade on growth can also be seen as in term of exports and imports. The export-led growth hypothesis was empirically investigated and supported by many studies which mostly found that exports promote growth by improving efficiency in the allocation of resources, encouraging factors of production to move from low- to high-productivity sectors and raising total factor productivity (Esfahani, 1991; Ghirmay, 2001; Jin, 2002; Kavoussi, 1984; Tremblay, 1990; Tyler, 1981). Recently, there is evidence of an increase in imports along with exports. Since there is much need of exchange of intermediate and capital goods (Esfahani, 1991; Tremblay, 1990), thus resulting in many developing countries have experience much activity emerging from importing. Imports of foreign inputs are an important factor linking trade and growth, and so international trade can help to promote economic growth by providing essential and efficient foreign inputs for the industrial sector (Lee, 1995; Walde and Wood, 2004).

3. Econometrics Model Specification

The conventional neo-classical production function was used to test the impact of FDI on growth, but added foreign direct investment as an additional variable because FDI is the prime source of human capital and new technology. Moreover, trade, exports and imports were also introduced as variables in the model to assess the export- and import-led growth hypothesis. Thus, the basic production function can be written as[2]

$$Y = F(K, L, IMP, EXP, TRADE, FDI, t) \tag{1}$$

where Y is real agricultural GDP, K is agricultural land used, L is the labor force in the agricultural sector, IMP and EXP are real agricultural imports and exports respectively, TRADE is the total of real agricultural exports plus imports, which is used to determine the level of trade liberalization, FDI is stock Japanese FDI in the agricultural sector, t is a time trend which captures the improvement in productivity due to technical progress. Assuming the production

[2] Neither fertilizer use nor agricultural machinery was included in the agricultural production function, due to lack of data. Domestic investment could also help to stimulate growth, but again limited availability of data and problems with national data recording systems (BOP basis), prevented this variable from being included in the model.

function to be log-linear, taking logs and differentiating with respect to time, thus the model can be illustrated as:

$$\dot{Y} = \alpha_0 + \beta_1\dot{K} + \beta_2\dot{L} + \beta_3 I\dot{M}P + \beta_4 E\dot{X}P + \beta_5 TR\dot{A}DE + \beta_6 F\dot{D}I + \varepsilon \qquad (2)$$

where a dot over a variable denotes the rate of growth of individual variables and ε denotes a random error term.

In this study, the panel data econometric approach was applied. Therefore, the model needed to deal with cross-section (N) and time series (T) data. Therefore, the growth function to be estimated can be illustrated as follows:

$$\dot{Y}_{it} = \alpha_i + \beta_1\dot{K}_{it} + \beta_2\dot{L}_{it} + \beta_3 I\dot{M}P_{it} + \beta_4 E\dot{X}P_{it} + \beta_5 TR\dot{A}DE_{it} + \beta_6 F\dot{D}I_{it} + \beta_7 D1998_{it} + \varepsilon_{it} \qquad (3)$$

$$i = 1,2,\ldots,N \quad t = 1,2,\ldots,T$$

where *i* refers to the number of individual countries in the panel, *t* refers to the number of observations over time. In addition, a dummy variable representing the Asian crisis of 1997 was also introduced into the equation to see whether it would affect the equation structure. It was assumed that the crisis would have had an impact in the following year, 1998[3]. In the context of panel data, the existence of unobservable growth determinants that are specific to regions or countries can be acknowledged and taken into account in the estimation procedures. Generally, a panel data set can be estimated in one of three ways, depending on whether the individual cross-section effects are considered to be constant, fixed or random. The corresponding statistical models are the ordinary least squares (OLS) model, the random effects (RE) model, and the fixed effects (FE) model. OLS simply assumes that the unobservable individual-specific effects do not differ i.e., they are homogenous effects, whereas RE and FE consider these effects into the model. However, the RE model was considered inappropriate for use in this study because of its assumption of the error term from unobservable individual-specific effects is uncorrelated with

[3] We confirmed the impact of 1997 Asian crisis in two ways. Firstly, by plotting graph, the value of agricultural GDP was dramatically dropped after 1998. Secondly, we calculated the equation (3) by comparing a 1997 time dummy with a 1998 time dummy. The result clearly indicated that there was a stronger impact of the Asian crisis in 1998.

the exogenous variables seems not to be real. Thus, in our study the homogeneity test was initially applied to see whether the individual effect still existed, and if no individual effect existed then the estimation was simply determined by applying the OLS model. If there was an individual effect then the FE model would be applied.

To start with, equation (3) is a pooled model representing a behavioral equation with the same parameters across countries. Equation (4) is the same behavioral equation but with different parameters across countries, and is assumed to be constant over time. Thus, we can postulate a separate regression for each individual country:

$$Y_{it} = \alpha_i + \beta_i' X_{it} + \mu_{it} \tag{4}$$

$$i = 1,2,\dots,N \quad t = 1,2,\dots, T$$

where α_i and $\beta_i' = (\beta_{1i}, \beta_{2i}, \dots, \beta_{Ki})$ are 1 x 1 and 1 x K vectors of constants that vary across i, X_{it} is a 1 x K vector of the exogenous variable in equation (3), and u_{it} is the error term. The homogeneity test could be conducted simply by testing the null hypothesis of whether the parameters in the individual models varied from country to country i.e., whether they shared common intercept and slope coefficients: H_o: $\alpha_1 = \alpha_2 = \dots = \alpha_N$, $\boldsymbol{\beta}_1 = \boldsymbol{\beta}_2 = \dots = \boldsymbol{\beta}_N$

The test could be executed by applying the following F-test (Hiao, 2003).

$$F = \frac{(S_2 - S_1)/[(N-1)(K+1)]}{S_1/[NT - N(K+1)]} \tag{5}$$

S2, the residual sums of squares (RSS), was obtained from the pooled OLS and S1 was obtained from summing the RSS from N individual OLS regressions and K is the number of slope variables. If we assume $u = N(0,\sigma^2 I_{NT})$ then, under the null hypothesis, this test statistic is distributed as $F((N-1)(K+1), N(T-(K+1))$.

4. The Data and Application of Panel Cointegration

Annual data were used covering the period 1987-2003. Agriculture GDP, the labor force and agricultural trade data were obtained from *Key Indicators of Developing Asian and Pacific*

Countries, ADB. Agricultural land use was obtained from the FAO, except for Taiwan data, which was obtained from *Taiwan statistical Data Book 2004*. Japanese agricultural sector FDI, accumulation of food industry, fishery, agriculture and forestry sector FDI were obtained from *Financial Statistics Monthly*, Ministry of Finance, Japan. Since the Japanese government does not report the stock value of FDI, a proxy was constructed by accumulating the outward FDI annual flow values. Moreover, Japanese FDI data are reported according to their fiscal year, running from April to March the following year, thus FDI data were converted to calendar year data by the formula $X_{CY} = (X_{FY(t-1)} + 3X_{FY(t)})/4$ before making any estimates. The data on GDP, exports, trade and FDI were converted into 1995 constant prices by using the consumer price index (CPI), which was obtained from the IMF, from each country. Missing data were generated by the standard growth model.

We initially investigated the time series properties of the data to check that our data is consistent with the model assumption, to enable us to test for the long-run relationships between dependent variables and explanatory variables.

4.1 Panel Unit Root Test

We tested the data to determine for non-stationary variables against the alternative of trend stationary variables, allowing different intercepts and time trends for each individual country. We applied the IPS unit root test proposed by Im *et al.* (2003) since this test allows each panel member to have a different autoregressive parameter and short run dynamics under the alternative hypothesis of trend stationary. The IPS test statistic, referred to as the t-bar statistic, is based on the average value of the Augmented Dickey–Fuller (ADF) test statistics as follow:

$$\Delta y_{it} = \alpha_i + \gamma_i trend + \beta_i y_{i,t-1} + \sum_{j=1}^{Pi} \rho_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \qquad (6)$$

i = 1, 2, … ,N; t = 1, 2, … ,T

where y_{it} is the variable under consideration, Δ is the first order difference operator, j = 1, 2, .,N, p_i is the lag length of Δy_{it} which is chosen based on Akaike Information Criterion (AIC), ε_{it} is the error term and is independent and identically distribute and ρ_{it} is the estimate vector of coefficient on the augmented lagged changes. All variables are expressed in natural logarithm. The null hypothesis of unit roots in the panel data is defined as $\beta i = 0$ for all i. (H_0) against the alternatives that all series are stationary processes.To test the hypothesis, IPS proposes a standardized W-tbar statistic given by

$$W_{tbar}(\mathrm{P},\rho)=\frac{\sqrt{N}\left\{t-bar_{NT}-\frac{1}{N}\sum_{i=1}^{N}\mathrm{E}\left[t_{iT}(\mathrm{P}i,0)\mid\beta_i=0\right]\right\}}{\sqrt{\frac{1}{N}\sum_{i=1}^{N}Var\left[t_{iT}(\mathrm{P}i,0)\mid\beta_i=0\right]}} \tag{7}$$

where *t-bar*$_{NT}$ is the average of individual ADF statistics, which can be expressed as $t-bar_{NT}=\sum_{i=1}^{N}t_{iT}(p_i,\rho_i)/N$, and the value of $E\left[t_{iT}(p_i,0)|\beta_i=0\right]$ and $Var\left[t_{iT}(p_i,0)|\beta_i=0\right]$ are tabulated in Im *et al.* (2003).

4.2 Panel Cointegration Test

In the empirical application of the panel cointergation test, we applied Pedroni's cointergation test methodology (1999 and 2004) since this methodology allowed us to test for the presence of long-run equilibria in multivariate panels, while permitting the dynamic, and even the long-run cointegrating vectors to be heterogeneous across individual members. In general, the Pedroni's cointegrating regression takes the form of:

$$y_{i,t}=\alpha_i+\delta_i t+\beta_{1i}x_{1i,t}+\beta_{2i}x_{2i,t}+\ldots+\beta_{Mi}x_{Mi,t}+e_{i,t} \tag{8}$$

for $t = 1,\ldots, T$; $i = 1,\ldots, N$; $m = 1,\ldots, M$

Pedroni (1999, 2004) discusses the construction of seven panel cointegration statistics for testing the null of no-cointegration, four based on pooling along the within-dimension, and three based on pooling along the between-dimension. In each category, one test is parametric ADF-based, and the other test involve the use of non-parametric corrections. The test statistics in the within-dimension category are based on estimators that effectively pool the autoregressive coefficient across different members, for the unit root tests on the estimated residuals. In contrast, the test statistics given in the between-dimension category are based on estimators that simply average the individually estimated coefficients for each member i. The existence of cointegration relationships between the variables was investigated through the stationary of the error term in equation (8). The test statistics in both categories have asymptotically normal distributions;

$$\frac{x_{N,T} - \mu\sqrt{N}}{\sqrt{\nu}} \Rightarrow \mathrm{N}(0,1)$$

where $x_{N,T}$ is the appropriately standardized form for each of the statistics. Also $\boldsymbol{\mu}$ and $\boldsymbol{\upsilon}$ are the corresponding values for each test of the mean and variance, respectively, and given in Pedroni (1999).

5. Empirical Result

The results of the IPS unit root tests indicated that most of variables were not stationary at I(0) (Table 3). After performing the first difference operation, however, all data were stationary at I(1). These results confirmed the necessary conditions for performing panel cointegration, thus we continued with the identification long-run growth relationships by applying the Pedroni panel cointegration test. The results reported in Table 4 indicated that the null of no cointegration was rejected by four of the panel tests, namely the *panel pp-statistic*, *panel adf-statistic*, *group pp-statistic* and *group adf-statistic*. These four rejections of the null strongly indicated the existence of cointegration relationships in our growth relation function. Therefore, we concluded that our estimation model could be interpreted as a long-run growth relationship.

In order to determine whether the estimation of model (3) should be an OLS model or a Fixed effect (FE) model, the Homogeneity F-test (5) was executed to assess whether the countries share a common intercept and slope coefficient. The results of the homogeneity F-test indicated that there was no common slope and intercept for all countries and regions implying that unobservable country-specific effects existed in all estimations. Therefore the FE model was the most appropriate to apply in our estimation

The results from the FE regression indicated that all external factors had a positive impact on agricultural growth (Table 5). The contribution of Japanese FDI to growth also showed a positive impact; however, the impact was much smaller than that of imports, exports and trade. This outcome may have been due to the fact that the characteristics of the agricultural sector, land and intensive labor, were the main constraints that meant that the benefits from FDI via technology transfer[4] were lower in the agricultural sector than in the manufacturing sector. Also we found that the Asian economic crisis in 1997 had a negative impact on agricultural growth in East Asia.

In AGRIBASE countries the results indicated that the impact of internal factors such as land and labor were not consistent. However, the mode that included exports can help to explain the impact of these variables on growth. Exports can help to improve productivity of land and labor directly as discussed in section 2, thus resulting in a positive impact on growth. Since agricultural production requires land and labor intensive, a positive impact would be expected in these countries where land and abundant labor prevail. Imports and exports have a very positive impact on agricultural growth. The export-led growth hypothesis that was confirmed again in this study was an expected outcome, since these countries are mostly agricultural exporters and have a comparative advantage in this sector. However, the import-led growth hypothesis was also found to be true in these countries. This evidence strongly suggests that if these countries only promote exports and lower imports e.g., import substitution policy, this would lower growth. To obtain growth in agricultural GDP, trade needs to be encouraged in both directions. Moreover, the trade variable which is a representation of trade liberalization clearly indicated that more

[4] For more detail of technology transfer in agricultural sector and the adaptation of agricultural technology and investment see Hayami and Ruttan (1985).

trade and exchange of agricultural commodities in these countries would be beneficial in helping accelerate economic growth. Japanese FDI also has a positive impact on growth in these sectors, although it is small. As discussed in the theoretical section, unlike trade which has direct impact on growth, FDI seems to have a complex effect on growth, and the agricultural sector which seems to be more constrained in absorbing benefits directly from FDI, would only receiving a small contribution from FDI. Even though there is some concern about the small amount of FDI contribution to the agricultural sector, these results imply that Japanese FDI has played a significant role in promoting growth.

In NON-AGRIBASE countries, agricultural GDP growth was strongly related to the availability of agricultural land, with a 1 per cent increase in land increasing agricultural growth by up to 3 per cent. This strong relationship may due to the fact that land used for agriculture has become scare for these countries, where alternative use for land may give higher benefits, thus resulting in a gradual decrease in land available for agricultural production. In contrast, labor had a negative impact on growth, possible due to export effects, since these countries are mostly importers of agricultural products rather than exporters. Consequently labor is unable to gain any improved productivity via exports causing the negative impact of labor on growth. Therefore, the export-led growth hypothesis probably does not work well in these countries. However, imports had a strong positive impact on growth, as a 1 per cent increase in imports lead to a 0.8 per cent increase in agricultural growth. These results might have been expected because these NON-AGRIBASE countries' economies are mostly agricultural importers and so do not rely much on agriculture. Consequently, trade variable also indicated that more trade liberalization in these countries could help stimulate agricultural growth. The impact of Japanese FDI on their agricultural growth was mildly positive, but it was not significant. Therefore it appears that the effect of Japanese FDI varies between countries/regions.

In AGRIBASE counties, Japanese FDI in the agricultural sector was mainly vertical investment (Sattaphon and Kiminami, 2006). In these countries Japanese MNE undertook FDI to establish production base because of the abundant resources available and exported most of the products back to the Japanese home market. Any remaining goods were sold to local markets or exported to third countries. Therefore, FDI improved the host economy growth via local employment, technological transfer and other spill-over effects. In contrast, FDI in NON-AGRIBASE countries has been mostly horizontal investment in order to access to their local markets, and therefore, this FDI has had little economic impact. Local employment has been increase, but there was no increase in agricultural productivity via technology transfer, since this kind of FDI competes with local production.

6. Conclusion Remarks

This study analyzed the impact of international trade and Japanese foreign direct investment (FDI) on growth in the agricultural sector of East Asian countries by applying the panel data econometric approach. The results indicated that, in the case of China, Malaysia, Indonesia, Philippines, and Thailand, exports are the most important factor contributing to growth. Moreover, import-led growth was also detected in these countries suggesting that importing capital or intermediate goods from abroad also helps to accelerate agricultural growth. Japanese FDI also had a positive impact on stimulating the growth process, but the effect was not large. In contrast, in Korea and Taiwan, agricultural growth was greatly affected by increased agricultural land use. Imports clearly had a more positive impact in stimulating agricultural growth than exports. However, there was only a slight positive impact of Japanese FDI on growth in these countries.

The finding of this study will help policy makers to understand the likely implications of possible future policies. The agricultural sectors of countries cannot rely solely on internal factors such as land and labor to promote agricultural growth. Agricultural growth requires more trade liberalization, especially when imports are an important factor for promoting growth. Attempting to lower imports e.g., import substitution policy would lead to retarded growth. Meanwhile, appropriate policies to attract Japanese FDI into the agricultural sector are also important in order to help accelerate growth in this sector.

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Table 1: Agricultural GDP and labor force share of the total economy (percentage)

Year / Country	1990 GDP	1990 LABOR	1997 GDP	1997 LABOR	2003 GDP	2003 LABOR
China	27.05	53.38	19.08	47.55	14.62	49.10
Indonesia	19.41	55.87	16.09	41.18	16.58	46.26
Malaysia	15.22	25.99	11.10	17.28	9.47	14.27
Philippines	21.91	45.20	18.87	40.38	14.44	37.21
Thailand	12.50	63.95	11.18	50.33	9.76	44.88
Korea	8.51	17.90	5.35	11.30	3.17	8.81
Taiwan	4.18	12.85	3.19	10.12	1.82	7.27

Source: Author's own calculation based on *Key Indicators of Developing Asian and Pacific Countries*, various issues, Asian Development Bank (ADB).

Table 2: Distribution of Japanese FDI during 1987 – 2003 (1000 US$)

Sector / Country	Food CASE	Food VALUE	Fishery CASE	Fishery VALUE	Agriculture&Forestry CASE	Agriculture&Forestry VALUE	Total CASE	Total VALUE
China	275	1060702	48	86859	34	39665	357	1187226
Indonesia	38	196176	103	135391	12	117127	153	448694
Malaysia	18	209852	6	125430	13	11527	37	346809
Philippines	12	645409	28	19647	8	25091	48	690147
Thailand	190	471664	5	7727	76	81008	271	560399
Korea	36	174621	0	126	2	4047	38	178821
Taiwan	48	122092	0	0	1	363	48	122455
Total	617	2880516	190	375180	146	278828	952	3534551

Source: *Financial Statistics Monthly*, various issues, Ministry of Finance, Japan.

Table 3: IPS Unit Root Test

Variable	W-tbar with Trend Level I(0)	W-tbar with Trend First Diff I(1)	W-tbar without Trend Level I(0)	W-tbar without Trend First Diff I(1)
LAGDP	-0.6912	-3.1512***	-0.0456	-5.1339***
LLAND	-1.3146	-2.1897	-0.8467	-4.6307***
LLABOR	-2.0149	-4.8418***	1.5102	-5.5514***
LEXP	-1.1803	-3.3901***	0.3094	-3.9663***
LIMP	0.0165	-3.8018***	-0.8875	-4.5887***
LTRADE	0.4013	-3.5452***	-0.6907	-3.2269***
LFDI	-3.7168***	-4.5695***	-2.9721***	-5.1758***

Note: 1) *** indicated significant from zero at 1%
2) Critical values for W-tbar with trend at 1%, 5% and 10% are -2.88, -2.66 and -2.54 respectively.
3) Critical values for W-tbar without trend at 1%, 5% and 10% are -2.24, -2.02 and -1.90 respectively.

Table 4: Pedroni Panel Cointegration Test

Panel Cointegration Test	**Test statistic (x)**
Panel v-statistic	-1.212
Panel rho-statistic	2.352
Panel pp-statistic	-3.775
Panel adf-statistic	-2.060
Group rho-statistic	3.332
Group pp-statistic	-5.004
Group adf-statistic	-1.825

Note: The Pedroni (1999) statistics are one-sided tests with a critical value of 1.65 ($x < -1.65$ implies rejection of the null), except the v-statistic that has a critical value of 1.65 ($x > 1.65$ suggests rejection of the null).The test include a constant and heterogeneous time trend in the data.

Table 5: The Fixed effects (FE) regression results of individual variables on the agricultural growth function

Explanatory variables	**ALL**				**AGRIBASE**				**NON-AGRIBASE**			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Land	1.191^{c}	-0.100	0.592^{a}	-0.263	1.530^{c}	-0.354	0.545	-0.588	3.028^{b}	1.112	2.215^{b}	2.197^{a}
	(0.374)	(0.387)	(0.322)	(0.584)	(0.412)	(0.471)	(0.386)	(0.706)	(1.235)	(0.994)	(0.968)	(1.149)
Labor	-0.093	0.456	0.0720	-0.102	0.571^{b}	-0.170	0.111	-0.259	-0.568^{a}	0.297	-0.083	0.245
	(0.144)	(0.152)	(0.127)	(0.212)	(0.232)	(0.252)	(0.212)	(0.362)	(0.311)	(0.302)	(0.265)	(0.331)
Exports	0.749^{c}				0.909^{c}				0.199			
	(0.070)				(0.078)				(0.219)			
Imports		0.471^{c}				0.463^{c}				0.812^{c}		
		(0.047)				(0.530)				(0.216)		
Trade			0.7604^{c}				0.760^{c}				0.782^{c}	
			(0.065)				(0.062)				(0.243)	
FDI				0.085^{c}				0.093^{b}				0.069
				(0.031)				(0.037)				(0.064)
Crisis	-0.239^{c}	-0.393^{c}	-0.281^{c}	-0.583^{b}	-1.191^{c}	-0.395^{c}	-0.292^{c}	-0.593^{c}	-0.408^{c}	-0.395^{c}	-0.200^{a}	-0.452^{c}
	(0.042)	(0.035)	(0.033)	(0.046)	(0.044)	(0.042)	(0.038)	(0.594)	(0.091)	(0.424)	(0.101)	(0.070)
Homogeneity												
F-test	28.931^{c}	28.931^{c}	28.931^{c}	28.931^{c}	32.351^{c}	32.351^{c}	32.351^{c}	32.351^{c}	23.870^{c}	23.870^{c}	23.870^{c}	23.870^{c}
R-square	0.8126	0.7992	0.8572	0.6427	0.8487	0.7892	0.8565	0.6090	0.8410	0.8910	0.8803	0.8427
F-test	117.06^{c}	107.44^{c}	162.14^{c}	48.57^{c}	106.54^{c}	71.14^{c}	113.43^{c}	29.59^{c}	37.04^{c}	57.24^{c}	51.49^{c}	37.51^{c}
No. obs.	119	119	119	119	85	85	85	85	34	34	34	34

Note: 1) All has intercept value and standard errors are in parentheses.

2) a, b and c indicate that the coefficient is significantly different from zero at 10%, 5% and 1% levels, respectively.

3) AGRIBASE comprises China, Malaysia, Indonesia, Philippines, Thailand and NON-AGBASE comprise Korea and Taiwan