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Effects of the 2008 Financial Crisis on developing Asia's Economic Growth

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Abstract

The aim of this paper is to study macro aspect of the virulent impacts of the 2008 financial crisis on Asian developing economies. To do this, we apply the Pedroni panel co-integration technique developed to examine the long-run relationship between economic growth, exports and inward FDI on a sample of selected Asian developing countries over the period 1995-2008. Our main finding is that FDI inflows and exports exert a significant and positive impact on developing Asia's economic growth. The 2008 global financial crisis is, therefore, likely to have a significant effect on developing Asia's economic growth through two main transmission channels - FDI and exports channels.

1. Introduction

The current financial crisis, which began in the U.S. and then spread to Europe, has now become global. While initial forecasts projected that the crisis would be limited to the most integrated economies, developing countries are now seriously hit by the current financial crisis and global economic slowdown. Although developing countries did not make this crisis, its effects have negatively reached developing countries through various channels and in different ways. In this turbulent context, more than ever prospects for sustaining global growth and stability seem to hinge on developing countries, particularly on the Asian emerging economies. Our paper, therefore, focuses on the possible impacts of the 2008 financial crises on developing Asia.

This paper starts with a brief discussion on the channels through which the 2008 financial crisis can affect developing Asia (*Section 2*). We then endeavour to econometrically investigate the impacts, real and expected, of this global crisis on developing Asia's economic growth through two main channels – foreign trade financial inflows (*Section 3*). For this purpose, we apply the panel co-integration technique developed by Pedroni (1999) to test for the long run co-integrated relationships between the variables in question. Next, the General Method of Moments (GMM) for a dynamic heterogeneous panel will be used to assess explicitly the transmission channels through which the 2008 financial crisis can hurt the Asian developing countries. We conclude this paper by discussing some policy guidelines referring to the main empirical findings (*Section 4*).

2. Possible Transmission Channels and Impacts of the 2008 Financial Crisis

Even though the 2008 crisis' outbreak was in developed economies, this crisis has already led to a real decline in economic growth of developing countries. The fact is that when the current financial crisis is transmitted, a developing country is more vulnerable if it has weak macroeconomic or undeveloped financial. The vulnerability degree of a developing country also increases with the number and size of linkages with the real economy and financial system of developed economies. This section, firstly, discusses the possible channels through which the financial crisis might be transmitted from an affected country to others, and secondly, provides a brief outline of the 2008 financial crisis' impacts on the Asian developing economies.

Decline in Exports Earning

The first important channel through which the financial crisis can be transmitted from developed to developing economies involves trade integration. If an economy experiences a shock such as a decline in imports demand, the exporting partner's trade balance of this economy will be adversely affected. Using a binary-probit model, Eichengreen and Rose (1999) tested whether bilateral trade linkages transmitted crises between industrial countries from 1959 to 1993. They find that the probability of a financial crisis occurring in a country increased significantly if the country had high bilateral trade linkages with countries in crises. Conducting a similar analysis with more countries from 1971 to 1997, Glick and Rose (1999) obtain a similar result. These two authors point out that trade linkages help explain cross-country correlations in exchange market pressure during crisis episodes, after controlling for other macroeconomic factors. In addition, Kaminsky and Reinhart (1998) show that sharing a common trade bloc will make an economy particularly susceptible to contagion of the financial crisis from a member economy. However, other researches have provided different answers to the role of trade on transmitting the financial crisis from a country affected to another one. Baig and Goldfajn (1998) suggest that trade was unimportant in the East Asian crisis because that the direct bilateral trade volumes between these economies were very small. Similar results were also obtained in Masson (1999) when the author analyses the Mexican crisis and the Asian crisis.

Turning now to the recent context, the 2008 financial crisis is likely to lead to a substantial decline in export earnings, since most developing countries have been basing their economic growth on

exports. The expected reductions in exports earnings come through a decline in demand for their goods from their country partners, especially, from developed countries. The negative effects of the current financial crisis in the U.S. and other developed countries such as G7 countries reduce the demand for their exports, since these markets are the important destinations of developing Asia's exports. *Figure 1* compares exports of goods and services as percentages of GDP of Asian developing countries over the period 1995 - 2008. The ongoing crisis is expected to slow export growth but the extent of the problem will only become apparent when data for 2009 become available. However, we observe that exports of goods and services as a percentage of GDP in 2008 were actually lower than in 2007 except the case of East Asia.

Decline in banking lending

While trade linkages play a significant role in transmitting the financial crisis from an economy affected to others, they cannot explain some cases of contagion effect, such as the one between Russia and Brazil in late 1990s, as these two countries did not have substantial trade links. In this case, the spread of financial crises may be determined by the degree of financial market integration between the economies concerned. For instance, a shock could begin with an international bank which then spills over to the real sectors of other economies through declines in banking lending. Kaminsky and Reinhart (2001) show that a common creditor may pull lending in an economy when a real shock in another economy has weakened its capital position. However, at the time of writing, this fear does not appear to be a significant concern in developing Asia. Fortunately, many Asian developing-country banks had limited interrelationships with international banks, in particular in China and in India, which have historically been less open to the global financial system than many other developing countries, and have retained capital controls.

Decline in financial inflows

The third main transmission channel is a decline in foreign capital flows. These flows include official development assistance (ODA), investment flows (both portfolio and foreign direct investment (FDI)), trade credits and flows of remittances. At the time of writing, the negative impacts of the current crisis on financial flows, in particular FDI, into Asian developing countries begin to be significant. Though FDI to Asian developing countries grew tremendously over the past seven years to a record high of over US$ 305 billion by 2007, it is expected that FDI flows in these countries have declined since 2008. The twelve economies in *Figure 2* typically account for well over 95% of FDI net inflows in Asian developing countries over the 3 years (2006 - 2008). This figure shows a very substantial increase in net FDI inflows over the last three year. However, a number of economies experienced a fall in net inflows of FDI in 2008. As a result, the total FDI for these twelve economies increased only 10.1% in 2008, compared with 40% in 2007. India, however, recorded a particularly sharp rise. This country has traditionally been wary of encouraging FDI because of its potential to induce financial instability if the foreign funds are rapidly withdrawn. This policy is now changing and India was the fourth largest recipient of FDI in 2008 among Asian developing countries. A fall in net FDI inflows can negatively affect the economic growth of Asian developing countries, since FDI is important channel to create new jobs, to transfer technology and managerial skills from more developed to less developed economies.

Together with declines in exports earning and capital flows, the economic growth of Asian developing countries has been down. *Figure 3* compares GDP growth rates of developing Asia over 2007-2008. While GDP growth rate was exceptionally high in 2007, this figure evidenced an important decline by the end of 2008. Particularly sharp declines in economic growth were recorded by Afghanistan, Taipei, Singapore. In sum, the current financial crisis is expected to slow economic growth of developing Asia but the extent of this the problem will only become more apparent when data for 2009 become available.

3. Impacts of the 2008 financial crisis on economic growth: An econometric analysis

Before delving into the econometric methodology, we outline some issues of our data set.

3.1. Data issues

As stated above, this paper is aimed at investigating possible impacts of the 2008 crisis on economic growth of developing Asia through export and FDI channels. Given this aim, we endeavour to make maximum use of both the time and cross-country dimensions of available data sets. So that, instead of a short span data covering only the most updated Asian data during the current crisis (since 2008), we use an extended set of panel data covering annual data of thirty Asian developing countries[1] from 1995 to 2008 to carry out our empirical analysis and to make econometric results more confident. The variables studied are identified as follows:

- EX_{it}: Exports per capita from country i at year t.

- FDI_{it}: FDI per capita into country i at year t.

- GDP_{it}: GDP per capita of country i at year t.

Our panel data are collected from Asian Development Bank Database at 1995 constant price and are expressed in logarithms to include the proliferate effect of time series and adjusted by GDP deflator to remove the influence of inflation. Two control variables are also included in our models:

- The first one is the Country Risk variable (labelled $control_{it}$), which is measured by the natural log value of International Country Risk Guide's (ICRG) country risk composite score. This variable controls for the institutional quality's impact.

- The second one is the real exchange rate of country i at year t (denoted RER_{it}) that is calculated as the product of the nominal exchange rate and relative price levels in each country. The RER is added as a control variable because of its potential role in influencing growth through its effects on the adjustment to economic shocks and through its influences on other determinants of economic growth, such as investment and international trade.

$$RER_{it} = e_{it} \times \frac{p_t^{USA}}{p_{it}} \tag{1}$$

where p_t^{USA} is the price level of the U.S., p_{it} is the price level of Asian country i, and e_i is the nominal exchange rate (IMF, International Financial Statistics, line 00rf) between the domestic currency and the U.S. dollar. e_{it} is the nominal exchange rate of country i at the time t. To construct the RER, we use the most commonly used price series that are consumer price indices (CPI) (IMF, International Financial Statistics, line 64, base year 1995).

3.2. Methodology and Empirical results

In the literature, many empirical works have employed the classical Gravity method to address the question of how financial crises affect bilateral foreign trade (e.g. Ma and Cheng, 2003; Berman, 2009). Including the crisis variables in an augmented Gravity model, Ma and Cheng (2003) argue that imports will fall during and after the crisis while exports will increase during but decrease after the crisis. Later, also applying the Gravity method, Berman (2009) predicts that both currency and banking crises have a long-lasting negative impact on bilateral foreign trade. However, the Gravity method is likely to allow assessing only impacts of financial crises on bilateral trade in these cited studies, since the Gravity method has been known as a specific one widely used to estimate bilateral trade value. For this reason, to capture fully impacts of the 2008 financial crisis on exports, FDI and

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[1] **Central and West Asia**: Armenia; Azerbaijan; Georgia; Kazakhstan; Kyrgyz; Pakistan; Tajikistan; Turkmenistan; Uzbekistan. **East Asia**: China; Hong Kong - China; Korea; Mongolia; Taiwan. **South Asia**: Bangladesh; Bhutan; India; Maldives; Nepal; Sri Lanka. **Southeast Asia**: Brunei Darussalam; Cambodia; Indonesia; Lao PDR; Malaysia; Myanmar; Philippines; Singapore; Thailand; Viet Nam.

economic growth as well, instead of using the Gravity equation, we employ the modern dynamic panel techniques including the Pedroni cointegration (1999) and the GMM estimator of Arellano and Bond (1991).

Unit root tests

First of all, it is necessary to verify the stationarity of each variable in question by performing simultaneously two following unit root tests. The first one is the Levin, Lin and Chu test (2002) (LLC test henceforth). The LLC test is viewed a pooled Dickey-Fuller test, or an Augmented Dickey-Fuller (ADF) test when lags are included, with the null hypothesis that of non-stationarity (I(1) behaviour). The second one is the Im, Pesaran and Shin test (1997) (IPS test henceforth), which is based on the mean of the individual Dickey-Fuller t-statistics of each unit in the panel and also assumes that all series are non-stationary under the null hypothesis. The IPS is called as a "Heterogeneous Panel Unit Root Test" and considered to be more general than the LLC test because of allowing for heterogeneity in dynamic panel.

Statistic results of the LLC and IPS tests are reported in *Table 1*. In both LLC and IPS tests for the levels, the small negative statistics values for each variable do not exceed the critical values (in absolute terms). However, when we take the first difference of each variable, the large negative statistics indicate rejection of the null of non-stationarity at least 1% level of significance. We can conclude that all variables are non-stationary and integrated of order one in level but integrated in order zero at least 1% level of significance after being differenced once.

Panel co-integration Test

Having established that the variables are integrated of the first order, the second step is to determine the nature of the long-run relationship among the variables studied. To do this, we employ the panel co-integration test developed by Pedroni (1999). The Pedroni test, which makes use of a residual-based ADF test, allows different individual cross-section effects by allowing for heterogeneity in the intercepts and slopes of the co-integrating equation. Together with assessing impacts of exports and FDI on economic growth, we also investigate the possible linkages between FDI inflows and exports in developing Asia. Additionally, our research based on annual data necessitates making an allowance for the possibility that the annual observations on each individual series (GDP, exports and FDI) can not represent long-run equilibrium values in any given year due to the slow adjustment of other explanatory variables. For this reason, the relationship between economic growth, exports and FDI is modelled in the dynamic equations, which include a lagged dependent variable, as follows:

$$GDP_{it} = \alpha_1 + \beta_{10}GDP_{it-j} + \beta_{11}EX_{it-j} + \beta_{12}FDI_{it-j} + \beta_{13}RER_{it-j} + \beta_{14}control_{it-j} + \varepsilon_{1it} \qquad (2)$$

$$EX_{it} = \alpha_2 + \beta_{20}EX_{it-j} + \beta_{21}FDI_{it-j} + \beta_{22}GDP_{it-j} + \beta_{23}RER_{it-j} + \beta_{24}control_{it-j} + \varepsilon_{2it} \qquad (3)$$

$$FDI_{it} = \alpha_2 + \beta_{30}FDI_{it-j} + \beta_{31}EX_{it-j} + \beta_{32}GDP_{it-j} + \beta_{33}RER_{it-j} + \beta_{34}control_{it-j} + \varepsilon_{3it} \qquad (4)$$

where $i = 1,...,30$ countries, $t = 1,...,14$ period observations and j is the value of lagged level. In all equations, the term $\varepsilon_{it} = \rho_i \varepsilon_{i(t-1)} + \xi_{it}$ is the deviation from the modelled long-run relationship. If the series are co-integrated, ε_{it} should be a stationary variable. In Equations 3-4, GDP_{it} is used as another control variable since economic growth has motivated inward FDI, which, in turn, have stimulated the production of export-oriented sectors.

The null hypothesis in the Pedroni test is whether ρ_i is unity. The Pedroni technique not only permits to test for the co-integrated relationship between the variables studied under four different models, but also provides seven different statistics for the test of the null hypothesis of no co-integration in heterogeneous panels. The first group of tests is termed "within dimension" including the "panel v-stat" and the "panel rho-stat", which are similar to the Phillips and Perron (1988) test and the panel pp-stat (panel non-parametric) and the "panel adf-stat" (panel parametric), which are

analogous to the single-equation ADF-test. The second group of tests calling "between dimensions" is comparable to the group mean panel tests of Im et al. (1997) and includes three tests: group rho-stat; group pp-stat; and group adf-stat. All of the Pedroni statistics under different model specifications are reported in Table 2. Large negative values for most of all seven deferent statistics (except for panel v-stat value) under the different models allow the rejection of the null hypothesis of no co-integrated relationship among the variables in question at the 1% significance level. We can, therefore, conclude the long-run co-integrated relationship among the variables in all three equations.

Panel causality tests

Now, to assess the possible effects of exports and FDI inflows on the economic growth of Asian developing countries, we employ the General Method of Moments (GMM) suggested by Arellano and Bond (1991). The choice of this methodology can be explained by several reasons. First, as mentioned above, the lagged dependent is also introduced in all estimated equations. This inclusion can lead to a correlation between the regressors and the error term. According to Nickell (1981), this correlation can make three dynamic panel Equations 2-3-4 to suffer from the estimation bias. Among other methods, which can correct the country specific effects as well as the time-specific effects, the GMM technique is preferred estimator. Second, the GMM technique allows getting rid of any endogeneity in explanatory variables. Finally, by differencing the GMM estimation ensures that all variables of interest are stationary.

The first key test is serial correlation tests, often labelled "*m1*" for first-order and "*m2*" for second-order serial correlation. We expect to find first-order serial correlation in the first differenced residuals. The key problem arises if there is second or higher order serial correlation, as this would suggest that some of the moment conditions are invalid. The second key test is the Sargan test to assess the model specification and over-identifying restrictions, whether the instruments, as a group, appear exogenous. This test is also known in the GMM context as the Hansen's J test. However, a problem with the original Arellano-Bond estimator is that lagged levels are often weak instruments for first differences, in particular for variables that are close to a random walk. So that, for robustness check, we employ the System-GMM technique suggested by Blundell and Bond (1998). Applying the GMM technique, Equation 2, for instance, can be rewritten as follow:

$$\Delta GDP_{it} = \beta_{10}\Delta GDP_{it-j} + \beta_{11}\Delta EX_{it-j} + \beta_{12}\Delta FDI_{it-j} + \beta_{13}\Delta RER_{it-j} + \beta_{14}\Delta control_{it-j}$$
$$+\lambda_{11}DU\_crisis + \lambda_{12}DU\_recession + \Delta \xi_{1it} \tag{2.1}$$

We include in Equation 2.1 two separate dummies. The first one denoted D*U_crisis* takes the value of 1 from 1997 to 1999 and in 2008, and 0 in all other periods to account for the appearance of two financial crises over the studied period - the 1997 Asian crisis and the 2008 financial crisis. On the other hands, one of the main objectives is to address the question of why the 2008 crisis breaking in developed countries can hit economic growth of Asian developing countries. As discussed in Section 2, the 2008 crisis can affect Asian developing economy through several channels and the most important one is the export channel. It also implies that if a developing country more opened their doors to international trade with developed countries in 2007, it would be more vulnerable to the 2008 crisis. This phenomenon is captured by including the second binary dummy denoted *DU_recession*. To determine the value of this dummy, we first calculate the 2007 economy's dependence degree (denoted Dd_i^{2007}) of each developing country on its exports to developed countries, as follow:

$$Dd_i^{2007} = \frac{EX_{dev}^{i,2007}}{EX_{total}^{i,2007}} \tag{5}$$

where $EX_{dev}^{i,2007}$ and $EX_{total}^{i,2007}$ are exports to developed countries and total exports of Asian country i in 2007 respectively. Second, we determine the average value of these dependence degrees, which is equal to 38.9 per cent in 2007. Then, we consider that *DU_recession* takes the value of 0 if the dependence degree of Asian country *i* is less than 38.9% and 1 in the opposite case. In other words,

the inclusion of this second dummy helps us to control for the global contagion effect of the 2008 financial crisis.

Results of both dynamic GMM estimator and System-GMM estimator are reported in Table 3. As shown in this table, the results of system-GMM estimator seem to be similar to those obtained from the GMM estimator. On one hand, the coefficient of lagged dependent variable estimated by System-GMM is close to that of dynamic GMM estimator. On the other hands, in spite of the difference in intensity, other coefficients obtained from System-GMM estimator have the same sign and are also significant as those in GMM estimator. This supports the robustness of our dynamic GMM results.

First, the results of the Sargan test and the serial correlation test are in the lower part of *Table 3*. On one hand, the Sargan test p-value basically suggests our instruments as a group are exogenous. On the other hand, the null hypothesis of serial correlation tests assumes no serial correlation. First order serial correlations (*m1*) are expected because of first differencing, p-values obtained suggest no significant second order serial correlation (*m2*). These two results imply that our explanatory satisfy the required orthogonal conditions.

Second, in the GDP model, exports and FDI inflows variables maintain positive and statistically significant coefficients. This means that an increase/decrease in exports and FDI inflows will increase/decrease GDP of the Asian developing countries. Similarly, in the exports and FDI models, we find an evidence of a significantly positive causality between FDI and exports. These results are consistent with our descriptive statistics, meaning that FDI inflows are oriented in the export sectors, and the rapid growth of export sectors, in turn, attracts FDI into developing Asia.

Thirdly, the estimated coefficients of two control variables are positive and significant in all FDI and Exports models. This means that when the domestic currency depreciate with respect to the US dollar (for example, when RER_{it} increases), there is a corresponding increase in FDI into and exports from Asian developing countries. For instance, 1% depreciation in the domestic currency causes an increase in FDI and exports of 0.03% and 0.02% respectively (with respect to the dynamic GMM results). A positive and significant value of RER variable in the GDP model also supports that the exchange rate policy can affect the economic growth of the developing Asia zone, directly and indirectly through FDI and export channels. On the other hand, our results suggest the role of ICRG variable in determining cross country differences of economic aspects. The control variable – ICRG country risk rating (proxy for institutions, higher rating means lower risk) appears in the FDI and exports models to be significant, and their slope coefficients are usually positive. In other words, an increase in ICRG score, meaning a decrease in country risk may promote FDI into and exports from Asian developing countries.

We now pay a special attention to the interaction between two dummies and the dependent variables. The estimated coefficients of *DU_crisis* are negative and statistically significant in all regressions and those of *DU_recession* are also significantly negative but pretty small. It implies that the appearance of any financial crisis – either the 1997 Asian financial crisis or the 2008 financial crisis – significantly and negatively hit inward FDI, exports and then economic growth of developing Asian. On the other hand, the significant values of *DU_recession* coefficient allows us to conclude the role of trade integration (export flows in this case) in transmitting the 2008 financial crisis from developed countries to Asian developing countries. In other words, the global contagion effect of the current crisis is due to the bilateral trade between the developed and developing worlds. However, this effect is pretty weak and may be explained by two main reasons:

i) The first one is that developing Asia is more and more reducing their dependence on international trade with developed countries – the origin of the 2008 financial crisis. In fact, the developing Asia's trade is mainly within the Asia zone. Figure 4 depicts the change in destinations of merchandise exports for twelve major exporters among Asian developing countries. The biggest export market for all Asian developing economies is the Asian market, except the case of Kazakhstan, with nearly 60% of its exports (mainly petroleum products) going to Europe.

ii) The second one refers to the sources of FDI flows into the Asian developing countries. After the 1997 financial crisis, the Asian developing countries have tended to enlarge either the regional trade integration or the regional financial integration. To demonstrate this consideration, we take into account the case of ASEAN, which is one of the most dynamic economic zones in Asia. From Figure 5, which plots the share of FDI into ASEAN by country sources, we observe a significant change in inward FDI trends. Recently, since 2007 the Asian NIEs (including Korea, Hong Kong and Taiwan) have become the most important FDI source of ASEAN. More interestingly, instead of FDI from the U.S., an important source of investments for ASEAN has come from the ASEAN member states. It means that the ASEAN zone, in particular and the Asian developing countries, in general reinforce their intra-regional integration in order to reduce their economic dependence on developed countries. Still, we can not ignore the important role of FDI from developed countries in promoting economic growth of Asian developing countries. That is why the 2008 financial crisis, which broke in advances countries, has been rapidly transmitted over the world.

Finally, this paper also evidences a bidirectional causality between exports and inward FDI, suggesting that Asian developing countries have succeeded in the export-oriented development strategy by allowing FDI to promote exports sectors. The fast growth of exports in the latter has attracted FDI into developing Asia. Yet, this existing causality may make the countries more vulnerable to the current financial crisis. Since the financial bubble beginning in developed countries leads to a fall in capital flows from these countries to developing Asia, in particular FDI. A decline in FDI, in turn discourages the growth of export sectors.

4. Implications and Closing Remarks

Our major findings suggest that the Asian developing governments are required to take immediate and short-term policy responses to minimize the impacts of the 2008 financial crisis. In other words, the policy responses would ensure that (i) the 2008 financial crisis will be contained, that (ii) financial systems' confidence is restored and that (iii) the impact on the real economy is minimised (Naudé, 2009). Projecting the key responses listed by Naudé (2009) in the case of developing Asia, some contemporarily relevant policy lessons should be required.

Firstly, the continued liberalisation, in both terms finance and trade, in developing countries under the guise of "free trade" agreements with developed countries needs to be challenged.

Secondly, as stated above, a decline in foreign capital flows is one of the main channels through which the current financial crisis may affect developing countries. Therefore, it is necessary that financial flows are as diversified, and as predictable, as possible. It is better to have a mix of domestically generated and foreign flows. In this case, increasing tax revenues may help Asian developing government to raise their domestic flows.

For conclusion, needless to say opening up the economy to foreign capital flows, particularly FDI flow, is one of the most important sources of economic growth as well as plays a determinant role in encouraging the exports of developing countries. Nevertheless, during the financial crisis period, a fall in FDI flows from developed countries has discouraged exports and then economic growth of developing countries. FDI has, therefore, become a main cause of propagating the 2008 financial crisis over the world. In other words, opening up the economy to foreign capital flows (meaning financial openness) without deepening the domestic financial system (meaning financial development) will make a developing country more suffer from the ongoing financial crisis. This suggests an open question of whether, in the long-run, financial openness or financial development is more ideal to encourage exports and then economic growth of the developing world. We leave this issue for the further research.

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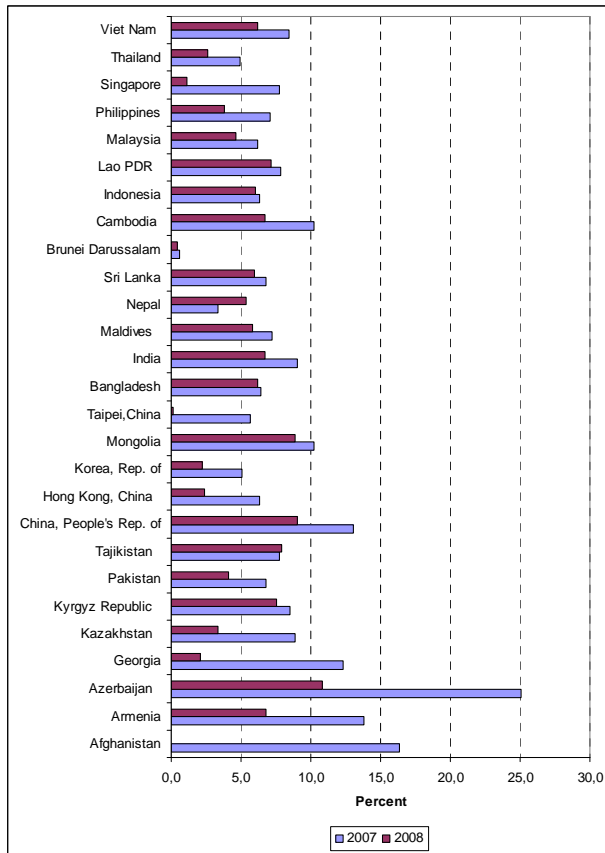**Figure 1: Exports of Goods and Services as a percentage of GDP, 1995-2008**
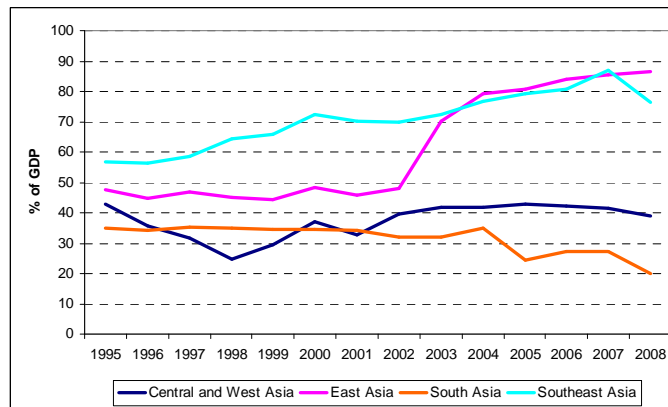
Source: Created from ADB database 2009

Figure 2: Net Inflows of Foreign Direct Investment 2006 – 2008
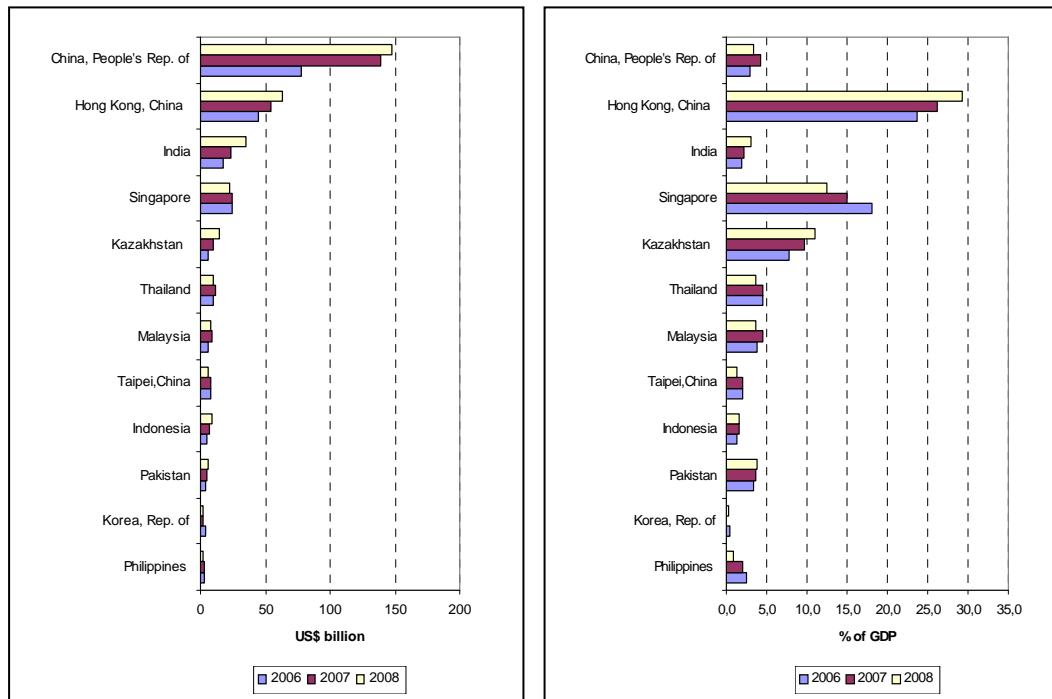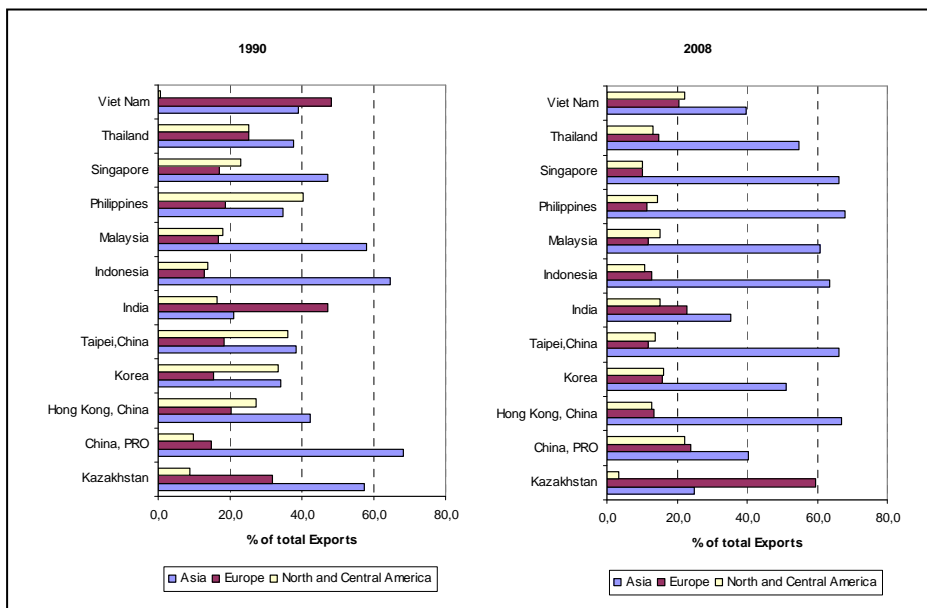

Source: Created from ADB database 2009

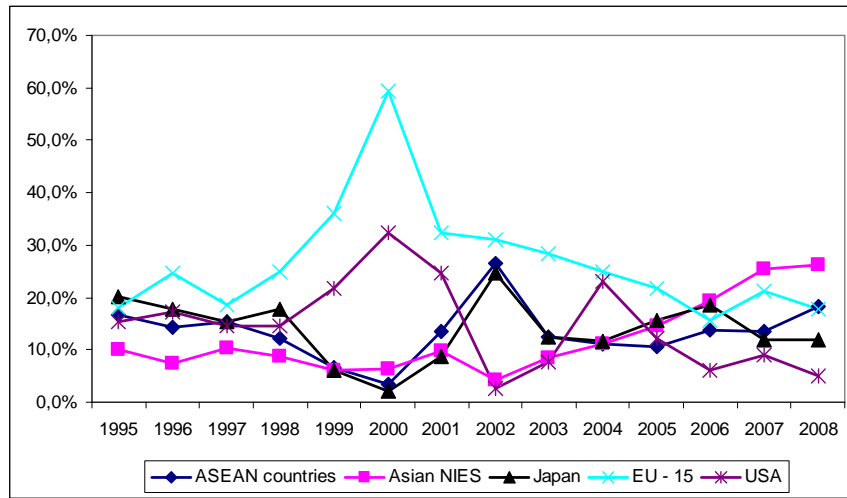**Figure 3: Real GDP Growth Rates, 2007 and 2008**

Source: Created from ADB database, 2009

Figure 4: Destination of Merchandise Exports

Source: Created from ADB database, 2009

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Figure 5: Structure of FDI flows into ASEAN

Source: Created from ASEAN Secretariat Database, 2009

Table 1: Panel unit root tests

		GDP_{it}	EX_{it}	FDI_{it}	RER_{it}	$control_{it}$
LLC Test	**Level**					
	(1)	-2.26	2.31	-1.89	-1.45	-1.52
	(2)	-1.08	2.19	-2.53	-1.63	-1.09
	(3)	-0.47	-2.63	-1.06	1.07	-1.49
	First Difference					
	(1)	4.63**	-4.75***	-5.45**	-5.03**	-6.10**
	(2)	-5.89**	-5.10***	-7.67*	-5.26**	-6.28**
	(3)	-11.97***	-9.32***	-13.49***	-10.90**	-8.32***
IPS test	**Level**					
	With common time effect					
	(1)[a]	-0.58	0.39	-1.04	-2.842	-1.38
	(2)[b]	-1.05	-1.78	-1.48	-2.860	-1.80
	Without common time effect					
	(1)[a]	-1.54	-0.91	-1.01	-1.260	-1.244
	(2)[b]	-1.96	-1.44	-1.70	-1.105	-1.859
	First Difference					
	With common time effect					
	(1)[a]	-2.53***	-2.15***	-1.91***	-2.11***	-1. 94**
	(2)[b]	-2.59***	-2.61***	-2.39**	-2.39**	-.79***
	Without common time effect					
	(1)[a]	-2.07***	-2.62***	-2.19***	-2.35**	-2.66**
	(2)[b]	-2.49***	-2.82***	-2.51***	-3.32***	-2.58**

*(1): Model with heterogeneous intercepts. (2): Model with heterogeneous intercepts and heterogeneous trend. (3): Model without heterogeneous intercepts. *** (**; *): Rejection of the null hypothesis at the 1%, 5% and 10% significance level respectively. [a]: The critical value at 1%, 5% and 10% is -1.83,-1.74 and -1.69 respectively. [b]: The critical value at 1%, 5% and 10% is -2.48, -2.38 and -2.33 respectively.*

Table 2: Pedroni panel co-integration test

GDP Model

	M1	M2	M3	M4		M1	M2	M3	M4
panel v-stat	1.45	-1.83	-3.75	0.06	group rho-stat	-12.85	-10.66	-10.40	-11.95
panel rho-stat	-5.82	-3.23	-8.22	-4.42	group pp-stat	-16.19	-13.39	-14.01	-12.96
panel pp-stat	-14.04	-13.10	-12.76	-9.60	group adf-stat	-11.36	-10.09	-9.36	-9.62
panel adf-stat	-11.66	-10.40	-8.91	-7.04					

Exports Model

	M1	M2	M3	M4		M1	M2	M3	M4
panel v-stat	1.62	-2.95	-3.03	2.01	group rho-stat	-14.01	-10.62	-11.47	-5.36
panel rho-stat	-6.66	-8.84	-4.17	-8.50	group pp-stat	-15.18	-12.52	-19.94	-21.72
panel pp-stat	-12.68	-11.72	-18.72	-18.42	group adf-stat	-12.14	-7.65	-13.70	-16.17
panel adf-stat	-10.65	-8.90	-13.38	-14.31					

FDI Model

	M1	M2	M3	M4		M1	M2	M3	M4
panel v-stat	1.01	-3.75	-4.36	0.39	group rho-stat	-5.22	-11.65	-10.11	-5.11
panel rho-stat	-8.52	-4.60	-3.60	-8.06	group pp-stat	-22.75	-22.91	-19.89	-19.60
panel pp-stat	-18.85	-21.36	-17.17	-15.71	group adf-stat	-10.47	-12.75	-12.47	-12.95
panel adf-stat	-11.32	-12.55	-12.50	-12.46					

M1: Model with heterogeneous trend and ignoring common time effect. **M2:** Model with heterogeneous trend allowing common time effect. **M3:** Model without heterogeneous trend allowing common time effect. **M4:** Model without heterogeneous trend ignoring common time effect.

Table 3: GMM causality test

		GMM estimator			System-GMM estimator		
		GDP	EX	FDI	GDP	EX	FDI
Independent Variables	GDP_{it}	0.86***	0.53***	0.92**	0.91***	1.41***	1.60**
		(0.06)	(0.11)	(0.17)	(0.02)	(0.14)	(0.44)
	EX_{it}	0.60***	0.54***	0.50***	0.14***	0.62***	0.43**
		(0.01)	(0.06)	(0.02)	(0.014)	(0.03)	(0.12)
	FDI_{it}	0.72**	0.60***	0.40***	0.52***	0.64***	0.42***
		(0.05)	(0.007)	(0.07)	(0.001)	(0.006)	(0.04)
	RER_{it}	0.002**	0.07**	0.03**	0.04***	0.12***	0.60**
		(0.001)	(0.03)	(0.007)	(0.009)	(0.03)	(0.26)
	$Control_{it}$	0.01	0.14*	1.60***	0.009	0.08*	0.94**
		(0.01)	(0.05)	(0.57)	(0.02)	(0.03)	(0.30)
DU_crisis		-0.05**	-0.29**	-0.23*	-0.05***	-0.17**	-0.54***
		(0.01)	(0.03)	(0.08)	(0.006)	(0.02)	(0.18)
$DU\_recession$		-0.0001**	-0.0003**	-0.0005***	-0.0005**	-0.0001*	-0.0060***
		(0.00005)	(0.00001)	(0.00009)	(0.00008)	(0.00004)	(0.0023)
Constant		0.01***	0.01***	0.12*	-	-	-
		(0.002)	(0.006)	(0.06)			
Sargan/Hansen P-value		0.9050	1.0000	0.8035	0.904	0.802	0.803
Serial Corr. (m1) P-value		0.0000	0.0000	0.0000	0.000	0.000	0.000
Serial Corr. (m2) P-value		0.2283	0.1512	0.4131	0.381	0.221	0.754

Values in parentheses are robust standard errors. *** (**; *): Significant at 1%, 5% and 10% level respectively.