

# Financial Development, Financial Openness and Trade Openness: New evidence

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## **ABSTRACT**

This paper aims at investigating the linkages among financial development, financial openness and trade openness in twenty-nine Asian developing countries over the period 1994-2008. Employing the Pedroni co-integration technique, our research provides a number of major findings. The first one supports an evidence of bidirectional causality between trade openness and financial development/openness. This means that opening up the economy to trade seems to be a precondition for financial development and financial openness, which, in turn, allow developing countries to generate gains in terms of trade openness. The second one suggests that the relationship between financial development and financial openness is heterogeneous, as well as its variation across different measures. Finally, this paper provides a complementary contribution to earlier studies as asking for the question of whether the inclusion of financial crisis in estimated models can change the nature of the relationship between financial development and both types of openness.

**Key words:** Financial development; Financial Openness; International Trade; Financial Crisis; Developing countries; Panel Co-integration.

**JEL Classification:** D90, F14, F36, G01, O16

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## 1. Introduction

The abundance of theoretical as well as empirical researches has strongly argued the possible links between financial development and financial/trade openness, particularly in the case of developing countries. These researches can be characterized in two groups: i) one investigates the role of financial development/openness on generating gains in terms of trade openness; ii) the other one discusses the possibility that financial/trade openness can influence the development of financial system.

Firstly, in terms of financial development, Kletzer and Bardhan (1987) show that countries with a relatively well-developed financial sector have a comparative advantage in industries and sectors that rely on external finance. Extending this argument and allowing both sectors to use external finance, one being more credit intensive due to increasing returns to scale, Beck (2002) finds that the level of financial development has an effect on the structure of the trade balance. On one hand, reforming the financial sector might have implications for the trade balance if the level of financial development is a determinant of countries' comparative advantage. On the other hand, the effect of trade reforms on the level and structure of the trade balance might depend on the level of financial development. More recently, in building a model with two sectors, one of which is financially extensive, Do and Levchenko (2004) find that openness to trade will affect demand for external finance, and thus financial depth, in the trading countries. In particular, their model predicts that in wealthy countries, trade should be associated with faster financial development. By contrast, in poor countries, more trade should lead to slower financial development, as these countries import financially intensive goods rather than develop their own financial system.

Secondly, several papers focus on the theoretical links between trade and financial openness, which is measured by the level of openness to foreign capital flows, especially FDI flows. In examining whether FDI and trade flows are complements or substitutes, Swenson (2004) suggests a theory to support her findings of complementarities at a high level of data aggregation and substitution effects at the product level. Aizenman and Noy (2004), on the other hand, confirm the presence of almost symmetric inter-temporal feedbacks between trade and financial openness. Furthermore, in order to reinforce their previous analysis – having established the presence of strong way inter-temporal feedbacks between trade and financial openness, Aizenman and Noy (2006) examine the strength of the inter-temporal feedbacks between disaggregate measures of trade and financial openness in developing countries. They find that for many developing countries in recent years, there has been an increase in FDI flows and trade in manufacturing and services and that these are linked.

Comparing with the large body of work investigating the links between financial development and trade, and between financial openness and trade, many recent empirical studies have begun to reveal the possible linkages among financial development, financial openness and trade openness at once (e.g. Rajan and Zingales (2003) and Baltagi et al. (2009)). Rajan and Zingales's analysis, basing on a panel data of twenty four countries mostly industrialised during the period 1913-1999, suggests that the simultaneous opening of both trade and capital accounts holds the key to successful financial

development. In the light of Rajan and Zingales hypothesis and using modern panel data techniques, Baltagi et al. (2009) address an empirical question of whether trade and financial openness can help explain the recent pace in financial development, as well as its variation across countries in recent year. Their finding, which only provides a partial support to the Rajan and Zingales hypothesis, suggests that trade and financial openness are statistically significant determinants of banking sector development. However, these two studies have only focused on the one-way relationship running from financial/trade openness to financial development, but have not yet reveal this relationship in opposite way. In addition, in these two cited researches, the relationship between financial development and openness has only been examined in models without the financial crisis variable. The fact is that the appearance of financial crisis may change the nature of relationship between financial development and financial/trade openness. Therefore, needless to say introducing a financial crisis variable in estimated models should be asked for in the empirical researches.

We know that openness, which is explained by opening up the economy to foreign capital flows (including official development assistance (ODA), investment flows (both portfolio and foreign direct investment (FDI)), trade credits and flows of remittances) and to trade, has been one of the most important sources of economic growth in developing countries. Nevertheless, in the current virulent situation, both types of openness have become the main channel through which the 2008 financial crisis can affect developing countries. For example, though FDI to Asian developing countries grew tremendously over the past seven years to a high record of over US\$ 305 billion by 2007 (ADB, 2009), it is expected that FDI flows in these countries have declined since 2008. A fall in net inflows of FDI can negatively affect the economic growth of Asian developing countries. Because FDI is an important factor to promote international trade, to create new jobs and to transfer technology and managerial skills from more developed to less developed economies.

Earlier studies (Rajan and Zingales (2003) and Baltagi et al. (2009)) suggest that financial openness and trade openness are a precondition for financial development. However, the development of a domestic financial system, which depends so much on financial flows from and trade flows with developed countries, can make the 2008 financial crisis spread rapidly from developed countries to developing countries (so-called contagion effect). Thus, in developing countries, building a well developed domestic financial system without depending much on financial/trade openness should have on policy makers' long-run agendas. Domestic financial depth would allow the developing countries to face the future financial instability.

The aim of this paper is, therefore, to resolve the two issues outlined above, which have not yet deal with in earlier empirical researches. First, we tend to examining the possible two-way causality between financial development and financial/trade openness. Second, introducing a binary financial crisis dummy in all estimated models, we investigate the financial crisis' impacts on the relationship between the variables of interest. To do this, we apply a panel co-integration technique developed by Pedroni (1999) and dynamic panel estimation techniques of Arellano and Bond (1991) for a sample of

twenty nine selected Asian developing countries over the period 1995-2008. In detail, we use two different indicators - the ratio of liquid liabilities to GDP and the ratio of private credit to GDP - to capture the financial development level, and use the ratio of total capital inflows to GDP to measure the level of financial openness. We also include the Country Risk variable as control, which is measured by the natural log value of International Country Risk Guide's (ICRG) country risk composite score comprising 22 risk components in three subcategories of risk: political, financial, and economic.

The remainder of this paper is organised as follows. *Section 2* describes the data set. *Section 3* specifies the econometrical methodology employed. *Section 4* reports and discusses the empirical results. This section also compares the major findings with the ones of earlier related studies and outlines the main policy implications. Concluding remarks follow in *Section 5*.

## **2. Measures and data issues**

This section outlines individual measures of financial/trade openness and financial development and then builds our panel data set covering annual data of Asian developing countries from 1994 to 2008. The Asian developing countries studied in this paper are listed in *Appendix A*.

### ***Financial Openness***

We begin with a discussion on the possible measures of financial openness, which are distinguished by being considered as “*de facto*” or “*de jure*” measures. The *de facto* measure is the financial globalisation indicator constructed by Lane and Milesi-Ferreti (2006). This indicator is defined as the volume of a country's foreign assets and liabilities (% of GDP). The *de jure* measure is the Chinn and Ito (2006) index of capital account openness (KAOPEN). The authors constructed this measure from four binary dummy variables that codify restrictions on cross-border financial transactions reported in the IMF's Annual Reports on Exchange Arrangements and Exchange Restrictions. Beside these two measures, basing on an annual data for a group of 34 developed and developing countries for the period 1980-1996, Abiad and Mody (2005) provided another financial liberalisation index. This index captures six different aspects of liberalisation, including credit controls, interest rate controls, entry barriers, regulations, privatisation, and international transactions. Comparing with other index, the one of Abiad and Mody (2005) has a much wider range than most other indicators of financial liberalization - from 0 to 18.

*De jure* and *de facto* measures are used in almost empirical researches, more recently in Baltagi et al. (2009). In this paper, we can not, unfortunately, deploy all types of these measures due to the data unavailability. Following Lane and Milesi-Ferretti (2006), we only use two *de facto* measures of financial openness. The first one is to measure the openness to foreign direct investment (FDI), which is calculated as a ratio of total FDI inflows to GDP in U.S. dollars and obtained from Asian Development Bank (ADB) database. The second one, related to control of capital flows, is calculated

as a ratio of *Gross private capital flows to GDP* in U.S. dollars. Data is collected from World Development Indicators (WDI), available annually. Gross private capital flows are the sum of the absolute values of direct, portfolio, and other investment inflows and outflows recorded in the balance of payments financial account, excluding changes in the assets and liabilities of monetary authorities and general government.

### ***Financial Development***

There is a large literature discussing the possible measures of financial development. For measuring overall financial development, the most popular measure is the ratio of liquid liabilities to GDP (labelled *LLY*). Basing on the liquid liabilities of the financial system, this measure has been used in King and Levine (1993). This measure can be too high in countries with undeveloped financial markets. Other standard measures are the ratio to GDP of credit issued to the private sector by banks and other financial intermediaries (labelled *PRIVO*) and the ratio of the commercial bank assets to the sum of commercial bank assets and central bank assets (labelled *BTOT*).

Beck et al. (2000) includes two other measures of the efficiency of financial intermediation. The first one is the ratio of overhead cost to total bank assets, denoted *OVC*. The second one is the Net Interest Margin (*NIM*) equals the difference between bank interest income and interest expenses, divided by total assets. On the other hand, Levine and Zervos (1998) take into account three different measures of stock market capitalisation. The first one is the value of listed companies on the stock market as share of GDP in a given year (*MCAP*). The second one is Total Value Traded (*TVT*), which is the ratio of trades in domestic shares to GDP and is considered as an indicator of stock market activity. The last one is the Turnover Ratio (*TOR*) considered as the ratio of trades in domestic shares to market capitalisation. A potential problem is that three measures used in Levine and Zervos (1998) are not available prior to 1975.

Using a principal components analysis, Huang and Temple (2005) aggregate different sets of standard indicators into six new measures of financial development. The first one is designed to capture overall financial development, and is denoted *FD*. This measure is based on the complete set of eight components, namely *LLY*, *PRIVO*, *BTOT*, *OVC*, *NIM*, *MCAP*, *TVT* and *TOR*. The second one, namely *FDSIZE*, is effectively the average of *LLY* and *MCAP*, and provides a summary of the combined importance of bank-based and equity-based finance, relative to GDP. The third one, *FDEFF*, is designed to capture financial efficiency, and is based on *OVC*, *NIM*, *TVT* and *TOR*. The fourth one, *FDBANK* based on *LLY*, *PRIVO*, *BTOT*, *OVC* and *NIM*, captures the extent of bank-based intermediation. The fifth one, *FDSTOCK*, captures the equity market development, and is based on *MCAP*, *TVT* and *TOR*. The last one, *FDEPTH*, is an aggregate combination of *LLY*, *PRIVO* and *BTOT* and measures the financial system's depth.

Needless to say, choosing the financial development indicators, which are suitable for each research objective, is no easy task. In this paper, to measure the financial development, we will use the ratio of liquid liabilities to GDP (labelled *LLY*) and credit issued to private enterprises to GDP (denoted

*PRIVO*). These two indicators have been also deployed in Svaleryd and Vlachos (2002). We exclude, however, the value of listed companies on the stock market relative to GDP, because this variable is not available for all Asian developing countries in our sample.

### **Trade Openness**

A number of standard measures of trade openness have been discussed in recent empirical researches. We now summarize the available indicators of trade openness, which were drawn in Svaleryd and Vlachos (2002). One of the most popular direct measures of trade openness is the Sachs and Warner (1995) index, which is precisely documented in Svaleryd and Vlachos (2002). According to the authors, the Sachs-Warner index indicates that a country is judged as open when it does not fulfil any one of the following criteria: (i) average tariffs are higher than 40%, (ii) non-tariff trade barriers cover more than 40% of imports, (iii) the economic system is considered socialist, (iv) major exports are monopolized by the state, and (v) the black market exchange rate premium exceeded 20%. Rodriguez and Rodrik (1999) argue that the Sachs–Warner index serves as a proxy for a wide range of policy and institutional differences and not only of trade policy. Beside the Sachs-Warner index, Svaleryd and Vlachos (2002) also make some use of other indicators of trade policy. The first is the ratio of import duty revenue to the value of total imports. This ratio is used as a proxy for effective import tariffs. The second additional measure is an indicator of the share of all traded goods that are subject to quotas and similar restriction.

In this paper, in order to simplify all estimations, trade openness level is measured by the ratio of the sum of imports and exports to GDP (denoted OPEN). This ratio has been also considered as the most simple and popular indicator of trade openness.

### **Control Variables**

Along with three dependant variables, some control variables are also included in our estimated model, as follows:

- The Country Risk variable (labelled  $control_{it}$ ) is measured by the natural log value of International Country Risk Guide's (ICRG) country risk composite score. The ICRG rating comprises 22 risk components in three risk subcategories: political, financial and economic (see *Appendix B*). The composite scores, ranging from 0 to 100, higher scores are associated with lower risk. In this paper, the ICRG composite score is used as an aggregate control variable for institutional, legal, policy, financial and economic factors allowing us to determine the macroeconomic situation, which can directly affect FDI and trade flows of Asian developing countries. Because a number of ICRG risk components are themselves considered important determinants of trade and FDI flow, for instance, law and order, financial stability and inflation rate.

- $RER_{it}$  : Real exchange rate of country  $i$  at year  $t$ , which is calculated as the product of the nominal exchange rate and relative price levels in each country. The real exchange rate of country  $i$  at time  $t$  is thus:

$$RER_{it} = e_{i,t} \times \frac{P_t^{USA}}{P_{it}} \quad (1)$$

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.  $e_i$  is expressed as the number of domestic currency units per US dollar unit, so that  $e_i$  rises with an depreciation of the domestic currency. *Equation 1* suggests that we should expect to find a positive coefficient on the real exchange rate in all estimated regressions, meaning that an increase in the bilateral real exchange rate represents a real depreciation of the domestic currency. 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). These have the advantage of being timely, similarly constructed across countries and available for a wide range of countries over a long time span. The exchange rate regime can be considered as a control variable in a growth function because of its potential role in influencing growth through its effects on the adjustment to economic shocks. The exchange rate regimes literature has emphasized how an economy's adjustment process following a shock can differ based on the nature of the exchange rate regime. Moreover, the choice of exchange rate regimes could also affect economic growth indirectly through its influences on other determinants of economic growth, such as investment and international trade.

- *GDP Growth rate* and *GDP per capita* at constant price 1995 are used as control variables for demand of finance. These two variables are also utilised in Rajan and Zingales (2003).

As stated above, being complementary to earlier empirical studies, our research also aims at resolving the question of whether the appearance of financial crisis might influence the nature of the relationship among financial development, financial openness and trade openness. We, therefore, introduce in all estimated regressions a binary crisis dummy covering the effect of financial crises over the period studied. This dummy takes the value of 1 from 1997 to 1999 and in 2008, and 0 in the opposite case.

*<Insert Table 1>*

Our data sets are summarised in *Table 1.a*, which provide the source of all variables of interest, their units of measurement, means, standard deviation, minimum and maximum values. *Table 1.b* reports the quite different values of correlation coefficients between all key variables, which aid the modelling and help to confirm the choice of variables in our estimated models. The correlation coefficients between trade openness and financial openness vary between 0.32 and 0.33, while these coefficients between trade openness and financial development take the values of 0.21 and 0.16. This suggests that

in developing Asia, trade openness is more correlated to financial openness than to financial development. The correlation coefficients between financial development and financial openness range between 0.03 and 0.37 mean that we expect to obtain quite different results about the possible link between these two variables. In terms of GDP, the different values of correlation coefficients imply that the impact of GDP per capita on other variables is more significant than the influence of GDP growth rate. Relating to the ICRG control variable, high values of its correlation coefficients with other variables mean that the ICRG risk components have been an important determinant of macroeconomic variables. Concerning the RER variable, we obtain quite different results. While the RER's correlation with financial and trade openness are high, its correlation with financial development is pretty low, running from 0.006 to 0.026. This issue explain why the RER has not added as a control variable in the financial development regressions. To this end, it is noteworthy that the correlation between the crisis dummy and other variables, while negative, is rather small and ranges between -0.17 and -0.01.

### 3. Empirical methodology

To investigate the possible two-way causality among financial development, financial openness and trade openness, the variables utilised in our econometric model are defined as follows:

- $FO_{it}$  : is financial openness indicator of country  $i$  at time  $t$ . This indicator includes  $FDI_{it}$  - FDI to GDP ratio – and  $GPC_{it}$  - Gross private capital flows to GDP ratio;
- $FD_{it}$  : is financial openness indicator of country  $i$  at time  $t$ . This indicator includes the ratio of liquid liabilities to GDP ( $LLY_{it}$ ) and credit issued to private sectors to GDP ( $PRIVO_{it}$ );
- $OPEN_{it}$  : is trade openness indicator of country  $i$  at time  $t$ ;
- $ICRG_{it}$  : is the natural log value of International Country Risk Guide;
- $GDP_{it}$  : is GDP growth rate of country  $i$  at time  $t$ ;
- $GDP_{it}^p$  : is GDP per capita of country  $i$  at time  $t$ ;
- $RER_{it}$  : is the real exchange rate of country  $i$  at time  $t$ ;
- $CRI^1$  and  $CRI^2$ : are binary dummies taking the value of 1 in the financial crisis periods and of 0 in other periods. The first one captures the effect of 1997 Asian financial crisis and the second one captures the effect of 2008 financial crisis.

Our empirical specification is performed in three steps. First, we test for the order of integration or the presence of unit root of our panel. Second, having established the order of integration, we use the heterogeneous panel co-integration technique developed by Pedroni (1999) to test for the long run co-integrated relationships among the variables studied in question. In the last step, the dynamic panel General Method of Moments (GMM) developed by Arellano and Bond (1991) will be applied.



### 3.1. Panel unit root test

Unit root tests are traditionally used to test for the order of integration of the variables or to verify the stationarity<sup>1</sup> of the variables. The traditional Augmented Dickey-Fuller (1979) (ADF) technique has become well-known to test for the time series' unit root. To test for the panel unit root, a number of such recent developments has also appeared in the literature, including: Levin, Lin and Chu (LLC test) (2002); Im, Pesaran and Shin (IPS test) (1997); Maddala and Wu (1999); Choi (2001); and Hadri (2000). From among these different panel unit root tests, the LLC test and the IPS test are the most popular. Both of these tests are based on the Augmented Dickey-Fuller (ADF) principle.

The LLC test assumes homogeneity in the dynamics of the autoregressive (AR) coefficients for all panel members. Concretely, the LLC test assumes that each individual unit in the panel shares the same AR(1) coefficient, but allows for individual effects, time effects and possibly a time trend. Lags of the dependent variable may be introduced to allow for serial correlation in the errors. The test may be viewed as a pooled Dickey-Fuller test, or an ADF test when lags are included, with the null hypothesis that of non-stationarity (I(1) behavior). After transformation, the t-star statistic is distributed standard normal under the null hypothesis of non-stationarity.

The IPS test is more general than the LLC test because of allowing for heterogeneity in dynamic panel. Therefore, it is described as a "Heterogeneous Panel Unit Root Test". It is particularly reasonable to allow for such heterogeneity in choosing the lag length in the ADF tests when imposing uniform lag length is not appropriate. In addition, the IPS test allows for individual effects, time trends, and common time effects. Based on the mean of the individual Dickey-Fuller t-statistics of each unit in the panel, the IPS test assumes that all series are non-stationary under the null hypothesis. Lags of the dependent variable may be introduced to allow for serial correlation in the errors. The exact critical values of the t-bar statistic are given in the IPS test. The IPS test has thus considered a technique, which has higher power than other tests, including the LLC test. The stationarity of all variables is considered as a precondition for performing the co-integration test in the next step.

### 3.2. Panel co-integration

The traditional co-integration analysis presented by Engle and Granger (1987) allows identifying the relationship between the variables by eliminating the risk of spurious regression. However, the Engle and Granger approach cannot identify the number of co-integration vectors and cannot adequately estimate the parameters if the number of variables is more than two. Hence, Johansen (1988) use maximum likelihood method within a vector autoregressive (VAR) framework to test for the presence of co-integration relationship between the economic variables. The Johansen's procedure is useful in conducting individual co-integration tests, but does not deal with panel co-integration test.

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<sup>1</sup> If a time series is found to be non-stationary or integrated of order  $d$ , denoted by I( $d$ ), it can be made stationary by differencing the series  $d$  times. If  $d = 0$ , the resulting I(0) process represents a stationary time series.

To tack this issue, most of the recent researches utilized the heterogeneous panel co-integration test developed by Pedroni (1999). Pedroni's test allows different individual cross-section effects by allowing for heterogeneity in the intercepts and slopes of the co-integrating equation.

The Pedroni panel co-integration technique makes use of a residual-based ADF test. The Pedroni test for the long-run co-integrated relationship among financial openness, financial development and trade openness is based on the estimated residuals from the three long-run models as follows:

$$OPEN_{it} = \beta_{10i} + \beta_{11}FO_{it} + \beta_{12}FD_{it} + \beta_{13}GDP_{it} + \beta_{14}GDP_{it}^p + \beta_{15}ICRG_{it} + \beta_{16}RER_{it} + \varepsilon_{1it} \quad (2)$$

$$FO_{it} = \beta_{20i} + \beta_{21}OPEN_{it} + \beta_{22}FD_{it} + \beta_{23}GDP_{it} + \beta_{24}GDP_{it}^p + \beta_{25}ICRG_{it} + \beta_{26}RER_{it} + \varepsilon_{2it} \quad (3)$$

$$FD_{it} = \beta_{30i} + \beta_{31}FO_{it} + \beta_{32}OPEN_{it} + \beta_{33}GDP_{it} + \beta_{34}GDP_{it}^p + \beta_{35}ICRG_{it} + \varepsilon_{3it} \quad (4)$$

where  $i = 1, \dots, 29$  Asian developing countries and  $t = 1, \dots, 15$  period observations. The term  $\varepsilon_{it} = \rho_i \varepsilon_{i(t-1)} + \xi_{it}$  is the deviations from the modelled long-run relationship. If the series are co-integrated,  $\varepsilon_{it}$  should be a stationary variable. Equation 4 differs from Equations 2-3 in which we introduce the RER control variable in considering that the real exchange rate directly influences financial openness and trade openness.

The null hypothesis in Pedroni's test procedure is whether  $\rho_i$  is unity. On one hand, the Pedroni technique allows testing for the co-integrated relationship between FDI and exports in four different models: Model without heterogeneous trend and ignoring common time effect (**M1**); Model without common time effect and allowing heterogeneous trend (**M2**); Model with heterogeneous trend and allowing common time effect (**M3**); Model with common time effect and ignoring heterogeneous trend (**M4**). On the other hand, Pedroni test's results include seven different statistics for the test of the null hypothesis of no co-integration in a heterogeneous panel. The first group of tests is termed "within dimension". This group includes: The "panel v-stat" and the "panel rho-stat" are similar to the Phillips and Perron (1988) test; the panel pp-stat (panel non-parametric) and the "panel adf-stat" (panel parametric) 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). The "between dimensions" tests include three tests: group rho-stat; group pp-stat; and group adf-stat.

### 3.3. Panel causality test

The Pedroni test can conclude the presence of a long-run co-integrating relationship among the variables studied, but has not yet precisely indicated the direction of this possible relationship. We use, therefore, the dynamic General Method of Moments (GMM) developed by Arellano and Bond (1991) - to tackle this issue. A brief outline of the GMM estimation is given below.

First, a time-stationary vector auto-regression (VAR) model is constructed as follow:

$$Y_{it} = \alpha_0 + \alpha_j Y_{it-j} + \delta_j X_{it-j} + f_{yi} + u_{it} \quad (5)$$

where  $Y_{it}$  and  $X_{it}$  are the co-integrated variables,  $i = 1, \dots, n$  represents cross-sectional panel members,  $u_{it}$  is error terms. This model differs from the standard causality model in that it adds individual fixed effects  $f_{yi}$  for each panel member  $i$ . In *Equation 5*, the lagged dependent variables are correlated with the error term  $u_{it}$ , including the fixed effects. Hence, Ordinary Least Squares (OLS) estimates of the above model will be biased. The remedy is to remove the fixed effects by differencing. However, differencing introduces a simultaneous problem because lagged endogenous variables will be correlated with the new differenced error term. In addition, heteroscedasticity is expected to be present because, in the panel data, heterogeneous errors might exist with different panel members. To deal with these problems, instrumental variable procedure is traditionally used in estimating the model, which produces consistent estimates of the parameters. In this case, GMM method proposed by Arellano and Bond (1991) has been shown to produce more efficient and consistent estimators compared with other procedures.

In our research case, we include lagged dependent variable in the right hand side of the three following equations:

$$\begin{aligned} OPEN_{it} = & \beta_{10i} + \beta_{11}OPEN_{it-j} + \beta_{12}FO_{it} + \beta_{13}FD_{it} + \beta_{14}GDP_{it} + \beta_{15}GDP_{it}^p \\ & + \beta_{16}ICRG_{it} + \beta_{17}RER_{it} + \delta t + \xi_{1it} \end{aligned} \quad (6)$$

$$\begin{aligned} FO_{it} = & \beta_{20i} + \beta_{21}FO_{it-j} + \beta_{22}OPEN_{it} + \beta_{23}FD_{it} + \beta_{24}GDP_{it} + \beta_{25}GDP_{it}^p \\ & + \beta_{26}ICRG_{it} + \beta_{27}RER_{it} + \delta t + \xi_{2it} \end{aligned} \quad (7)$$

$$\begin{aligned} FD_{it} = & \beta_{30i} + \beta_{31}FD_{it-j} + \beta_{32}OPEN_{it} + \beta_{33}FO_{it} + \beta_{34}GDP_{it} + \beta_{35}GDP_{it}^p \\ & + \beta_{36}ICRG_{it} + \delta t + \xi_{3it} \end{aligned} \quad (8)$$

where  $\beta_{10i}, \beta_{20i}$  and  $\beta_{30i}$  capture country effects, control for unobserved heterogeneity, it is different across countries and fixed through time; the other coefficients  $\beta$  capture the effects of independent variables on dependent variables including financial openness, financial development and trade openness. The index  $i$  refers to the unit of observation (Asian developing countries),  $t$  refers to the time period ( $t = 1, 2, \dots, 15$ ).  $\xi_{it}$  is a disturbance term assumed to satisfy the Gauss–Markov conditions. A trend term  $\delta t$  has been introduced to allow for a shift of the intercept over time. The term  $\delta t$  controls for the time trend in variables.

Applying the GMM technique and first differencing *Equation (6-7-8)*, we get:

$$\begin{aligned} \Delta OPEN_{it} = & \beta_{11}\Delta OPEN_{it-j} + \beta_{12}\Delta FO_{it} + \beta_{13}\Delta FD_{it} + \beta_{14}\Delta GDP_{it} + \beta_{15}\Delta GDP_{it}^p \\ & + \beta_{16}\Delta ICRG_{it} + \beta_{17}\Delta RER_{it} + \Delta \xi_{1it} \end{aligned} \quad (9)$$

$$\begin{aligned} \Delta FO_{it} = & \beta_{21}\Delta FO_{it-j} + \beta_{22}\Delta OPEN_{it} + \beta_{23}\Delta FD_{it} + \beta_{24}\Delta GDP_{it} + \beta_{25}\Delta GDP_{it}^p \\ & + \beta_{26}\Delta ICRG_{it} + \beta_{27}\Delta RER_{it} + \Delta \xi_{2it} \end{aligned} \quad (10)$$

$$\begin{aligned} \Delta FD_{it} = & \beta_{31} \Delta FD_{it-j} + \beta_{32} \Delta OPEN_{it} + \beta_{33} \Delta FO_{it} + \beta_{34} \Delta GDP_{it} + \beta_{35} \Delta GDP_{it}^p \\ & + \beta_{36} \Delta ICRG_{it} + \Delta \xi_{3it} \end{aligned} \quad (11)$$

In these last equations, we have removed group effects and time trend. The transformed error term, for example  $\Delta \xi_{1it} = \xi_{1it} - \xi_{1it-1}$  is correlated with  $\Delta OPEN_{it} = OPEN_{it} - OPEN_{it-1}$  because the first expression implies  $OPEN_{it}$  depends on the error term  $\xi_{1it}$ , and this may result in a statistical endogeneity problem. In order to resolve this problem, we use the lagged levels as instruments for the first difference of the lagged dependent variable. The reason is that while the first-differenced errors are correlated with the first difference of the lagged dependent variable, they may be uncorrelated with lagged levels of the dependent variable dated  $(t-2)$  and earlier. The lagged levels may be used as instruments for the first difference of the lagged dependent variable.

The first key test is serial correlation test derived by Arellano and Bond (1991), in which the null hypothesis assumes no serial correlation in error term  $\xi_{it}$ . Arellano and Bond's tests for serial correlation are 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. In the opposite case, if there is second or higher order serial correlation, the key problem would arise. To assess the model specification and over-identifying restrictions, we employ the Sargan test as the second key test, which is also known in the GMM context as Hansen's J test.

## 4. Empirical Analysis

### 4.1. Estimation Results

This section reports and analyses our empirical results. We begin with a discussion on the statistic results of the LLC and IPS tests, which are reported in Table 2 and Table 3, respectively.

*<Insert Table 2 & Table 3>*

In the LLC test for the levels of all variables in question, the small negative statistics values for each variable can not exceed the critical values (in absolute terms). However, when we take the first difference of each variable, the large negative LLC statistics indicate rejection of the null of non-stationarity at least 5% significance level for all models. The LLC results, in general, indicate that the null of a unit root for the individual series is not rejected for all of the series tested at their levels.

Given the short span of the individual series, we are more confident to accept the more powerful IPS panel test results, which undoubtedly do not reject the unit root null of unit roots for the panel with 435 observations. According to the IPS results, we note that the null of unit root is strongly rejected at least 5% level of significance for all series at their first difference. In sum, all variables are non-stationary and integrated of order one in level but integrated in order zero in their first difference at least 5% significance level. 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 of interest by employing the Pedroni co-integration technique.

*<Insert Table 4>*

*Table 4* reports the Pedroni's statistics under the different model specifications. Large negative values for all six different statistics (except some panel  $v$ -stat values) 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 question. Moreover, we notice a substantially large variation of the panel co-integration statistics among five models. Thus, we should perhaps not be surprised to see quite different results in the panel causality tests.

The previous results concluded the presence of a co-integrating relationship among the variables, but did not indicate the channels through which the variables studied may influence each other. As stated in the previous section, to resolve this question, we apply the dynamic GMM estimators in which the trade openness, financial openness and financial development terms, by turns, are treated either exogenous or endogenous.

*<Insert Table 5.a>*

*Table 5.a* reports all econometrical results in two parts. The upper shows the estimated coefficients for each GMM regression. The lower presents the Sargan test's statistics and the serial correlation test. 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 variables satisfy the required orthogonal conditions. According to the GMM results, the possible linkages between the variables in question are summarised in *Table 6*.

*<Insert Table 6>*

We begin with a discussion on the effects of different variables on trade openness, which are presented in the first column of *Table 5.a*. We note that both financial openness and financial development have a positive and significant effect on trade openness at least 10% level of significance. The estimated results also imply that financial development influence trade openness much less than financial openness. The two estimated financial development coefficients are around 0.09 and 0.04, while these coefficients of financial openness vary between 0.15 and 0.36. Besides, the positive and significant coefficients GDP per capita, GDP growth rate and ICGR score suggest that trade openness is positively correlated with the level of economic development and the quality of economic institutions. The same positive and significant correlation between trade openness and real exchange rate is also observed.

Examining now the regressions relating to financial openness indicators that reported in the 2<sup>nd</sup> and 3<sup>rd</sup> columns of *Table 5.a*, we first find a positive and significant impact of trade openness on both

indicators of financial openness (GPC and FDI), meaning that entry of capital flows may be explained by the strategy of foreign investors for seeking potential markets in developing countries along with profiting from other factors such as abundant labour, socio-political stability, good macroeconomic fundamentals, ...etc. Concerning the possible effects of financial development on financial openness, we obtain quite different results. We can not find any interaction running from financial development to Gross Private Capital flows (GPC variable), while the LLY and PRIVO coefficients are both significant at the 1% level in the FDI model: a negative value for LLY coefficient and a positive value for PRIVO coefficient. These two coefficients are qualitatively dissimilar, but indicate a similar effect of both financial development indicators on FDI, meaning that a developing country with a well developed financial system is more attractive to FDI than others. In detail, deepening the domestic financial system, which is manifested by a rise in credit issued to private enterprises (explained by a positive PRIVO coefficient) and a decline in liquid liabilities (a negative LLY coefficient), is necessary for attracting FDI inflows to developing Asia. Our findings also suggest that other exogenous variables (except GDP per capita) have similarly positive and significant effects on both financial openness measures.

Next we focus our attention on the estimated results reported in the last two column in *Table 5.a* that reflect the possible impacts of independent variables on financial development. In both LLY and PRIVO regressions, trade openness enters with significant coefficients of around -0.1 and 0.08, respectively. This supports an important role of trade openness in constructing a developed financial system. Relating to the effects of financial openness on financial development, we find once again two dissimilar results. First, liquid liabilities seem to be quite independent on financial openness either GPC or FDI. This independence is a positive sign for developing Asia, since entry of foreign capital flows can not cause any increase in liquid liabilities in economy. In the other hand, this result supports Asian developing countries' governmental efforts in controlling their monetary markets. Second, the financial openness interaction terms with PRIVO indicator are significantly positive and around 0.08 and 0.23, meaning that the effect of GPC entry on PRIVO is smaller than this one of FDI. Another consideration can be discussed is that instead of state sectors, private sectors are more and more attractive to foreign investors in the developing countries. Finally, in terms of control variables, we find that financial development also depends on economic development (explained by GDP per capita and GDP growth rate) and the institutions quality (explained by the ICRG score).

We now turn our attention to investigating the effect of financial crises on financial development and on both terms of openness. To do this, we once again apply the GMM technique for three Equations (9-10-11), in which all variables in question are maintained, but two crisis dummies are now introduced as exogenous variables. Results of the new GMM estimation are reported in *Table 5.b*.

*<Insert Table 5.b>*

This new step allows us to resolve the question of whether financial crises can influence the relationship between financial development and openness. On one hand, we find that introducing of

crisis dummy does not change the qualitative nature of the results. In other words, it does not alter the sign or the statistical significance of any variable. Only the magnitudes of the estimated coefficients are little affected. On the other hand, it is noteworthy that the appearance of financial crises negatively and significantly affects both financial and trade openness.

First, following the estimated coefficients of  $CRI^1$  dummy, the 1997 Asian financial crisis resulted in a strong decline in trade and investment as well as a restraint on financial development. The fact is that this crisis started in East Asia, no doubt, marked its serious impacts on the world economy, in particular on the financial and monetary system of East-Asia. According to the financial crisis list provided by Laeven and Valencia (2008) (*Appendix C*), almost of developing Asian countries in our sample have been directly suffered from the 1997 slump.

Similarly, we find a negative impact of the 2008 financial crisis on both trade and financial openness but we do not find any effect of financial crises on financial development. This issue can be explained as follow. The 2008 financial crisis began in the U.S. and then spread to Europe. The financial system of Asian developing countries has not been, fortunately, directly affected by this crisis. However, the 2008 financial crisis has been transmitted from developed economies to Asian developing countries through two main channels – trade and financial openness. This means that the economic slowdown following the 2008 financial crisis in the developed world has resulted in a strong decline in exports from and in investment flows to Asian developing countries. This finding allows us to conclude that although the absence of a direct effect, the 2008 financial crisis has still hurt the financial development of developing world through financial and trade openness channels due to a given relationship between financial development and both type of openness.

Overall, our research provides two major findings. The first one, which is consistent with the ones of earlier empirical studies, supports a set of linkages between financial development and two types of openness. The second one, which has not yet deal with in previous empirical researches, discusses the possible impact of financial crisis on financial development as well as on trade/financial openness. We, therefore, focus the rest of this paper on comparing our important findings with the ones of earlier researches and also analysing some policy implications.

## **4.2. Comparisons with related recent studies**

Investigating the possible two-way causality among financial development, financial openness and trade openness at once, our empirical work may be seen as a complement to earlier studies. Since almost recent well-known researches have almost focused on the one-way linkage among these three variables or only on the interaction of one of two financial terms with trade openness.

Relating to the relationship between financial development and trade openness, Beck (2002) provide a theoretical model with two sectors, which shows that one possible causal link from the level of financial development to the structure of the trade balance. To give support to the predictions of his model, Beck performs an empirical test basing a 30-year panel data with 65 countries. The author

finds that countries with a higher level of financial development have higher shares of manufactured exports in GDP and in total merchandise exports and have a higher trade balance in manufactured goods. Following Beck's study, building a model, in which a country's financial development is an equilibrium outcome of the economy's productive structure, Do and Levchenko (2004) pronounce the differences in financial development between advanced and developing countries. They suggest that when a wealthy country open to trade, the financially dependent sectors grow in this country, and so does the financial system, while as the financially intensive sectors shrink in a poor country, demand for external finance decreases and the domestic financial system deteriorates. To reinforce their consideration, Do and Levchenko examine their model using data on financial development for a sample of 77 countries. They provide empirical evidence that trade openness differentially affects countries' financial systems. In richer countries trade promotes financial system growth, in poorer ones the effect is the opposite. Both papers of Beck (2002) and Do and Levchenko (2004) have provided an evidence of the linkages between financial development and trade openness. However, these authors have only deal with the one-way relationship between these two variables: running from financial development to trade openness in Beck (2002) and running from trade openness to financial development in Do and Levchenko (2004).

In terms of the linkage between financial and trade openness, we have to take into account a set of well-known studies of Aizenman and Noy. Aizeman and Noy (2004) indicate that the *de-facto* financial openness of developing countries, which is measured by international financial flows as percent of GDP, is a complex endogenous variable, systematically impacted by economic and political economy factors which include commercial openness, the political regime and corruption. They find that almost all of the linear feedback between trade and financial openness can be accounted for by the Granger causality from financial openness to trade openness (53%) and from trade to financial openness (34%). In 2006, Aizeman and Noy develop their earlier research on the inter-temporal feedbacks between trade and de-facto financial openness basing a set of disaggregated measures. Their results are consistent with the notion that, for many developing countries during their period studied, there has been an increase in foreign direct investment flows and trade in manufacturing and services and that these are linked.

We now turn our attention to some recent researches on the linkage between financial development and openness. First, the most recent influent contribution in this literature is the one of Rajan and Zingales (2003). According to the authors, trade openness without financial openness is unlikely to deliver financial development. Their analysis, in general, suggests that the simultaneous opening of both trade and capital accounts holds the key successful for financial development. Needless to say, this is an important prediction of their contribution that lends itself to rigorous empirical analysis using other modern econometric methods. Following Rajan and Zingales (2003), Chinn and Ito (2006) investigate whether financial openness leads to financial development after controlling for the level of legal development using a panel encompassing 108 countries over the period 1980 to 2000. According



to them, financial openness does contribute to equity market development, but only when a threshold level of general development of legal systems and institutions has been attained. In addition, Chinn and Ito (2006) find that an increase in trade openness is a precondition for financial openness, and then for financial development. More recently, using the similar financial development measures in Chinn and Ito (2006) (the private credit indicator), Baltagi et al. (2009) provide a partial support to the Rajan and Zingales hypothesis, which stipulates that both types of openness are necessary for financial development to take place. Furthermore, they suggest that the marginal effects of trade (financial) openness are negatively related to the degree of financial (trade) openness. This implies that relatively closed economies may benefit from opening up their trade and/or capital accounts. Although these economies can benefit most by opening both their trade and capital accounts, opening up one without the other could still deliver benefits in terms of banking development.

Although the last three studies outlined above have investigated the relationship among financial development and both type of openness, their main objective has only aimed at reaching the possible impacts of financial and trade openness on financial development. According to these researches, opening up the economy to trade and financial capital flows is a precondition for deepening the domestic financial system. However, along with this consideration, two other important questions should be challenged: i) whether financial development, in turn, plays a determinant role in encouraging both types of openness; and ii) whether financial development or financial openness is better long-run option to stimulate trade openness in developing countries. A number of major findings in our paper have responded to these two questions. First,

- i) We find an evidence of bidirectional causality between financial development and trade openness as well as between financial openness and trade openness. This suggests that trade openness is necessary for attracting foreign capital flows (financial openness) and then promoting the development of financial system. In turn, financial development and financial openness seem to be an important condition for trade openness to take place in the developing Asia countries.
- ii) Relating to the interaction term between financial development and financial openness, we obtain quite different results with different indicators. On one hand, the first financial openness indicator – Gross Private Capital – is positively related to the PRIVO indicator, but does not influence the LLY indicator. On the other hand, we find a bidirectional causality between FDI and PRIVO indicators and an unidirectional running from LLY to FDI. This means that a developed financial system allows developing Asia to be more attractive to foreign investors. By contrast, the interactions of FDI with two financial development measures are not identical. Entry of FDI seems to result in a rise in credits issued to private sectors, while we failed to detect the impact of FDI inflows on liquid liabilities. Because of the inconclusive relationship between FDI and LLY indicators, we cannot support the important role of financial openness on deepening financial system in

developing Asia. This exceptive result differs from all earlier researches. Yet, this difference is comprehensible because the model specifications are not identical, the estimation procedures are not the same and the datasets and data frequencies used for estimation are different. For instance, to measure the level of financial openness we use the ratios of FDI to GDP and GPC to GDP, while Chinn and Ito (2006) proposed a special index of capital account openness (KAOPEN) and Baltagi et al. (2009) used a combination of the Chinn and Ito (2006) index (*de jure* measures) and the Lane and Milesi-Ferretti (2006) index (*de facto* measure).

Our second major finding relates to the impacts of financial crisis on financial development and both types of financial openness. On one hand, we note that the financial crises have negative effects on financial and trade openness. On the other hand, the empirical results suggest that even if the financial crisis does not have any direct impact on financial development, it can still disturb financial development, indirectly, through two main channels – financial and trade openness. Therefore, it is noteworthy that more a developing country depends on financial and trade openness, more its financial system can suffer from a global financial crisis. This issue has challenged a long-run political question of how developing countries should develop their domestic financial system in order to maintain their financial stability as well as their macroeconomic stability.

### **4.3. Policy implications**

This section discusses some guidelines to the developing countries' policymakers, which have been drawn from our major empirical findings.

Firstly, our paper supports a bidirectional causality between financial development and trade openness and between financial and trade openness. This suggests that developing countries should make a suitable policy in attracting foreign capital flows along with deepening their domestic financial system in order to ameliorate trade openness, on one hand. On the other hand, developing countries could generate gains not only in terms of financial development but also in terms of financial openness by opening up their economy to trade.

Secondly, it is noteworthy that the relationships between financial openness and financial development, which are measured by different indicators, are heterogeneous. This finding recommends the different interactions between different indicators of financial openness and development should be required in each a political economy consideration of developing countries' government. For instance, opening up their capital account (attracting FDI and GCP) allows deepening the domestic financial system in terms of increasing credits to private sectors (PRIVO indicator). However, this policy can not help the government of developing countries limit liquid liabilities in their domestic financial market.

Thirdly, our extended analysis argues that trade and financial openness has become the main channel through which the financial development of an Asian developing country is affected by the 2008

financial crisis due to a strong relationship between financial development and both types of openness. As a result, more a domestic financial system depends on financial and trade openness, more it might be hit by the financial crisis. This means that opening up either trade or capital account can result in a negative feedback during the financial crises periods. However, needless to say trade openness and foreign capital flows have been the most important source of the developing countries' economic growth. This consideration suggests another political question of how should developing countries' policymakers do, in order to promote financial/trade openness as well as to maintain their domestic financial stability even during the financial crisis periods. The key response is to make an efficient intra-regional integration policy instead of depending much on economy of extra-regional developed countries.

*<Insert Figure 1>*

*Figure 1* show the destinations of merchandise exports for twelve major exporters among Asian developing countries. From this figure, we observe a significant change in developing Asia's exports destination, meaning that Asian developing countries are more and more reducing their dependence on international trade with developed countries – the origin of the 2008 financial crisis. However, developed countries (including the U.S and Europe) are still the most important trading partners of developing Asia. On the other hand, there has been also an important change in FDI sources of Asian developing countries. After the 1997 financial crisis, the Asian developing countries have tended to enlarge their economic integration at the regional level. For instance, we take into account the case of ASEAN zone, which is one of the most dynamic economic zones in Asia. *Figure 2* shows that the structure of FDI source into ASEAN has changed. Since 2007, the Asian NIEs (including Korea, Hong Kong and Taiwan) have become the most important FDI source of ASEAN. In particular, instead of FDI from the US, a significant source of investments for ASEAN came from the ASEAN member states in the last years. Yet, FDI into ASEAN from developed countries has still played an important role in promoting its economic growth. This is why FDI is one of the main channels transmitting the 2008 financial crisis from developed countries to Asian developing countries.

*<Insert Figure 2>*

To this end, reinforcing the intra-regional integration in both terms – trade and investment - between Asian developing countries should have on the long-run economic political agendas.

## **5. Concluding remarks**

We began our empirical research by examining the relationship between financial development and both types of openness. We obtain a series of major findings. The first one supports an evidence of bidirectional causality between trade openness and financial development/openness. The opening of goods and service markets in the developing countries seems to be a precondition for financial development/openness. In turn, financial development and financial openness both allow developing countries to benefit more in terms of trade openness. Additionally, the empirical statistics also indicate

that the effect of financial openness on trade openness is likely to be larger than the one of financial development. The second key finding shows that the linkages between the different indicators of financial development and financial openness are not identical. Relating to the financial openness' impact on financial development, we observe a positive relationship running from two financial openness indicators (FDI and GPC) to PRIVO, but any evidence that LLY indicator depends upon financial openness. In opposite way, while the development of domestic financial market seems to be necessary for attracting FDI flows, we do not find any effect of financial development neither PRIVO nor LLY on the GPC indicator. According to this evidence, the policymakers in developing countries should be careful in taking any political economy decision to avoid any mistake, which may result from considering that the linkages between the different indicators of financial openness and financial development are always homogeneous.

We also extend this research by introducing two binary crisis dummies in each empirical model and exploring the possible effects of financial crises on financial development and openness, this paper has provided an interesting and complementary contribution to earlier studies. First, the inclusion of crisis dummies in estimated models has not changed the relationship between the variables of interest. Second, while the 1997 financial crisis seems to have a negative effect on all dependent variables, the 2008 financial crisis has not exercised any effects on the development of domestic financial system in Asian developing countries. However, due to a strong linkage between financial development and openness, the 2008 financial crisis can still disturb developing countries' financial development through financial and trade openness channels. Therefore, building a well developed domestic financial system along with reducing economic dependence on trade and capital flows from the developed world should have on the long-run agendas of developing countries' policymakers. To this end, formal economic modelling should be challenged, not only to investigate precisely and completely such a complex relationship among financial development, financial openness and trade openness, but also to deepen our considerations concerning the political economy mechanisms for developing countries. We leave this issue for the future researches.

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#### **APPENDIX A: List of Asian developing countries studied**

<b>Region</b>	<b>Country</b>
<b>Central and West Asia</b>	Armenia; Azerbaijan; Georgia; Kazakhstan; Kyrgyz Republic; Pakistan; Tajikistan Turkmenistan; Uzbekistan.
<b>East Asia</b>	China; Hong Kong - China; Korea, Rep. of; Mongolia.
<b>South Asia</b>	Bangladesh; Bhutan; India; Maldives; Nepal; Sri Lanka
<b>Southeast Asia</b>	Brunei Darussalam; Cambodia; Indonesia; Lao PDR; Malaysia; Myanmar; Philippines; Singapore; Thailand; Viet Nam.

#### **APPENDIX B: The International Country Risk Guide (ICRG) Risk Components**

**Political Risk Components** Government Stability ; Socioeconomic Conditions; Investment Profile; Internal Conflict; External Conflict; Corruption; Military in Politics; Religious Tensions; Law and Order; Ethnic Tensions; Democratic Accountability; Bureaucracy Quality.

**Financial Risk Components** Foreign Debt as a Percentage of GDP; Foreign Debt Service as a Percentage of XGS; Current Account as a Percentage of XGS; Net Liquidity as Months of Import; Cover Exchange Rate Stability.

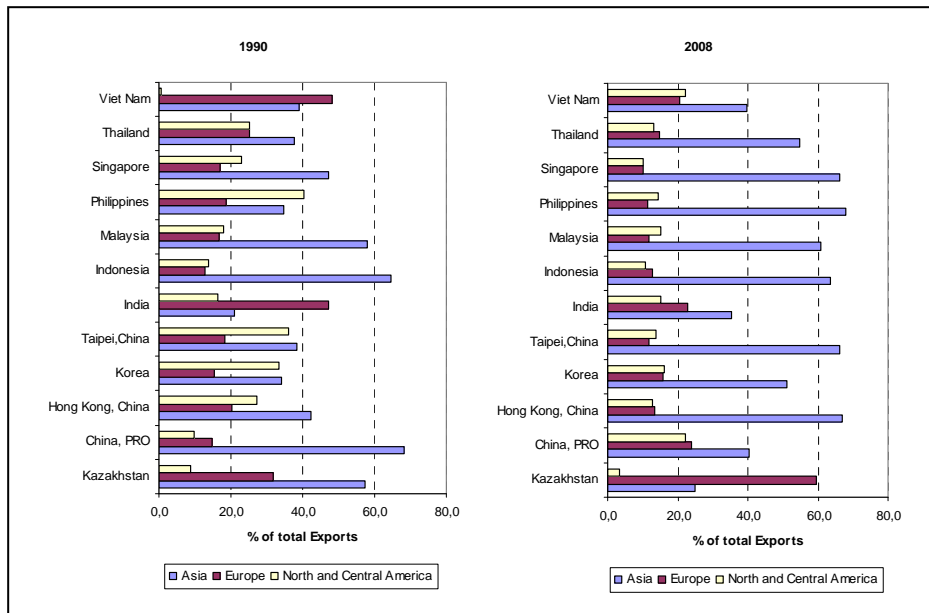
**Economic Risk Components** GDP per Head of Population; Real Annual GDP Growth; Annual Inflation Rate; Budget Balance as a Percentage of GDP; Current Account Balance as a Percentage of GDP.

**APPENDIX C: Timing of Financial Crisis (1994-2008)**

<b>Country</b>	<b>Systemic Banking Crisis (starting date)</b>	<b>Currency Crisis (year)</b>	<b>Debt Crisis (default date)</b>	<b>Debt Restructuring (year)</b>
Armenia	1994	1994	-	-
Azerbaijan	1995	1994	-	-
Bangladesh	-	-	-	-
Bhutan	-	-	-	-
Brunei Darussalam;	-	-	-	-
Cambodia	-	-	-	-
China	-	1998	-	-
Georgia	-	1999	-	-
Hong Kong, China	-	-	-	-
India	-	-	-	-
Indonesia	1997	1998	1999	2002
Kazakhstan	-	1999	-	-
Korea, Rep. of	1998	1999	-	-
Kyrgyz Republic	1995	1997	-	-
Lao PDR		1997	-	-
Malaysia	1997	1998	-	-
Maldives	-	-	-	-
Mongolia	-	1997	-	-
Myanmar	-	2007	-	-
Nepal	-	-	-	-
Pakistan		-	-	-
Philippines	1997	1998	-	-
Singapore	-	-	-	-
Sri Lanka	-	-	-	-
Tajikistan	-	1999	-	-
Thailand	1997	1998	-	-
Turkmenistan	-	-	-	-
Uzbekistan	-	1994, 2000	-	-
Viet Nam	1997	-	-	1997

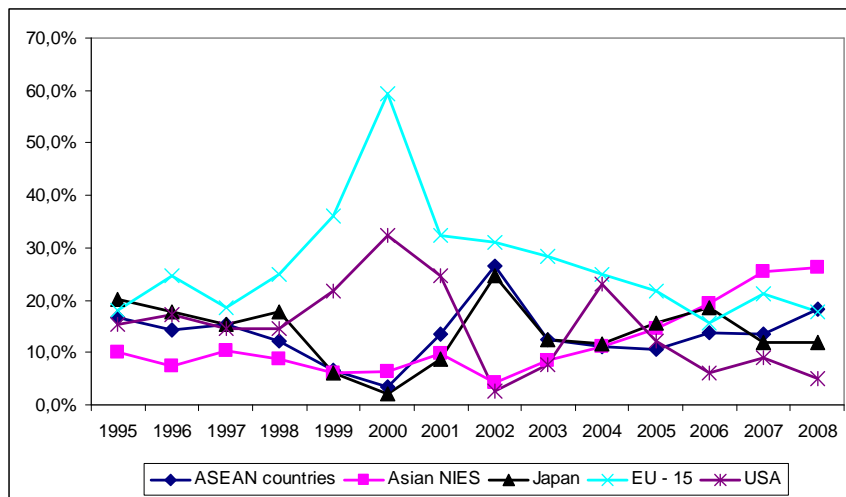
*Source: Created from Laeven and Valencia (2008)*

**Figure 1: Destination of Merchandise Exports**



Source: Created from ADB database, 2009

**Figure 2: Structure of FDI flows into ASEAN**



Source: Created from ASEAN Secretariat Database, 2009



**Table 1.a: Summary Statistics and Correlations Matrix (1994 - 2008; Countries = 29; Observations = 345)**

Variable	Source	Measurement Unit	Mean	Standard Deviation	Minimum	Maximum
Trade Openness (Exports; Imports; GDP)	ADB	% of GDP	0.547	0.508	0.011	2.694
Gross Private Capital	WDI	% of GDP	0.288	0.152	0.086	1.122
Foreign Direct Investment	ADB	% of GDP	0.047	0.064	0.000	0.428
Liquid liabilities	ADB	% of GDP	56.556	57.358	3.485	378.001
Credit issued to the private sector	ADB	% of GDP	490.641	3462.342	-1903.83	60030.79
GDP per capita	ADB	US Dollars at 1995 price	2894.327	5361.109	122.269	24942.91
GDP growth rate	ADB	%	5.681	5.676	-21.3	39.006
Institutional variable	ICRG	Appendix A	38.51	21.37	2.88	89.28
Real Exchange Rate	IMF	US Dollars	1229.978	2719.387	0.024	13942.08
Crisis Dummy			0.2666667	0.4427258	0	1

**Table 1.b: Correlations Matrix**

	<i>GPC</i>	<i>FDI</i>	<i>LLY</i>	<i>PRIVO</i>	<i>OPEN</i>	<i>GDP<sup>p</sup></i>	<i>GDP</i>	<i>ICRG</i>	<i>RER</i>	<i>Crisis</i>
<i>GPC</i>	1.0000									
<i>FDI</i>	0.0871	1.0000								
<i>LLY</i>	0.0387	0.3783	1.0000							
<i>PRIVO</i>	0.2591	0.3295	0.4161	1.0000						
<i>OPEN</i>	0.3315	0.3224	0.2181	0.1679	1.0000					
<i>GDP<sup>p</sup></i>	0.1366	0.2795	0.6885	0.4013	0.5215	1.0000				
<i>GDP</i>	0.1456	0.2170	0.3790	0.1328	0.2931	0.1442	1.0000			
<i>ICRG</i>	0.6390	0.6404	0.3049	0.2854	0.5281	0.2471	0.1146	1.0000		
<i>RER</i>	0.2986	0.3903	0.0268	0.0067	0.3725	0.0864	0.0333	-0.2680	1.0000	
<i>Crisis</i>	-0.1463	-0.1569	-0.1429	-0.1065	-0.1147	-0.1710	-0.0910	-0.0161	0.2251	1.0000

**Table 2: LLC Unit Root Test**

		<i>GPC</i>	<i>FDI</i>	<i>LLY</i>	<i>PRIVO</i>	<i>OPEN</i>	<i>GDP<sup>p</sup></i>	<i>GDP</i>	<i>ICRG</i>	<i>RER</i>
Level	(1)	-1.391	-1.716	-1.411	-1.257	-0.945	-2.191	-1.577	-1.056	-0.864
	(2)	-1.368	-0.906	-0.855	-0.804	-1.213	-1.733	-1.430	-1.032	-1.488
	(3)	-1.060	-0.984	-0.864	-1.204	0.475	-1.049	-0.883	-1.340	0.479
First Difference	(1)	-4.778**	-5.226**	-4.922**	-5.887**	-5.719***	-5.917***	-6.869***	-6.984***	-7.099***
	(2)	-4.598**	-4.718**	-5.172***	-5.627**	-6.099***	-7.023***	-6.904***	-6.068***	-7.003***
	(3)	-4.388**	-4.559**	-5.122***	-6.078**	-6.775***	-5.546***	-6.308**	-6.197***	-8.162***

(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% and 5% significance level respectively.

**Table 3: IPS Unit Root Test**

		<i>GPC</i>	<i>FDI</i>	<i>LLY</i>	<i>PRIVO</i>	<i>OPEN</i>	<i>GDP<sup>p</sup></i>	<i>GDP</i>	<i>ICRG</i>	<i>RER</i>	
Level	With common time effect										
		(1) <sup>a</sup>	-1.623	-1.245	-1.310	-0.926	-1.186	0.657	-2.022***	-1.352	-1.074
		(2) <sup>b</sup>	-1.962	-1.753	-2.182	-1.952	-1.832	-1.499	-2.256	-1.829	-1.134
	Without common time effect										
	(1) <sup>a</sup>	-1.660	-1.560	-1.091	-0.778	-1.268	-0.934	-2.194***	-1.447	-1.636	
	(2) <sup>b</sup>	-1.999	-2.193	-2.110	-1.909	-1.840	-2.272	-2.274	-1.865	-1.344	
First Difference	With common time effect										
		(1) <sup>a</sup>	-2.220***	-2.195***	-2.197***	-2.310***	-2.083**	-1.740**	-2.489***	-1.984*	-2.012***
		(2) <sup>b</sup>	-2.968***	-2.643***	-2.594***	-2.549***	-2.592***	-2.815***	-2.344*	-2.429**	-2.558***
	Without common time effect										
	(1) <sup>a</sup>	-2.335***	-2.280***	-2.216***	-2.425***	-2.074***	-2.517***	-2.719***	-1.901**	-2.289***	
	(2) <sup>b</sup>	-2.855***	-2.509***	-2.522***	-2.723***	-2.430***	-2.610***	-2.633***	-2.797***	-2.419**	

(1): Model with heterogeneous intercepts. (2): Model with heterogeneous intercepts and heterogeneous trend. <sup>a</sup>: The critical value at 1%, 5% and 10% is -1.83, -1.74 and -1.69 respectively. <sup>b</sup>: The critical value at 1%, 5% and 10% is -2.48, -2.38 and -2.33 respectively.

**Table 4: Pedroni Co-integration Test**

Model			Statistic Values						
			panel v-stat	panel rho-stat	panel pp-stat	panel adf-stat	group rho-stat	group pp-stat	group adf-stat
Financial Openness	GPC Model	M1	1.66	-8.41	-15.83	-12.84	-5.25	-18.23	-13.56
		M2	-3.21	-4.89	-17.69	-12.39	-5.15	-18.99	-12.05
		M3	-3.34	-5.04	-17.82	-9.78	-5.14	-18.77	-9.89
		M4	1.49	-8.84	-16.48	-11.29	-5.48	-18.89	-11.61
	FDI Model	M1	0.75	-9.09	-17.65	-12.01	-5.87	-22.88	-10.73
		M2	-4.08	-4.61	-19.18	-12.04	-6.74	-22.39	-10.04
		M3	-3.76	-4.72	-20.83	-9.81	-5.60	-21.94	-9.36
		M4	0.85	-9.34	-17.99	-10.48	-5.91	-20.72	-10.04
Financial Development	LLY Model	M1	1.19	-5.52	-11.04	-8.96	-5.06	-12.04	-9.85
		M2	-3.29	-4.93	-12.14	-8.15	6.42	-12.29	-7.29
		M3	-3.06	-5.28	-12.85	-8.96	-6.13	-13.69	-8.49
		M4	1.59	-6.62	-12.59	-9.64	-7.05	-13.59	-9.83
	PRIVO Model	M1	1.16	-5.44	-10.04	-8.66	-7.72	-12.00	-8.63
		M2	-3.14	-5.61	-10.18	-7.02	6.82	-10.40	-6.04
		M3	-2.83	-6.56	-13.98	-8.17	-6.90	-14.65	-8.82
		M4	1.61	-7.40	-12.60	-9.18	-4.60	-15.02	-9.94
<b>OPEN Model</b>	M1	1.51	-8.89	-16.27	-12.62	-5.88	-19.57	-13.98	
	M2	-3.34	-5.09	17.54	-12.85	-5.56	-18.45	-13.94	
	M3	-3.01	-4.59	-14.92	-9.13	-5.03	-15.20	-8.10	
	M4	1.63	-7.80	-13.26	-10.08	-5.11	-15.31	-11.38	

**Table 5.a: Trade openness, Financial Development and Financial Openness / GMM Estimations**

	Dependent Variables				
	<i>OPEN</i>	Financial Openness		Financial Development	
		<i>GPC</i>	<i>FDI</i>	<i>LLY</i>	<i>PRIVO</i>
<i>OPEN</i>	0.1646*** (0.0413)	0.0923*** (0.0301)	0.3898*** (0.1293)	-0.1023*** (0.0335)	0.0848*** (0.0507)
<i>GPC</i>	0.1554* (0.0760)	0.1952*** (0.0525)	–	0.0867 (0.0930)	0.2360*** (0.0890)
<i>FDI</i>	0.3684*** (0.0835)	–	0.0932*** (0.0485)	-0.0433 (0.0530)	0.0833*** (0.0206)
<i>LLY</i>	-0.0922* (0.0484)	0.0779 (0.0877)	-0.5179*** (0.1942)	0.2608*** (0.0276)	–
<i>PRIVO</i>	0.0447** (0.0213)	-0.0637 (0.0654)	0.1430*** (0.0256)	–	0.1801*** (0.0233)
<i>GDP<sup>p</sup></i>	0.29015*** (0.0423)	0.0947*** (0.0257)	0.0437 (0.1008)	0.3725*** (0.0224)	0.3215*** (0.0348)
<i>GDP</i>	0.0830** (0.0313)	0.0953*** (0.0292)	0.5200*** (0.1235)	0.0909*** (0.0321)	0.2947*** (0.0512)
<i>ICRG</i>	0.6146*** (0.0750)	0.2154*** (0.0503)	0.0885*** (0.0260)	0.4082*** (0.0478)	0.6397*** (0.0748)
<i>RER</i>	0.2407*** (0.0146)	0.0287*** (0.0084)	0.1420*** (0.0350)	–	–
<i>Constant</i>	0.0347*** (0.0048)	0.0022*** (0.0003)	0.0074 (0.0130)	0.0064*** (0.0031)	0.0269*** (0.0050)
<i>Sargan Test (p-value)</i>	353.63 [0.7797]	287.81 [0.9997]	283.62 [0.9999]	330.91 [0.9509]	338.98 [0.9091]
<i>First order serial correlation test (p-value)</i>	-13.83 [0.0000]	-14.02 [0.0000]	-15.02 [0.0000]	-14.18 [0.0000]	-12.56 [0.0000]
<i>Second order serial correlation test (p-value)</i>	1.23 [0.2180]	0.16 [0.8758]	0.78 [0.3155]	-0.74 [0.4603]	-0.42 [0.6771]

Values in parentheses are robust standard errors. Values in brackets are the p-values. \*\*\* (\*\*, \*): Significant at 1% level (5%, 10% level)

**Table 5.b: Trade openness, Financial Development and Financial Openness / GMM Estimations**

	Dependent Variables				
	<i>OPEN</i>	Financial Openness		Financial Development	
		<i>GPC</i>	<i>FDI</i>	<i>LLY</i>	<i>PRIVO</i>
<i>OPEN</i>	0.1749*** (0.0410)	0.0918*** (0.0302)	0.3846*** (0.1282)	0.1038*** (0.0334)	0.0751** (0.0304)
<i>GPC</i>	0.1566** (0.0655)	0.2189*** (0.0532)	–	0.0930 (0.0929)	0.2278** (0.0882)
<i>FDI</i>	0.3787*** (0.0831)	–	0.0843*** (0.0477)	-0.0408 (0.0530)	0.0816*** (0.0205)
<i>LLY</i>	0.0985** (0.0585)	0.0793 (0.0882)	-0.5018*** (0.1942)	0.2653*** (0.0275)	–
<i>PRIVO</i>	0.0457** (0.0212)	-0.0644 (0.0657)	0.1433*** (0.0282)	–	0.1942*** (0.0233)
<i>GDP<sup>p</sup></i>	0.2766*** (0.0427)	0.0953*** (0.0260)	0.0497 (0.1018)	0.3792*** (0.0221)	0.3369*** (0.0344)
<i>GDP</i>	0.0829*** (0.0512)	0.0956*** (0.02955)	0.5249*** (0.1236)	0.09168*** (0.0321)	0.2963*** (0.0510)
<i>ICRG</i>	0.6342*** (0.0744)	0.2209*** (0.0505)	0.0928 (0.0205)	0.4109*** (0.0475)	0.6155*** (0.0744)
<i>RER</i>	0.2496*** (0.0143)	0.0279*** (0.0084)	0.1518*** (0.0347)	–	–
<i>CRI<sup>1</sup></i>	-0.1651*** (0.0351)	-0.0076** (0.0038)	-0.1109*** (0.0283)	-0.0786** (0.0423)	-0.1188** (0.0324)
<i>CRI<sup>2</sup></i>	-0.0781*** (0.0295)	-0.0021** (0.0010)	-0.0954*** (0.0402)	-0.1056 (0.1306)	-0.1723** (0.3755)
<i>Constant</i>	0.0324*** (0.0047)	0.0007 (0.0030)	0.0095 (0.0127)	0.0072** (0.0030)	0.0275*** (0.0049)
<i>Sargan Test (p-value)</i>	351.90 [0.8089]	288.44 [0.7797]	285.45 [0.9998]	332.49 [0.9482]	340.29 [0.9068]
<i>First order serial correlation test (p-value)</i>	-13.90 [0.0000]	-14.04 [0.0000]	-15.09 [0.0000]	-14.21 [0.0000]	-12.61 [0.0000]
<i>Second order serial correlation test (p-value)</i>	0.99 [0.3240]	0.16 [0.8692]	0.66 [0.3579]	-0.73 [0.4626]	-0.41 [0.6829]

Values in parentheses are robust standard errors. Values in brackets are the p-values. \*\*\* (\*\*, \*): Significant at 1% level (5%, 10% level)

**Table 6: Linkages between the variables of interest**

	Dependent Variables				
	OPEN	GPC	FDI	LLY	PRIVO
OPEN	–	Yes (+)	Yes (+)	Yes (-)	Yes (+)
GPC	Yes (+)	–	–	No	Yes (+)
FDI	Yes (+)	–	–	No	Yes (+)
LLY	Yes (-)	No	Yes (-)	–	–
PRIVO	Yes (+)	No	Yes (+)	–	–
GDP <sup>p</sup>	Yes (+)	Yes (+)	No	Yes (+)	Yes (+)
GDP	Yes (+)	Yes (+)	Yes (+)	Yes (+)	Yes (+)
ICRG	Yes (+)	Yes (+)	Yes (+)	Yes (+)	Yes (+)
RER	Yes (+)	Yes (+)	Yes (+)	–	–

(+): Positive linkage; (-): Negative linkage