FIW – Working Paper

FIW Working Paper N° 60
November 2010

Financial Development, Financial Openness and Trade Openness: New evidence

PHAM Thi Hong Hanh

Abstract

Employing the Pedroni co-integration technique and the GMM estimator, this paper aims at investigating the possible connection between financial development, financial openness and trade openness in twenty-nine Asian developing countries over 1994-2008. Firstly, we find a bidirectional causality between trade openness and financial development/openness. Secondly, the relationship between financial development and financial openness is heterogeneous 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.

JEL : D90, F14, F36, G01, O16
Keywords: Financial development; Financial Openness; International Trade; Financial Crisis; Developing countries; Panel Co-integration.

The author

CARE – EMR, Faculty of Laws, Economics and Management, University of Rouen
3, Avenue Pasteur F-76186 Rouen Cedex 1, France
Phone: +33 (0)2 32 76 97 86, Fax : +33 (0)2 32 76 96 63, E-Mail: thihonghanh.pham@univ-rouen.fr

Financial Development, Financial Openness and Trade Openness: New evidence

PHAM Thi Hong Hanh

CARE – EMR, Faculty of Laws, Economics and Management
University of Rouen
3, Avenue Pasteur F-76186 Rouen Cedex 1, France
Phone: +33 (0)2 32 76 97 86
Fax : +33 (0)2 32 76 96 63
Email: hanh.phamhong@gmail.com
thihonghanh.pham@univ-rouen.fr

ABSTRACT

Employing the Pedroni co-integration technique and the GMM estimator, this paper aims at investigating the possible connection between financial development, financial openness and trade openness in twenty-nine Asian developing countries over 1994-2008. Firstly, we find a bidirectional causality between trade openness and financial development/openness. Secondly, the relationship between financial development and financial openness is heterogeneous 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

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 trade balance structure. 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, building a model with two sectors, one of which is financially extensive, Do and Levchenko (2004) find that openness to trade will affect the demand for external finance, and thus financial depth, in the trading countries. Accordingly, the North (wealthy countries) production of the financially intensive good will be expanded, while the South (poor countries) production will be reduced due to its wealth-constrained endowments.

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 openness to FDI flows. For instance, Aizenman and Noy (2004) evidence the presence of almost symmetric inter-temporal feedbacks between trade and financial openness. Furthermore, in order to reinforce their consideration, 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 in the case of developing countries, there has been an increase in FDI flows and trade in manufacturing and services and that these are linked.

Comparing with a large number of works investigating the links between financial development and trade, and between financial openness and trade, many recent empirical studies have began to reveal the possible linkages among financial development, financial openness and trade openness at once (e.g. Rajan and Zingales,

2003; Baltagi et al., 2009). Rajan and Zingales's analysis, based on a panel data of twenty-four industrialised countries over 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, these two cited researches seem to ignore the impacts of financial crisis on financial development and both types of openness. Meanwhile, the appearance of financial crisis may change the nature of relationship between financial development and financial/trade openness. That is why introducing a financial crisis variable in estimated models should be asked for in the empirical researches.

Therefore, the aim of this paper is to resolve the two issues outlined above, which have not yet deal with in any existing empirical work. Firstly, we tend to examining the possible two-way causality between financial development and financial/trade openness. Secondly, 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.

The remainder of this paper is organised as follows. *Section 2* describes the panel data set. *Section 3* specifies the econometrical methodology. *Section 4* reports and discusses the empirical results. This section also compares our major findings with those 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 1.*

Financial Openness

The existing measures of financial openness 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, henceforth). 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) provide 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. This indicator raging from 0 to 18 seems to have a much wider range than others.

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.[1] Data is collected from World Development Indicators (WDI), available annually.

Financial Development

In the literature, there are various indicators used to measure the degree of financial development. The most popular measure is the ratio of liquid liabilities to GDP (libelled

[1] According to the World Bank, "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".

LLY), which is favoured in Mc Kinnon (1973) and 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 (libelled *PRIVO)* and the ratio of the commercial bank assets to the sum of commercial bank assets and central bank assets (libelled *BTOT*).

Beck et al. (2000) includes two 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, to measure the development of stock market, Levine and Zervos (1998) use the value of listed companies on the stock market as share of GDP in a given year (*MCAP*). They also use Total Value Traded (*TVT*) as an indicator of stock market activity, which is the ratio of trades in domestic shares to GDP. Finally, the authors deploy the Turnover Ratio (*TOR*) as the ratio of trades in domestic shares to market capitalization. A potential problem with these measures of the stock market is that they are not available prior to 1975.

Taking into account all above indicators and using principal components analysis Huang and Temple (2005) introduce six new aggregate measures of financial development. The first one is designed to capture overall financial development and 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. By contrast, 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. *FDSTOCK* captures equity market development, and is based on *MCAP, TVT* and *TOR*. Finally, a measure of financial depth, *FDEPTH*, uses only *LLY, PRIVO* and *BTOT*.

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 the sample.

Trade Openness

Up to now, there is a large body of literature proposing and evaluating alternative measures of trade openness. Among others, the most well-known is the Sachs and Warner index (SW). The SW index, which is constructed by Sachs and Warner (1995), is a dummy variable for openness based on five individual dummies for specific trade-related policies. Relying on this index, a country is classified as closed if it displays at least one of the following characteristics:

- Average tariff rates of 40 percent or more;
- Non-tariff barriers covering 40 percent or more of trade;
- A black market exchange rate that is depreciated by 20 percent or more relative to the official exchange rate, on average, during the 1970s or 1980s;
- A state monopoly on major exports;
- A socialist economic system.[2]

Rodriguez and Rodrik (1999) argue that the SW index serves as a proxy for a wide range of policy and institutional differences and not only of trade policy. However, the SW index is a binary dummy which only suggests that a country is either open or closed. Consequently, this index can not capture the different degrees of trade openness between countries in question. Additionally, many of the underlying data used to construct the SW index are only available for some countries in the sample and at one point of time. On the other hand, most recent studies have assessed the relationship between trade openness and other economic factors in terms of trade volume/value, not trade policies due to the difficulties in measuring policy. In this case, the SW index could not be used. Finally, the statistical correlation between the SW index and other variables of interest is not always obvious and difficult to interpret the empirical results.

For this reason, although the SW index is based on five selected criteria to cover various types of trade restrictions, it has not been largely employed in the recent empirical researches. In fact, the most simple and widely-used indicator is the proportion of a country's GDP involved in international trade (exports and imports), which has been recognised in the literature as a good indicator for measuring the levels of trade openness. In this paper, we also use this indicator for the research objectives.

[2] See Kornai (1992) for the definition of socialist economic system.

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 score, ranging from 0 to 100, comprises 22 risk components in three risk subcategories: political, financial and economic. A higher ICRG score is associated with lower risk. The ICRG composite score is, here, 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 as the 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:

$$RER_{it} = e_{i,t} \times \frac{p_t^{USA}}{p_{it}} \qquad \textbf{(1)}$$

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, IFS) 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, IFS). These have the advantage of being timely, similarly constructed across countries and available for a wide range of countries over a long time span.

- *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 two separate binary crisis dummies covering the effect of financial crises over the period under consideration.

<Insert Table 1>

Table 1 reports the quite different values of correlation coefficients between all variables in question, 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 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 explains 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 crisis dummies. The first one, capturing the effect of 1997 Asian financial crisis, takes the value of 1 during 1997-1999 and of 0 in the opposite cases. The second one, capturing the effect of 2007 financial crisis, takes the value of 1 in 2008 and of 0 over 1995-2007.

Our empirical specification is performed in three steps. Firstly, we test for the order of integration or the presence of unit root of our panel. Secondly, 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[3] 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). Among others, the LLC test and the IPS test are the most widely-used. 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

[3] 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.

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.

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:

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

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

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

where $i = 1,...,29$ Asian developing countries and $t = 1,...,15$ 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, ε_{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 ρ_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.

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

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

where Y_{it} and X_{it} are the co-integrated variables, i = 1,….., 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:

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

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

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

where β_{10i}, β_{20i} and β_{30i} capture country effects, control for unobserved heterogeneity, it is different across countries and fixed through time; the other coefficients β 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… 15). ξ_{it} is a disturbance term assumed to satisfy the Gauss–Markov conditions. A trend term δt has been introduced to allow for a shift of the intercept over time. The term δt controls for the time trend in variables.

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

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

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

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

In the last three 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 ξ_{1it}, and this means that we may have a statistical endogeneity problem. Although 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. In our research, the panel dataset has a short time dimension. So that, in order to avoid the over-fitting biases that are sometimes associated with using all the available moment conditions, we only allow maximum of 2 or 4 lags of levels to be used as instruments.

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 ξ_{it}. Arellano and Bond (1991) introduce two tests for serial correlation, often labelled "*m1*" for first-order and "*m2*" for second-order serial correlation. We expect to find the 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 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 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 allow us to reject 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 deferent 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 to 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.

Panel causality in estimation equations without binary crisis dummies

We start with interpreting the GMM estimator's results for all estimation equations without introducing two binary crisis dummies.

<Insert Table 5>

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. The 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. 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 independent variables on trade openness, which are presented in the first column of *Table 5*. 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 affects trade openness less than financial openness. The two estimated financial development coefficients are around 0.09 and 0.04 in trade openness equation (Eq. 9), while those in financial openness equation (Eq. 10) 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.

Investigating now the impacts of different explanatory variables on financial openness indicators that reported in the 2nd and 3rd columns of *Table 5*, 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 the quite different results. We find no connection between financial development and Gross Private Capital flows, 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 different values, however, evidence the same finding that a developing country with a well developed financial system is more attractive to FDI than others. Precisely, 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 turn our attention to the possible impacts of independent variables on financial development, which are reported in the last two columns in *Table 5*. In both LLY and PRIVO equations, trade openness enters with significant coefficients of around -0.1 and 0.08, respectively. This supports an important role of trade openness in fostering the development of financial system. Relating to the effects of financial openness on financial development, we find once again two different results. Firstly, 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 the governmental efforts of Asian developing countries in controlling their monetary markets. Secondly, 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).

Panel causality in estimation equations with binary crisis dummies

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 employ 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 7*.

<Insert Table 7>

This new step allows us to resolve the question of whether the appearance of financial crises can matter for the existing relationship between financial development and openness. On one hand, we find that the inclusion of crisis dummies 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.

Firstly, 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 in

financial development. The fact is that this crisis started in East Asia and, no double, marked its serious impacts on the regional economy, in particular on the financial and monetary system of East-Asia. This finding is also consistent with that of Laeven and Valencia (2008), suggesting that almost of developing Asian countries in our sample had directly suffered from the 1997 slump.

Similarly, we find a negative impact of the 2007 financial crisis on both trade and financial openness but no effect of this crisis on financial development. In fact, the 2007 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 2007 financial crisis has been transmitted from developed economies to Asian developing countries through two main channels – trade and financial openness. This finding allows us to conclude that in spite of the absence of a direct effect, the 2007 financial crisis has still hurt the financial development of developing world through financial and trade openness channels due to a strong relationship between financial development and openness.

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 empirical studies. Since almost recent well-known researches have almost focused on the one-way linkage among these three variables or only on the connection between financial development and financial openness or between financial openness and 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 trade balance structure. 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 trade openness fosters the financially dependent sectors as well as the development of financial sector in a wealthy country, 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 theoretical consideration, Do and Levchenko provide an empirical analysis relying on a sample of 77 countries. The authors argue that trade openness differently affects countries' financial systems. In richer countries trade openness promotes the financial depth, in poorer ones the impacts of trade openness on financial development is reverse. Both cited papers only evidence the one-way relationship running from financial development to trade openness in Beck (2002) and running from trade openness to financial development in Do and Levchenko (2004).

Regarding the relationship between financial and trade openness, we look at a set of well-known studies of Aizenman and Noy (2004, 2006). 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, such as commercial openness, the political regime and corruption. They find that all of the linear feedback between trade and financial openness can be accounted for by the Granger causality running from financial openness to trade openness (53 percent) and running from trade to financial openness (34 percent). Relying on a set of disaggregated measures, Aizeman and Noy (2006) develop their 2004 work and suggest that for many developing countries, an increase in FDI flows linked to an increase in trade.

We now turn our attention to recent empirical works focusing on the connection between financial development and openness. The most influent contribution in this literature is the one of Rajan and Zingales (2003). Accordingly, 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, such an important prediction of the Rajan and Zingales contribution 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 1980-2000. In this work, 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 favoured

by 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 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. Firstly,

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 developing Asia countries.

ii) Relating to the interaction term between financial development and financial openness, we obtain such different results. On one hand, the first financial openness indicator – Gross Private Capital – is positively related to the PRIVO indicator, but does not influence on 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 can not support the important role of financial openness on deepening the 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 find that the financial crises have negative effects on financial and trade openness. On the other hand even if the financial crisis has no 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 translated from our major empirical findings.

Firstly, our paper supports a bidirectional causality between financial development and trade openness as well as between financial openness 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 that 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 to 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 2007 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 developing countries' policymakers should 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 2007 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 2007 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 start our empirical research with examining the relationship between financial development and both types of openness – trade and financial 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, both financial development and financial openness allow developing countries to encourage the country's trade openness. Additionally, the empirical statistics also indicate that the effect of financial openness on trade openness is likely to be larger than that of financial development. The second key finding evidences such a complex connection between financial development and financial openness. 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 no 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 find no effect of financial development on GPC indicator. According to this finding, the policymakers in developing countries should be careful in taking any political economy decision to avoid any mistake, which may result from confusing 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. Firstly, the inclusion of crisis dummies in estimated models has not changed the relationship between the variables of interest. Secondly, while the 1997 financial crisis seems to have a negative effect on all dependent variables, the 2007

financial crisis has no direct effects on the development of domestic financial system in Asian developing countries. However, due to a strong linkage between financial development and openness, the 2007 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 be the long-run economic policy of developing countries. To this end, formal economic modelling should be challenged, not only to precisely and completely investigate such a complex relationship among financial development, financial openness and trade openness, but also to reinforce our considerations concerning the political economy mechanisms for developing countries. We leave this issue for the future researches.

References

Abiad, A., Mody, A., 2005. Financial reform: what shakes it? What shapes it?, American Economic Review 95, 66–88.

Aizenman, J., 2004. Financial opening and development: evidence and policy controversies, American Economic Review 94(2), 65-70.

Aizenman, J. and Noy, I., 2006. Endogenous Financial and Trade Openness: Efficiency and Political Economy Considerations, NBER Working Paper 2004/04.

Aizenman, J. and Noy, I., 2006. FDI and trade-Two way linkages?, The Quarterly Review of Economics and Finance 43, 317-337.

Arellano,M., Bond, S.,1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, Review of Economic Studies 58, 277–297.

Baltagi, B.H., Demetriades, P., Law, S.H., 2009. Financial development and openness: Evidence from panel data, Journal of Development Economics 89, 285-296.

Beck, T., Demirguc-Kunt, A. and Levine, R., 2000. A new database on the structure and development of the financial sector, World Bank Economic Review 14(3), 597-605.

Beck, T., 2002. Financial development and international trade: Is there a link?, Journal of International Economics 2, 107-131.

Chinn, M.D., Ito, H., 2006. What matters for financial development? Capital controls, institutions and interactions, Journal of Development Economics 81, 163–192.

Choi, I. 2001. Unit root tests for panel data, Journal of International Money and Finance 20, 249-272.

Dickey, D.A., and Fuller, W.A., 1979. Distribution of the estimators for autoregressive time series with a unit root, Journal of the American Statistical Association 74/366, 427 - 431.

Do, Q.T., and Levchenko, A.A., 2004. Trade and financial development, World Bank Working Paper 3347.

Engle, R.F. and Granger, C.W.J., 1987. Co-integration and error-correction: Representation, estimation and testing, Econometrica 55, 251-276.

Hadri, K., 2000. Testing for Stationarity in Heterogeneous Panel Data, Econometric Journal 3, 148-61.

Huang, Y., Temple, J., 2005. Does external trade promote financial development?, CEPR Discussion Paper 5150.

King, R., Levine, R., 1993. Finance and growth: Schumpeter might be right, Quarterly Journal of Economics 108, 717–737.

Kletzer, K. and Bardhan, P.K. 1987. Credit markets and patterns of international trade. Journal of Development Economics, no. 27, pp.57-70.

Im, K., Pesaran, M.H. and Shin, Y., 1997. Testing for unit roots in heterogeneous panels, Journal of Econometrics 115(1), 53-74.

Johansen, S., 1988. Statistical analysis of co-integration vectors, Journal of Economic Dynamics and Control 2, 231 - 254.

Lane, P.R., Milesi-Ferretti, G.M., 2006. The external wealth of nations Mark II: revised and extended estimates of foreign assets and liabilities 1970–2004, IMF Working Paper 06/69.

Laeven, L. and Valencia, F., 2008. Systemic Banking Crises: A New Database, IMF Working Paper 08/224.

Levine, A., Lin, C.F. and Chu, C.S., 2002. Unit root tests in panel data: asymptotic and finite-sample properties, Journal of Econometrics 108, 1-24.

Levine, R., and Zervos, S., 1998. Stock markets, banks, and economic growth, American Economic Review 88, 537–558.

Maddala, G.S. and Wu, S.W., 1999. Comparative study of unit root tests with panel data and a new simple test, Oxford Bulletin of Economics and Statistics 61 (Special Issue).

Pedroni, P. 1999. Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors, Oxford Bulletin of Economics and Statistics 61 (Special Issue).

Phillips, P.C.B. and Perron, P., 1988. Testing for a unit root in time series regression, Biometrika 75(2), 335-346.

Rajan, R.G., Zingales, L., 2003. The great reversals: the politics of financial development in the twentieth century, Journal of Financial Economics 69, 5–50.

Rodriguez, F., and Rodrik, D., 1999. Trade policy and economic growth: a skeptic's guide to cross - national evidence, NBER Working Paper 7081.

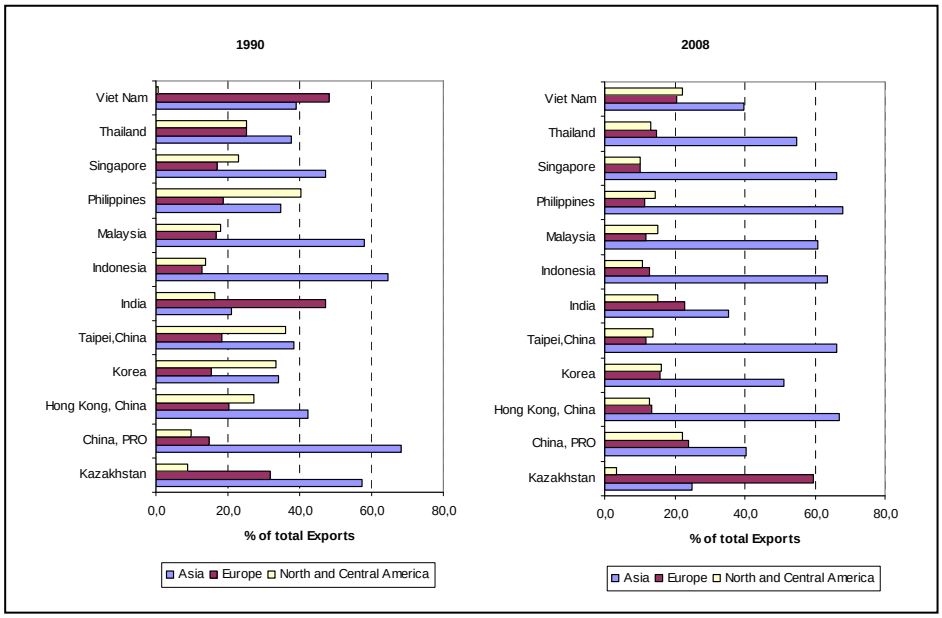
Sachs, J., and Warner, A., 1995. Economic reform and the process of global integration, Brookings Papers of Economic Activity 1, 1–118.

Svaleryd, H., and Vlachos, J., 2002. Markets for risk and openness to trade: how are they related?, Journal of International Economics 57, 369–395.

APPENDIX 1: List of Asian developing countries studied

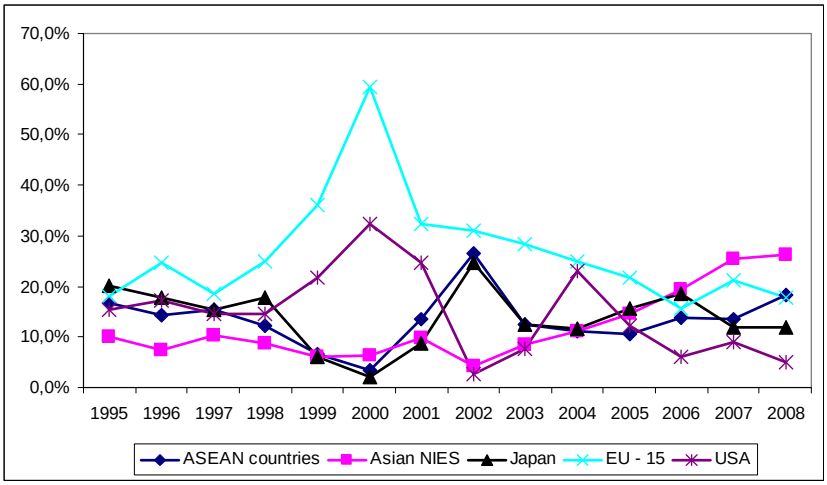
Region	Country
Central and West Asia	Armenia; Azerbaijan; Georgia; Kazakhstan; Kyrgyz Republic; Pakistan; Tajikistan Turkmenistan; Uzbekistan.
East Asia	China; Hong Kong - China; Korea, Rep. of; Mongolia.
South Asia	Bangladesh; Bhutan; India; Maldives; Nepal; Sri Lanka
Southeast Asia	Brunei Darussalam;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

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: Correlations Matrix (1994 - 2008; Countries = 29; Observations = 345)

	GPC	*FDI*	*LLY*	*PRIVO*	*OPEN*	*GDP^{p}*	*GDP*	*ICRG*	*RER*	*Crisis*
GPC	1.0000									
FDI	0.0871	1.0000								
LLY	0.0387	0.3783	1.0000							
PRIVO	0.2591	0.3295	0.4161	1.0000						
OPEN	0.3315	0.3224	0.2181	0.1679	1.0000					
GDP^{p}	0.1366	0.2795	0.6885	0.4013	0.5215	1.0000				
GDP	0.1456	0.2170	0.3790	0.1328	0.2931	0.1442	1.0000			
ICRG	0.6390	0.6404	0.3049	0.2854	0.5281	0.2471	0.1146	1.0000		
RER	0.2986	0.3903	0.0268	0.0067	0.3725	0.0864	0.0333	-0.2680	1.0000	
Crisis	-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

		GPC	*FDI*	*LLY*	*PRIVO*	*OPEN*	*GDP^p*	*GDP*	*ICRG*	*RER*
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

		GPC	*FDI*	*LLY*	*PRIVO*	*OPEN*	*GDP^p*	*GDP*	*ICRG*	*RER*
Level	With common time effect									
	(1)[a]	-1.62	-1.24	-1.31	-0.92	-1.18	0.65	-2.02***	-1.35	-1.07
	(2)[b]	-1.96	-1.75	-2.18	-1.95	-1.83	-1.49	-2.25	-1.82	-1.13
	Without common time effect									
	(1)[a]	-1.66	-1.56	-1.09	-0.77	-1.26	-0.93	-2.19***	-1.44	-1.63
	(2)[b]	-1.99	-2.19	-2.11	-1.90	-1.84	-2.27	-2.27	-1.86	-1.34
First Difference	With common time effect									
	(1)[a]	-2.22***	-2.19***	-2.19***	-2.31***	-2.08**	-1.74**	-2.48***	-1.98*	-2.01***
	(2)[b]	-2.96***	-2.64***	-2.59***	-2.54***	-2.59***	-2.81***	-2.34*	-2.42**	-2.55***
	Without common time effect									
	(1)[a]	-2.33***	-2.28***	-2.21***	-2.42***	-2.07***	-2.51***	-2.71***	-1.90**	-2.28***
	(2)[b]	-2.85***	-2.50***	-2.52***	-2.72***	-2.43***	-2.61***	-2.63***	-2.79***	-2.41**

(1): Model with heterogeneous intercepts. (2): Model with heterogeneous intercepts and heterogeneous trend. [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 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
OPEN Model		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: Trade openness, Financial Development and Financial Openness / GMM Estimations

	Dependent Variables				
		Financial Openness		Financial Development	
	OPEN	*GPC*	*FDI*	*LLY*	*PRIVO*
OPEN	0.16*** (0.04)	0.09*** (0.03)	0.38*** (0.12)	-0.10*** (0.03)	0.08*** (0.05)
GPC	0.15* (0.07)	0.19*** (0.05)	_	0.08 (0.09)	0.23*** (0.08)
FDI	0.36*** (0.08)	_	0.09*** (0.04)	-0.04 (0.05)	0.08*** (0.02)
LLY	-0.09* (0.04)	0.07 (0.08)	-0.51*** (0.19)	0.26*** (0.02)	_
PRIVO	0.04** (0.02)	-0.06 (0.06)	0.14*** (0.02)	_	0.18*** (0.02)
GDP^p	0.29*** (0.04)	0.09*** (0.02)	0.04 (0.10)	0.37*** (0.02)	0.32*** (0.03)
GDP	0.08** (0.03)	0.09*** (0.02)	0.52*** (0.12)	0.09*** (0.03)	0.29*** (0.05)
ICRG	0.61*** (0.0750)	0.21*** (0.05)	0.08*** (0.02)	0.40*** (0.04)	0.63*** (0.07)
RER	0.24*** (0.01)	0.02*** (0.00)	0.14*** (0.03)	_	_
Constant	0.03*** (0.00)	0.00*** (0.00)	0.00 (0.01)	0.00*** (0.00)	0.02*** (0.00)
Sargan Test (p-value)	353.63 [0.7797]	287.81 [0.9997]	283.62 [0.9999]	330.91 [0.9509]	338.98 [0.9091]
First order serial correlation test (p-value)	-13.83 [0.0000]	-14.02 [0.0000]	-15.02 [0.0000]	-14.18 [0.0000]	-12.56 [0.0000]
Second order serial correlation test (p-value)	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 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^p	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

Table 7: Trade openness, Financial Development and Financial Openness / GMM Estimations

	Dependent Variables				
		Financial Openness		Financial Development	
	OPEN	*GPC*	*FDI*	*LLY*	*PRIVO*
OPEN	0.17*** (0.04)	0.09*** (0.03)	0.38*** (0.12)	0.10*** (0.03)	0.07** (0.03)
GPC	0.15** (0.06)	0.21*** (0.05)	_	0.09 (0.09)	0.22** (0.08)
FDI	0.37*** (0.08)	_	0.08*** (0.04)	-0.04 (0.05)	0.08*** (0.02)
LLY	0.09** (0.05)	0.07 (0.08)	-0.50*** (0.19)	0.26*** (0.02)	_
PRIVO	0.04** (0.02)	-0.06 (0.06)	0.14*** (0.02)	_	0.19*** (0.02)
GDP^{p}	0.27*** (0.04)	0.09*** (0.02)	0.04 (0.10)	0.37*** (0.02)	0.33*** (0.03)
GDP	0.08*** (0.05)	0.09*** (0.02)	0.52*** (0.12)	0.09*** (0.03)	0.29*** (0.05)
ICRG	0.63*** (0.07)	0.22*** (0.05)	0.09 (0.02)	0.41*** (0.04)	0.61*** (0.07)
RER	0.24*** (0.01)	0.02*** (0.00)	0.15*** (0.03)	_	_
CRI^{1}	-0.16*** (0.03)	-0.006** (0.003)	-0.11*** (0.02)	-0.07** (0.04)	-0.11** (0.03)
CRI^{2}	-0.07*** (0.02)	-0.002** (0.001)	-0.09*** (0.04)	-0.10 (0.13)	-0.17** (0.37)
Constant	0.03*** (0.00)	0.00 (0.00)	0.01 (0.01)	0.007** (0.003)	0.02*** (0.00)
Sargan Test (p-value)	351.90 [0.8089]	288.44 [0.7797]	285.45 [0.9998]	332.49 [0.9482]	340.29 [0.9068]
First order serial correlation test (p-value)	-13.90 [0.0000]	-14.04 [0.0000]	-15.09 [0.0000]	-14.21 [0.0000]	-12.61 [0.0000]
Second order serial correlation test (p-value)	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)*