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Determinants of Financial Integration in the East Asia-Pacific Region

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Abstract

In this paper we argue about the determinants that influence the process of financial market integration in the East Asia-Pacific region. We question whether GDP, Exchange rate and real interest rate influence the financial integration. We construct a regression specification with respect to a probit/tobit panel model for our data set of the selected East Asia-Pacific countries over the 1990–2005 period. Generally, we find that macroeconomic indicators of the members are associated with higher or lower probability of integrating their financial markets and GDP has a positive effect on financial integration, while the results related to exchange rate and interest rate are ambiguous. The implication is that the elimination of exchange rate risk within the East Asia-Pacific region means the common currency, which reduces the remaining differences of investment and consumption opportunities across the member countries of the East Asia-Pacific during the implementation of financial integration.

Keywords: Financial Integration, Macroeconomic Determinants, East Asia-Pacific Region, Panel Probit/Tobit Specification

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1-Introduction

It is generally agreed that deepening financial integration is beneficial on the whole. It is also conceivable that it may have less positive effects. For example, too much consolidation in a market segment might hinder competition. As a consequence, it is extremely important to monitor and understand the process of financial market integration. Financial integration is also important for other reasons. For example, since monetary policy is implemented through a financial system, the system should be as efficient as possible in order to guarantee a smooth and effective transmission of monetary policy. In addition, financial integration affects the structure of the financial system, which in turn may have implications for financial stability. Monitoring integration is therefore important for regulators and central banks.

Financial market integration is a central theme in international finance and the benefits of economic growth via risk sharing, improvements in allocational efficiency and reductions in macroeconomic volatility and transaction costs are all well accepted (Prasad et al., 2003; Baele et al., 2004). Whilst international integration within specific financial asset markets has received much attention, the subject of its determinant that explain this type of economic integration has not. However, size of an economy, changes in exchange rates and interest rates are more relevant to affect financial integration.

In this paper we argue about the determinants which influence the process of financial market integration in the East Asia-Pacific region. We question whether the aforementioned factors influence the financial integration over the period 1990-2005. we specify a panel regression model which is estimated by probit/tobit methods.

The remainder of this paper is organized as follows: Section 2 defines financial integration, and briefly reviews the generally accepted benefits and barriers of financial integration. Section 3 reviews the most closely related literature. Section 4 determines the requirements for the integrated financial market implementation, and then specifies a model for financial integration in the region and explains the relevant data sources. Section 5 discusses the empirical results, and finally Section 6 concludes.

2- Definition, Benefits and Barriers of Financial Integration

The adopted definition of financial integration by Baele et al. (2004) contains three important features. First, it is independent of the financial structures within regions. Financial structures encompass all financial intermediaries – institutions or markets – and how they relate to each other with respect to the flow of funds to and from households, governments and corporations. Second, financial integration is not about removing frictions that hamper the optimal allocation of capital. Rather, financial integration is concerned with the symmetric or asymmetric effects of existing frictions on different areas. In other words, even in the presence of frictions, several areas can be financially integrated as long as frictions affect these areas symmetrically. Third, financial integration defined by Baele et al. (2004) separates the two constituents of a financial market, namely the supply of and the demand for investment opportunities. Full integration requires the same access to banks or trading, clearing and settlement platforms for both investors (demand for investment opportunities) and firms (supply of investment opportunities, e.g. listings. In addition, full integration requires that there is no discrimination among comparable market participants based solely on their location of origin.

Financial integration should offer additional opportunities to share risk and to smooth consumption inter-temporally. This is an important element of financial integration. Kalemli-Ozcan et al. (1999) provide empirical evidence that sharing risk across regions enhances specialisation in production, thereby resulting in well-known benefits. The increase in the set of financial instruments and in the cross-ownership of assets resulting from financial integration should offer additional possibilities to diversify portfolios and share idiosyncratic risk across regions. From theoretical models of risk-sharing[1], we know that when agents in an area fully share risk, the consumption of agents in one region co-moves with that of agents located in other regions of that area, while consumption does not co-move with region-specific shocks. In addition, financial market integration

1- See for instance Cochrane (1991) and Townsend (1994).

promotes risk sharing benefits through asset markets and this may create economic incentives for countries to join a currency union and give up control of their monetary policy (Kim et al 2005).

It is a generally accepted view that greater financial integration should allow a better allocation of capital. The complete elimination of barriers to trading, clearing and settlement platforms will allow firms to choose the most efficient trading, clearing and/or settlement platforms. Another implication of greater financial integration, which is partially linked to the issue of capital allocation described above, is additional economic growth. One channel through which financial integration acts upon economic growth is greater financial development (Baele et al., 2004).

The link between financial development and financial integration is of the utmost importance, as there is strong evidence that financial development is linked with economic growth. As described in Levine (1997), financial systems serve some basic purposes. Among others, they 1) lower uncertainty by facilitating the trading, hedging, diversifying and pooling of risk; 2) allocate resources; and 3) mobilise savings. These functions may affect economic growth through capital and technological accumulation in an intuitive way.

Indeed, economic growth and financial development are so intertwined that it is difficult to draw any firm conclusion with respect to causality. Nevertheless, recent research has found evidence that financial development affects growth positively. Rousseau (2002) finds empirical evidence that financial development promotes investment and business by reallocating capital. Also, industry-level studies like that of Jayaratne and Strahan (1996) show that financial development causes economic growth. Moreover, Bekaert et al. (2002) find that equity market liberalization increases subsequent average annual real economic growth. This highlights the importance of financial integration as an additional step towards financial development, which in turn seems to be conducive to greater economic growth.

However, financial integration is more complex than described here, as the process will transform the financial systems of all regions. But the aforementioned theoretical results are ambiguous as to how further financial integration affects welfare. The process of financial integration should

therefore be monitored closely, to observe whether markets evolve toward an efficient structure.

On the investment point of view, higher transaction costs and lower market liquidity are the main reasons that make smaller markets less attractive to institutional investors and thus represent important barriers to investment in and thus integration of these markets. Other barriers to international investment (including taxes on foreign security holdings and ownership restrictions) are crucial factors that prevent market integration. Consequently, in partially integrated economies, investors' portfolios may be biased towards home assets because the benefits of international diversification are not large enough to offset its costs (Black, 1974; Stulz, 1981; Errunza and Losq, 1985; Eun and Janakira-Manan, 1986; Cooper and Kaplanis, 2000).

In theory, if financial markets are not integrated, entailing differential investment and consumption opportunity sets across countries, investment barriers will affect investors' portfolio choices and companies' financing decisions. If purchasing power parity does not hold, exchange rates affect the cost of consumption across countries, and, thus, exchange rate risk influences the price of assets to investors abroad. International asset pricing models recognize these effects by including exchange rate risk as priced factors (e.g. Solnik, 1974; Stulz, 1981; Adler and Dumas, 1983) and can, thus, be used to empirically investigate the issue of financial market integration (Dumas and Solnik, 1995). Even without exchange rate risk, however, many differences between national markets for labor and capital in the East Asia-Pacific currently remain, based on regulation, language, familiarity, transaction costs, etc.

3- Literature Review

The issue of financial market integration has also been studied in the academic empirical finance literature. DeFusco et al. (1996) examine weekly data for January 1989–May 1995 denominated in US dollars. They conclude that there is no cointegration in a block of Asia-Pacific countries consisting of the U.S., Korea, Philippines, Taiwan, Malaysia, and Thailand. They also conclude that there is no cointegration in the other two regions they examine, thus capital markets are segmented.

Sharma and Wongbangpo (2002) examine monthly data from January 1986 through December 1996 for the ASEAN-5 markets denominated in local currencies. They find a long-run cointegrating relationship among the stock markets of Indonesia, Malaysia, Singapore, and Thailand, but conclude that the Philippine market does not share the relationship. Furthermore, there is only one cointegrating vector among the four markets, leaving three common trends. One particularly interesting finding is that Malaysia and Singapore move together one-for-one in the cointegrating vector, apparently because of the distribution of inward foreign direct investment flows, the strength of trade between the two economies, the geographical proximity and cultural factors.

Tan and Tse (2002) use daily data in local currencies over 1988–2000 in a nine-variable VAR to examine the linkages among US, Japan, and seven Asian stock markets including Malaysia, Philippines, Singapore, and Thailand. By truncating the data at the end of 1996 and re-starting the data in mid-1998 to create a pre-crisis and post-crisis comparison, they find that markets appear to be more integrated after the crisis than before, and that Asian markets are most heavily influenced by the United States but that the influence of Japan is increasing. The most noteworthy effect among the ASEAN-5 is that Malaysia is apparently an outlier; Malaysia is less affected by the United States and Japan after the crisis, which can be attributed to the influence of its capital and currency controls, but Singapore and Malaysia still affect each other strongly, which can be attributed to geographic proximity, economic linkages and structural symmetry.

Cheung et al (2003) investigate the status of real and financial integration of China, Hong Kong, and Taiwan, using monthly data on 1-month interbank rates, exchange rates, and prices. Specifically, the degree of integration is assessed based on the empirical validity of real interest parity, uncovered interest parity, and relative purchasing power parity. There is evidence stating that these parity conditions tend to hold over longer periods, although they do not hold instantaneously. Overall, the magnitude of deviations from the parity conditions is shrinking over time. In particular, China and Hong Kong appear to have experienced significant increases in integration during the sample period. It is also found that exchange rate variability plays a major role in determining the variability of deviations from these parity conditions.

Click and Plummer (2005) consider the degree to which the five stock markets in the original Association of Southeast Asian Nations countries (ASEAN-5) are correlated as a way to assess the feasibility of policy initiatives to enhance ASEAN stock market integration and the implications for portfolio investors. In particular, they consider whether the ASEAN-5 markets are integrated or segmented using the time series technique of cointegration to extract long-run relations. Their empirical results suggest that the ASEAN-5 stock markets are cointegrated and are thus not completely segmented by national borders. Therefore, they conclude that ASEAN-5 stock markets are integrated in the economic sense, but that integration is far from complete.

4- The Model

The nature of the new financial structures, which are emerging, is conditioned by the introduction of a single currency and by a wider process of financial globalization. There are compelling reasons to convert the stock price indices into a common measuring unit, but that raises the question as to which currency should be chosen (Click and Plummer, 2005).

Hence, the introduction of common currency is one of the most important events for global financial markets. That is, a immediate consequence of the adoption of the common currency is an integration of money and bond markets. Increasing integration of the equity markets within a region is likely to be another consequence of the elimination of exchange rate risk across countries within the region as a result of the adoption of a single currency (Yunjong, 2004). Consequently, the impact of the common currency on the integration of equity markets within the region is an important issue with significant implications for asset management, risk management and international asset pricing.

The launch of the common currency is clearly associated with reduced exchange rate volatility and convergence of interest rates. Thus, development in exchange rate towards a currency union may increase the region's (for instance, East Asia-Pacific) financial market integration.

However, Exchange rate uncertainty can have a negative effect on financial integration because exchange rate risk is an important source of risk priced on capital markets (Dumas and Solnik 1995 & Hardouvelis et al. 2001). In contrast, Fratzscher (2002) provides empirical evidence that exchange rate stabilization has been important for stock market integration in Europe.

In an integrated world economy real interest rate equalization is the broadest measures of financial integration (Golberg et al. 2003). Since interest rate parity is suggested as parity for interest rates on such assets like government bonds which are at least close if not perfect substitutes, in retail banking it seems even more difficult to argue that credit portfolios are perfect substitutes across countries. When money market rates equalise by means of an international arbitrage process such changes will have an impact on lending rates via domestic competition that ties lending and borrowing rates together. Finally, international competition, or the threat of it will help to harmonize the pricing behavior of banks and thus lead to a cointegration of retail prices (Kleimeier and Sander, 2000).

Moreover, Most of the empirical work done in this field has focused on OECD countries and East Asia. Kaminsky and Schmukler (2002) studied the dynamic aspects of international financial integration and suggested that equity prices tend to be more internationally connected than interest rates. Moosa and Bhatti (1997) provide conclusive empirical evidence on the high level of integration between goods and financial markets of Japan and six Asian countries by testing uncovered interest parity (UIP) and *ex ante* purchasing power parity (PPP).

The macroeconomic impact of international financial integration depends on the extent of domestic financial integration, that is to say the integration of domestic institutional interest rates such as deposit and loan interest rates with domestic money market rates which themselves turn on the regulatory and competitive structure of domestic financial markets.

According to Makin (1994), there is a consensus that UIP fails to provide any information about the degree of financial integration. This is based on concerns regarding time varying currency risk premia or irrational expectations about exchange movements. But UIP can be restated with the focus on the relationship between domestic and foreign interest rates, given expectations about movements in the exchange rate. In particular, if interest rates and exchange rates are non-stationary processes, then it could be

interesting to see whether domestic and foreign interest rates have long-run co-movements. This would prove that both variables are co-integrated and determine financial integration (Surbhi and Bhanumurthy, 2005).

Goodwin, B. K, and T. Grunnes (1994) examine the long-run co-movement among the real interest rates of the U.S., Canada, and a select group of Latin American countries to assess the extent of financial market integration between these countries during a period of high capital mobility. The findings of their study support a long-run relationship between the short-term U.S. real interest rate and those of the Latin American countries

Besides exchange rate and interest rate, it is possible that macroeconomic reforms implemented around the time of equity market liberalization diminish macroeconomic imbalances and promote financial integration. The GDP of each East Asia-Pacific member can thus be an indication of the size and capacity of the economy to provide possibility of integrated financial market implementation. Therefore we add GDP as a control variable to the regression so that financial integration in the region should be particularly sensitive to macroeconomic changes.

Now, following the most important determinants of financial integration, as already discussed in this section, we estimate Equation (1), which has been specified as follows:

$$FI = \alpha_0 + \alpha_1 GDP + \alpha_2 ER + \alpha_3 IR + \alpha_4 D_j + \varepsilon, \quad j = 1, 2, 3 \qquad (1)$$

where *FI* stands for financial integration, which is a dichotomous variable equals to one if markets are financially integrated (*FI*=1, for the period 1997-2005) and zero otherwise (*FI*=0, for the period 1990-1996). In principle, this study uses data of 11 East Asia-Pacific countries[1] over the 1990-2005 period, while pre-financial integration is related to the years before the Asian crises in 1997 (1990-1996), and post-integration contains the years after the crisis (1997-2005). Thus, the event of the Asian crisis can

1- The selected countries in the region are: Australia, China, Indoneisia, Japan, Malaysia, New Zealand, Singapore, South Korea, Thailand, The Philipins and Vitenam. Some of countries are important regarding their leading role on liberalizations.

be a proxy for financial integration in the region.[1] *GDP* is a measure of gross domestic product; *ER* denotes the exchange rate; *IR* is a measure of real interest rate; D_j is a set of dummies in which D_1 indicates the major countries (Australia, Japan, Korea and China) in the region that have a plan to be integrated in trade, D_2 stands for the Asian- Pacific countries which are of the OECD members while D_3 stands for the ASEAN members, ε is the error term of the equation and $\varepsilon \sim N(0,1)$.

The data consist of yearly data of the selected East Asia-Pacific countries over the considered period (1990-2005). The sample period is chosen on the basis that it represents the longest common time period over which data for most of the countries is available. The data on GDP is taken from the International Monetary Fund (IFS CD-ROM version 1.1.55). The data on foreign exchange rate is obtained from Penn World Table (PWT 6.2), and the data on real interest rate is taken from World Development Indicators 2005 (WDI) prepared by world bank.

4-1- Estimation Method

As explained previously**,** the dependent variable is a discrete measure of financial integration, which is also the probability of integrating the financial markets**.** To estimate the Equation (1), we apply a qualitative method of regressions specified in probit or tobit approaches. To illustrate this, we consider estimation of a panel data binary choice model. The idea is that, for each country *i* we have a binary outcome, FI_{it}, which indicates whether country *i* is involved in the integrated financial markets in year t.

Consider the model in latent variable form:

1- The Asian financial crisis was a shocking event in the region and it has spawned a number of initiatives for cooperation among central banks to enhance their ability to cope with volatile capital flows. The best known is perhaps the so-called Chiang Mai initiative. In its current form it consists of a set of bilateral swap agreements between central banks that increases the effective size of international reserves at the disposal of an individual central bank. While these swap agreements do not have any direct impact on private sector capital mobility, the intention behind them is presumably to make central banks better prepared for such flows (Click and Michael, 2005).

$$FI^{*}_{it} = x_{it}\theta_o + e_{it} \quad (2)$$

$$FI_{it} = 1\left[FI^{*}_{it} > 0\right]$$

$$e_{it}\left|x_{it}\right. \sim Normal(0,1)$$

Where x_{it} is a vector of exogenous variables (*GDP*, *ER*, *IR*, D_j) shown in Equation (1), lags of these.

Under the assumptions in the model (2), we have, for each *t*, $P(FI_{it} = 1 \left| x_{it}\right.) = \phi(x_{it}\theta_o)$, and the density of FI_{it} given $x_{it} = x_t$ is $f(FI_t = x_t) = \left[\phi(x_t\theta_o)\right]^{FI_t}\left[1-\phi(x_t\theta_t)\right]^{1-FI_T}$.

The partial log likelihood for cross section observation *i* is

$$l_i(\theta) = \sum_{t=1}^{T}\left\{FI_{it}\log\phi(x_{it}\theta) + (1-FI_{it})\log\left[1-\phi(x_{it}\theta)\right]\right\} \quad (3)$$

And the partial MLE in this case- which simply maximizes $l_i(\theta)$ summed across all *i*- is the pooled probit estimator. With *T* fixed and $N \to \infty$, this estimator is consistent and $\sqrt{N}$ -asymptotically normal without any assumptions other than identification and standard regularity conditions (Wooldridge 2002).

In addition, the linear regression model with panel-level random effects

$$FI_{it} = x_{it}\beta + v_i + \varepsilon_{it} \quad (4)$$

For $i = 1,\ldots, n$ panels, where $t = 1, \ldots, n_i$.[1] This stands for the tobit approach that the observed data of dependent variable (FI^o) represents possibly censored versions of *FI*.[2]

1- The random effects, v_i are i.i.d., $N(0, \sigma^2_v)$, and ε_{it} are i.i.d. $N(0, \sigma^2\varepsilon)$ independently of v_i.

2- If they are left-censored, all that is known is that $FI_{it} \le FI^o_{it}$. If they are right-censored, all that is known is that $FI_{it} \ge FI^o_{it}$ (Pendergast et al. 1996).

5- Empirical Results

Our use of probit/tobit models allows us to focus on the exploration of the explanatory variables effects on financial integration in the East-Asia Pacific region. We estimate the probability of financial integration using a panel probit or tobit model for our data set of the region over the 1990–2005 period.

Tables 1, 2 and 3 report the estimation results for financial integration in the selected 11 East Asia-Pacific countries. The tables report the effect of a change in each regressor on the probability of integration, evaluated at the mean of the data. The results also include the associated z-statistics in parentheses; these test the null of no effect. According to the probit/ tobit procedures, all explanatory variables are in one lag period. In addition to the three main lagged logarithm variables ($LGDP_{t-1}$, LER_{t-1} and LIR_{t-1}), each table includes three more variables in different cases. Cases *I*, *II* and *III* indicate the interacted effects of GDP, exchange rate, and interest rate with the specified dummy variables, D_j*LGDP_{t-1}, D_j*LER_{t-1}, D_j*LIR_{t-1}, respectively.

According to Table 1, all variables (except for LER_{t-1} and D_1*LER_{t-1}) affect significantly and statistically (at the 5% significance level) financial integration in the region during the considered period. The $LGDP_{t-1}$ has a positive effect on financial integration at the 5% significance level, expect for case *II*, (Table 2). However, the interacted effect between $LGDP_{t-1}$ and *D1* is significant, but negative as shown in Table 1. This implies unexpected results to the contribution of China, Australia, Japan and Korea in financial integration.

According to the results reported in the tables, the coefficient of exchange rate is not significant for all cases. This implies that exchange rate does not totally play an important role in the region due to the different exchange rate regime. In addition, the interacted effects of exchange rate with D_1 and D_3 are not significant while the interacted effect of exchange rate and D_2 (the coefficient of *D2*LER(-1)* in Table 2) on financial integration is statistically significant, but negative. This result shows currency appreciation of the OECD members in the region, which includes Japan and Australia, increases the chance of financial integration in the region that can be as a result of their dominant role in the financial markets.

According to Table 1, the coefficient of *LIR(-1)* (lagged logarithm of interest rate) is significantly estimated by probit (-0.91) and tobit (-0.30), so that it has an inverse effect on financial integration. However, its interacted effect with a number of major members (shown by the *D1*LIR(-1)* variable) is positive leading to a possibility of integrating financial markets in the East Asia-Pacific region. But this effect is negative in conjunction with Cases *II* and *III.* More specifically, this finding concludes the ambiguous role of interest rate in integrating financial markets in the region.

6- Concluding Remarks

Financial integration for East Asia-Pacific economies should be seen as a long-term objective. In this paper we find that the macroeconomic indicators of the members are associated with higher or lower probability of integrating their financial markets. This result is clearly evident in panel estimation in the context of probit and tobit models, estimating the likelihood of the onset of financial integration where account is taken of a host of macroeconomic factors containing GDP, exchange rate and interest rate. We find evidence that GDP has a positive effect on integrating financial markets, while the results related to exchange rate and interest rate are ambiguous. The significance of GDP implies the enhancement of product on capacity in the region for financial integration promotion.

The results on exchange rate and interest rate support the literature (Click and Plummer, 2005) where countries behave differently when inflation rates are different across currencies or when real exchange rate changes. The introduction of common currency is one of the most important events for global financial markets. Thus, an immediate consequence of the adoption of convergence in exchange rate and interest rate is an recommended integration of the East Asia-Pacific's money and bond markets. Increasing integration of the equity markets within the East Asia-Pacific is likely to be another recommendation of the elimination of exchange rate risk across countries within the East Asia-Pacific region as a result of the adoption of a commom currency. As the introduction of the common currency means the elimination of exchange rate risk within the East Asia-Pacific region, it will further reduce the remaining differences of investment and consumption opportunities across the member countries of the East Asia-Pacific being important for financial integration.

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Table 1: Panel probit/tobit results for the estimated East Asia-Pacific financial integration model (*Case I*)*

Random-effects probit regression Number of obs=168 Number of groups=11			
VARIABLE	Coefficient	Z statistic	P>|z|
LGDP(-1)	.57682	3.36	0.001
LER(-1)	.0764548	1.86	0.063
LIR(-1)	-.9067393	-3.09	0.002
D1*LIR(-1)	1.57838	3.71	0.000
D1*LER(-1)	-.0242966	-0.28	0.781
D1*LGDP(-1)	-.2910612	-3.85	0.000
CONSTANT	-4.847342	-2.57	0.010
		Wald chi2(6) =	21.11
		Prob > chi2 =	0.0018

Random-effects tobit regression Number of obs=168 Number of groups = 11			
VARIABLE	Coefficient	Z statistic	P>|z|
LGDP(-1)	.2000191	12.71	0.000
LER(-1)	.0257482	1.79	0.074
LIR(-1)	-.3014675	-3.16	0.002
D1*LIR(-1)	.5287348	3.99	0.000
D1*LER(-1)	-.0075993	-0.25	0.800
D1*LGDP(-1)	-.0976356	-4.60	0.000
CONSTANT	-1.203882	-	-
		Wald chi2(6) =	2391.17
		Prob > chi2 =	0.0000

* The results have been obtained by using **Stata9.2**.

Table 2: Panel probit/tobit results for the estimated East Asia-Pacific financial integration model (*Case II*)*

Random-effects probit regression		Number of obs = 16 Number of groups = 11	
VARIABLE	Coefficient	Z statistic	P>|z|
LGDP(-1)	.1693915	1.54	0.125
LER(-1)	.0347398	0.91	0.361
LIR(-1)	.0530295	0.27	0.788
D2*LIR(-1)	-1.941262	-2.61	0.009
D2*LER(-1)	-.7656783	-2.87	0.004
D2*LGDP(-1)	.3611181	2.55	0.011
CONSTANT	-1.97267	-1.41	0.159
		Wald chi2(6) = 13.47	
		Prob > chi2 = 0.0362	

Random-effects tobit regression		Number of obs = 168 Number of group= 11	
VARIABLE	Coefficient	Z statistic	P>|z|
LGDP(-1)	.0659846	1.70	0.089
LER(-1)	.0135505	0.98	0.329
LIR(-1)	.0195904	0.26	0.792
D2*LIR(-1)	-.4981316	-2.78	0.005
D2*LER(-1)	-.2068814	-3.14	0.002
D2*LGDP(-1)	.0899795	2.79	0.005
CONSTANT	-.2686561	-0.55	0.585
		Wald chi2(6) = 16.86	
		Prob > chi2 = 0.0098	

* The results have been obtained by using **Stata9.2**.

Table 3: Panel probit/tobit results for the estimated East Asia-Pacific financial integration model (*Case III*) *

Random-effects probit regression		Number of obs =168 Number of groups= 11	
VARIABLE	Coefficient	Z statistic	P>|z|
LGDP(-1)	.2399665	2.19	0.028
LER(-1)	.0278942	0.37	0.712
LIR(-1)	.5557977	1.95	0.051
D3*LIR(-1)	-1.594681	-3.65	0.000
D3*LER(-1)	.084354	0.94	0.349
D3*LGDP(-1)	.2524398	3.40	0.001
CONSTANT	-3.89735	-2.53	0.011
		Wald chi2(6) = 18.71	
		Prob > chi2 = 0.0047	

Random-effects tobit regression		Number of obs = 168 Number of groups = 11	
VARIABLE	Coefficient	Z statistic	P>|z|
LGDP(-1)	.0879193	2.30	0.021
LER(-1)	.0095213	0.37	0.712
LIR(-1)	.1965735	2.08	0.037
D3*LIR(-1)	-.5363093	-3.89	0.000
D3*LER(-1)	.0272819	0.90	0.368
D3*LGDP(-1)	.0847393	3.59	0.000
CONSTANT	-.9086197	-1.72	0.086
		Wald chi2(6) = 21.90	
		Prob > chi2 = 0.0013	

* The results have been obtained by using **Stata9.2**.