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# TRADING BLOC EXPOSURE IN INTERNATIONAL ASSET PRICING: THE CASE OF AFTA, CER AND NAFTA

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## Abstract

This paper shows that the resurgence of trade regionalism has a significant impact on stock market returns of the member countries in the ASEAN Free Trade Area (AFTA), Australia-New Zealand Closer Economic Relations Trade Arrangement (CER) and North American Free Trade Area (NAFTA). A trading bloc international capital asset pricing model (ICAPM) is proposed and we find that the trading bloc factor increases the explanatory power of the conventional ICAPM for AFTA and CER. Evidence indicates that returns of the markets in AFTA and CER are highly exposed to the trading bloc factor. At the same time, exposure to the global market is still significant, particularly for the more advanced markets of Singapore and Australia. The conventional ICAPM is still relevant for the large and leading world markets in NAFTA. The trade bloc factor, however, has minimal impact in influencing market returns of non-member countries. The findings of significant exposure to regional dynamics offer an explanation to why stock markets are generally segmented**.**

*Keywords:* APEC; integration; trade bloc; international CAPM; GARCH.

## 1. Introduction

The 1990s witnessed the resurgence of interest in regional trade agreements in spite of the attempt to promote multilateral trade negotiations in the WTO agenda. Regional integration has often been seen as a means to improve the competitiveness of member countries and integrate them into the world multilateral trading system. The new regionalism features more than trade integration, and initiatives are taken to deepen regional financial integration through areas such as currency arrangements, monetary policies and finance. Article 1109 in the North American Free Trade Agreement

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(NAFTA), for example, calls for free and quick transfers of all payments relating to equity transactions including dividends, interest and capital gains among the members. The December 1995 Association of Southeast Asian Nations (ASEAN) Summit endorsed in principle the concept of an investment area to lower and remove barriers to intra-regional investment among members of the ASEAN Free Trade Area (AFTA) (ASEAN Secretariat, http://www.aseansec.org/home.htm).

The aim of this paper is to investigate the importance of trade regionalism in asset pricing. This is motivated by the fact that economic integration through formation of trading blocs not only promotes real convergence but also active financial integration among member countries (Fratzscher, 2002). The strengthening of a regional trading bloc could stimulate both direct and portfolio investment from and for the member countries. As the core segment of the financial system, the stock market movements are expected to show more convergence within the trading bloc. When trading systems are homogenized through free trade arrangements, the increased economic interdependence among the bloc members could boost capital movements and lead to stock pricing convergence. Furthermore, efforts are likely to be taken to achieve harmonization of capital market regulations, synchronization of monetary policy, and coordination of exchange rate management to stabilize the parity of competitive advantages among the member states and to reduce arbitrage opportunities.

Existing literature on stock market integration offers limited insight on the impact of regionalism. The closest to this is the work of Lessard (1973) that investigated the opportunity of diversification in an investment union (a concept parallel to custom union) formed by 4 Latin countries comprising Argentina, Brazil, Chile and Columbia. Using multivariate factor analysis on data for 1958-1968, the study reported that stock markets of the union members were closely related to each other compared to non-member countries. Akdogan (1992) employed the asset pricing model to study the proportion of systematic risks in the asset markets of European Community (EC). Based on monthly data for 1972-1990, evidence was documented that the convergence of the EC markets was highly related to the schedule of relaxation of capital controls in the European Monetary Union. Using covariance and correlation analysis, Johnson and Soenen (1993) and Johnson *et al.* (1994) also documented similar conclusions on EC for the same sample period.

Most of the literature on stock market integration pursued along the direct modeling of the linkage channels, through cointegrating vectors, volatility spillovers and regime pricing. Soydemir (2000), for example, documented that Mexican stock market was weakly linked to those of Argentina and Brazil, but strongly tied with the US market in the period of 1988-1994. The author concluded that the results could be because these countries are members of different trading blocs, where Mexico is a member of NAFTA, while the other two Latin markets spearheaded the *Mercado Comun del Cono Sur* (MERCOSUR). Chen *et al.* (2002) also highlighted that the formation of MERCOSUR has an impact on the long-run cointegrating relationship of the stock prices of Argentina, Brazil, Chile, Colombia, Mexico and Venezuela for the period 1995-2000. In addition, Mexico was found to have dominant influence over most of the other Latin markets, due possibly to its linkages with the two dominant NAFTA members, US and Canada. The findings are similar even with sub-period analysis anchoring on the Asian and Russian crises, suggesting consistent results across different regimes. These studies are further supported by Johnson and Soenen (2003), who used the Geweke measures of feedback. They found evidence of simultaneous linkages between Canada and Mexico, and also among Argentina, Brazil, Chile (associate member of MERCOSUR) and Peru using daily data from 1988 to 1999.

Although these works offer insight on the integration of stock markets in countries belonging to a common trading bloc or a regional trade arrangement, they are not designed to examine the trading bloc effect on asset pricing. This paper attempts to investigate the effect of trade regionalism on stock price determination within the framework of the international capital asset pricing model. The focus is on the stock markets of countries that are engaged in three sub-regional trading arrangements within the Asia-Pacific Economic Cooperation (APEC), namely, NAFTA, AFTA and the Australia-New Zealand Closer Economic Relations Trade Arrangement (CER).[1, 2] As the progress of AFTA, CER and NAFTA can determine the degree of segmentation within APEC, this study attempts to find out if the financial integration process has gone beyond regional trading agreements by examining the pricing process of a market in response to the price dynamics of the other trading blocs of which the given market is not a member.

This paper is organized as follows. The next section outlines the asset pricing models and the data employed. Section 3 presents the results and discussions on the major findings. Concluding comments follow in Section 4.

## 2. Methodology

The capital asset pricing model (CAPM) offers a theoretical framework for pricing risky assets under equilibrium market condition in a domestic context. The investors' demand for each asset is determined on the basis of period-by-period optimization of the mean and variance of excess returns (*ER)*:

$$Max\ U = f[E(ER_t), V(ER_t)], \tag{1}$$

in order to maximize their utility function *U* where *ER* refers to the returns of the asset over and above the risk-free rate. In equilibrium, when all investors' optimal portfolio choices are aggregated, the following relationship is obtained:

$$E(R_{it} - R_{ft}) = \beta[E(R_{mt} - R_{ft})],$$

or,

$$E(R_{it} - R_{ft}) = \frac{\text{cov}(R_{it}, R_{mt})}{\text{var}(R_{mt})}[E(R_{mt} - R_{ft})], \tag{2}$$

[1] In 1994, APEC declared its intention to form a supraregional free trade area before 2020. Although APEC is still a trade forum, it is a potential trading bloc that goes beyond the size of the European Union. Ironically, many bilateral free trade agreements continue to emerge between the members of APEC, and also with other non-members countries (WTO, http://www.wto.org/english/tratop_e/region_e/region_e.htm).

[2] Oldest of the three, CER was put in place in 1983. ASEAN has agreed on the formation of AFTA in 1992, while NAFTA came into effect in 1994. These three regional groups account for 29 per cent of total intra-APEC trade (APEC, 1997).

where $R_{ft}$ is the rate of return to the risk-free asset, $R_{it}$ is the return to asset $i$ and $R_{mt}$ is the total return to the market portfolio.

The moments of the expected returns are stationary in Equation (2) as investors are assumed to maximize the utility of wealth held for one period. In reality, multiple periods should be considered and expected returns vary over time depending on the nature of the information available at a given point in time. The conditional CAPM is hence more relevant and can be written as:

$$E(R_{it} - R_{ft} | \Omega_{t-1}) = \frac{\operatorname{cov}(R_{it}, R_{mt} | \Omega_{t-1})}{\operatorname{var}(R_{mt} | \Omega_{t-1})} [E(R_{mt} - R_{ft} | \Omega_{t-1})], \tag{3}$$

where $E(. | \Omega_{t-1})$ is the conditional expectation based on the information set $\Omega$ available at time $t$-1. Since non-systematic risk can be diversified away, CAPM stipulates that investors are rewarded only for the systematic risk. The non-diversifiable risk is measured by beta, which is determined by the covariance of the return to asset $i$ with the return to the market portfolio. Thus, for expositional purposes, Equation (3) thus can be rewritten as:

$$E(R_{it} - R_{ft} | \Omega_{t-1}) = \delta_{mt} \operatorname{cov}(R_{it}, R_{mt} | \Omega_{t-1}). \tag{4}$$

Gan (2002) provided the theoretical exposition to show how the CAPM model can be extended to the international CAPM (ICAPM). In the international setting, the universe of the security portfolio consists of securities issued in different national markets. In a fully integrated world financial market where PPP holds, the expected return of a national equity market is solely exposed to the movement in returns of the world portfolio. Extending the earlier arguments on CAPM, the pricing of a national equity market is determined by the following process:

$$E(R_{it} - R_{ft} \mid \Omega_{t-1}) = \delta_{Wt} \operatorname{cov}(R_{it}, R_{Wt} \mid \Omega_{t-1}), \tag{5}$$

where $R_{it}$ now refers to the returns in a given market $i$, and $R_{ft}$ and $R_{Wt}$ represent the returns on the world risk-free asset and global portfolio, respectively, in time period $t$. The expected excess returns of the national stock market-$i$ are priced on its covariance with the world market returns, and on the sensitivity coefficient $\delta_{Wt}$. The ICAPM model implies that the expected excess return of a given market above the international risk-free rate is proportional to the country specific but non-diversifiable risk in the world market. A testable form of the ICAPM can be written as follows:

$$R_{it} - R_{ft} = \alpha_i + \beta_i^W (R_{Wt} - R_{ft}) + \varepsilon_{it}. \tag{6}$$

This is the traditional one-factor version of the model. While $\alpha_i$ represents the drift term, $\beta_i^W$ is the beta coefficient of the $i$th market to the world market and $\varepsilon_{it}$ is the market specific residuals that are orthogonal to the loading world factor.

In analyzing the case for EC, Akdogan (1992) replaced the world factor in Equation (5) with a weighted average portfolio of the trading bloc. The model is still in a one-factor setting given as follows:

$$E(R_{it} - R_{ft} \mid \Omega_{t-1}) = \delta_{Tt} \operatorname{cov}(R_{it}, R_{Tt} \mid \Omega_{t-1}), \tag{7}$$

where $R_{ft}$ represents the returns to portfolio of assets of all the markets in the bloc. Henceforth, we refer to this model as the trading bloc CAPM (TBCAPM). The following provides a testable form of the TBCAPM:

$$R_{it} - R_{ft} = \alpha_i + \beta_i^T (R_{Tt} - R_{ft}) + \varepsilon_{it}. \tag{8}$$

Instead of focusing on the trading bloc alone, we attempt to examine the financial integration in a region given the exposure to global market movements. To compare the relative impact of trading bloc and world factors, we combine Equations (6) and (8) into a two-factor model, that is referred to as the trading bloc-ICAPM or TB-ICAPM stated as:

$$R_{it} - R_{ft} = \alpha_i + \beta_i^W (R_{Wt} - R_{ft}) + \beta_i^T (R_{Tt} - R_{ft}) + \varepsilon_{it}. \tag{9}$$

The inclusion of $R_{Tt}$ into ICAPM provides a loading factor to capture the effect of the trading bloc whereby the country is a member. In this study, Equations (6), (8) and (9) are estimated for each of the stock markets.

In addition, to investigate the market response to the dynamics of the other trading blocs of which the given market is not a member, a multi-factor TB-ICAPM (MTB-ICAPM) is proposed. Extended from Equation (9), this model is stated as:

$$R_{it} - R_{ft} = \alpha_i + \beta_i^W (R_{Wt} - R_{ft}) + \sum_M \beta_i^M (R_{Mt} - R_{ft}) + \varepsilon_{it}, \tag{10}$$

where $M$ represents all the trading blocs, including that where the $i$th market is a member. If $\sum \beta_i^M = 0$, Equation (11) collapses to ICAPM.

Following Ramchand and Susmel (1998), all the pricing models are estimated using the generalized autoregressive conditional heteroscedasticity (GARCH) model of Bollerslev (1986). The variance is assumed to be time varying, where the error term follows the distribution $\varepsilon_{it} \mid \Omega_{t-1} \sim N(0, \sigma_{it}^2)$. The general form of a GARCH($p$, $q$) model is given by:

$$\sigma_{it}^2 = \omega_i + \sum_{j=1}^{p} \phi_{ij} \varepsilon_{i,t-j}^2 + \sum_{m=1}^{q} \psi_{im} \sigma_{i,t-m}^2, \tag{11}$$

where the conditional variance depends on the squared error terms of $p$ lags (known as the ARCH effects) and the conditional variance of $q$ lags (known as the GARCH effects). The presence of ARCH and GARCH effects in asset prices are well-documented in the survey paper by Bollerslev *et al.* (1992). In this study, the order of $p$ and $q$ are fixed at one, as this simple specification is sufficient for most empirical modeling purposes (Engle and Ng, 1993). To account for non-normal conditional distribution in the residuals, we use the robust quasi-maximum likelihood estimates suggested by Bollerslev and Wooldridge (1992). The variance-covariance estimator of this method is heteroscedasticity consistent.

The three trading blocs of AFTA, CER and NAFTA comprise a total of 10 member countries – five for AFTA (Indonesia, Malaysia, Philippines, Singapore and Thailand), two for CER (Australia and New Zealand), and three for NAFTA (US, Canada and Mexico). As in most of the literature on ICAPM, monthly data is used. The sample of analysis spans from January 1990 to February 2005. El-Hedi (2004) pointed out that the conditional ICAPM should be evaluated over a long period in order to capture the long-run dynamics. No sub-period analysis is conducted in this study. The country and world stock market indices compiled by Morgan Stanley Capital International (MSCI) are used to calculate the returns for each country and the global portfolio. The MSCI All Country World Index is a free float-adjusted market capitalization index designed to measure equity market performance of 49 developed and emerging markets. In computing the return to a trading bloc portfolio, an equal-weighted average of the market returns of all the other member countries except the returns of the market under study is used. This is to ensure that the local dynamics are excluded from the trading bloc portfolio. The global risk free rate is proxied by the three-month Treasury bill rates of the US. The Treasury bill rates are downloaded from the website of the Federal Reserve Bank.

## 3. Results and Discussion

Table 1 presents the descriptive statistics and correlation matrix of all the sample returns series. It is clear that the unconditional distribution of all the series is not normally distributed, as indicated by the Jarque-Bera test, except for Australia. The returns of the AFTA members exhibit the most volatile behavior, where Indonesian and Thailand have the highest standard deviation among all. The returns of the CER and NAFTA members are much less volatile, but Mexico experiences higher volatility than the others. The results suggest that the large and developed markets have relatively low volatility compared to the emerging markets. The relatively stable characteristics of the MSCI All Country World Index and 3-month Treasury bill rates are expected. The strongest pair-wise correlations are found for US-Canada and Australia-New Zealand. Among all, Indonesia is the most exogenous market, having very low correlations with non-AFTA countries. The results also indicate that the market returns of the same trading bloc tend to have stronger correlations compared to the returns of the markets in different trading blocs. As expected, the US has the highest correlation with the MSCI World Index given its most developed and liberalized stock exchange in the world. Interestingly, all except the return on the US index is negatively correlated with the 3-month Treasury bill rates. This reflects that the other stock markets are adversely affected by an interest rate rise in the US.

The estimated ICAPM, TBCAPM and TB-ICAPM models are reported in Table 2. The estimates for the multi-factor TB-ICAPM model are given in Table 3. The diagnostic tests in both the tables suggest that all the models are statistically acceptable. The Jarque-Bera test shows that most of the residual series are normally distributed although non-normality is reported for some cases. The GARCH(1,1) specification is generally sufficient to take account of the conditional heteroscedasticity.[3] The LM test indicates no further ARCH effect up to twelve lags. At least one of the ARCH or GARCH coefficients is significant in the models. The only exceptions are the ICAPM for Philippines and TBCAPM for Australia. The GARCH effects are generally larger in magnitude compared to the ARCH effects, suggesting that the volatility is more sensitive to the lagged volatility than to the new surprises in the market.

The results from Table 2 suggest that the trading bloc effects on pricing of a national stock market cannot be neglected. The trading bloc excess returns are statistically significant in affecting the excess returns of all the ten individual markets. The exposure to the trading bloc factor varies by the degree of market openness and development. The magnitude of the coefficient suggests the following degree of exposure to the AFTA factor: Indonesia, Thailand, Philippines, Malaysia and Singapore. This order is consistent in both TBCAPM and TB-ICAPM. The more advanced markets of Singapore and Malaysia have lower exposure to the AFTA factor. The use of ICAPM alone for the AFTA stock markets can be misleading. In this model, Thailand and Indonesia are highly exposed to the world market movements, and this is followed by Philippines, Singapore and Malaysia. This suggests problems of specification bias in ICAPM due to omission of the trading bloc factor. In fact, inclusion of the trading bloc factor in TB-ICAPM has rendered the world factor insignificant for the smaller markets of Indonesia and Philippines.

Both Australia and New Zealand exhibit high exposure to the world factor in the absence of the CER trading bloc factor. When CER is factored into TB-ICAPM, the world beta coefficient reduced substantially. The stock returns of New Zealand are more exposed to the trading bloc factor compared to the world factor. On the other hand, the Australia market shows larger exposure to the world factor. For NAFTA, it is clear that the world market is the dominant factor for all the three markets. This is consistent across the three asset pricing models. The magnitude of the trading bloc factor in TB-ICAPM is rather small for all three cases and not significant for Mexico. Given the economic importance of NAFTA in terms of world trade,[4] it is not surprising that the stock markets in NAFTA are highly exposed to the world factor. To these countries, the world factor and trading bloc factor are synonymous.

Overall, the results show that markets that have a low world beta are likely to have higher exposure to the trading bloc factor, whereas markets with a high world beta tend to have lower trading bloc exposures. The latter is particularly true for the developed markets, including Singapore, Australia and the three markets in NAFTA. Additionally, we find that the trading bloc factor has significantly increased the explanatory power of the asset pricing models of AFTA. This is also true for CER,

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[3] GARCH(2,1) was estimated for ICAPM of the US and TB-ICAPM of Mexico as the original specification failed to get pass the $Q^2(12)$ diagnostic test. The second lag of the ARCH coefficient, however, is not reported in the table. The results are available upon request.

[4] In 2003, the three countries in NAFTA accounted for 15.9% (19.5%) of total world trade in merchandise (commercial services) exports, amounting to 1162 (288) billion USD per annum, and absorbed 22.8% (19.1%) of total world merchandise (commercial services) imports, amounting to 1727 (229) billion USD per annum. The five countries in AFTA only accounted for 5.8% (3.8%) and 5.1% (4.8%) of total world merchandise exports and imports, respectively. The corresponding figures for CER are 1.2% (1.5%) and 1.4% (1.5%), respectively.

but to a lesser extent. As for NAFTA, the increase is only marginal. To find the best specification for each market, we rely on the Schwarz information criterion (SC) that imposes a stiff penalty on the number of the loading factors that enter the model. For AFTA, TBCAPM is selected for Indonesia, Malaysia and Philippines, while TB-ICAPM is selected for Singapore and Thailand. For CER, TB-ICAPM is selected for both Australia and New Zealand. For NAFTA, however, ICAPM cannot be out-performed. We could infer that the trading bloc factor is particularly important in the pricing of risky assets of less developed markets, but the world factor is important for the more liberalized and developed markets.

The betas in the multiple factor TB-ICAPM reported in Table 3 shed some light on whether linkages exist in the pricing of national equity among trading blocs within APEC. The first observation is that the stock markets in AFTA and CER show strong convergence to their own trading bloc factor. Not only the own trading bloc factor is highly significant, the magnitude of the coefficient is also larger than the coefficient of the world factor and the coefficient of the other trading blocs where the given market is not a member. Consistent with the earlier results, the stock markets in NAFTA converge strongly to the world factor, but less to the own trading bloc factor. Pockets of cross-bloc relationships are significant. For instance, the CER factor is significant for Thailand, the AFTA factor is significant for New Zealand, the CER factor is significant for US and Canada, and the AFTA factor is significant for Mexico. Nevertheless, the magnitude of these cross-bloc effects is much smaller compared to the world and the own-bloc effects. This indicates that the trading blocs have minimal impact in influencing the market returns of non-member countries. Overall, the result suggests that most of the stock markets converge to their respective regional trading bloc, and the stock markets of APEC members included in this study are indeed segmented by regions.

## Table 1
## Summary of Descriptive Statistics and Correlation Matrix of Returns

| | AFTA | | | | | CER | | NAFTA | | | World | Treasury Bill |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Indonesia | Malaysia | Philippines | Singapore | Thailand | Australia | New Zealand | US | Canada | Mexico | | |
| | | | | | | **Panel A: Descriptive Statistics** | | | | | | |
| **Mean** | -0.0046 | 0.0009 | -0.0018 | 0.0028 | -0.0023 | 0.0051 | 0.0027 | 0.0068 | 0.0052 | 0.0124 | 0.0040 | 0.0420 |
| **Standard Deviation** | 0.1402 | 0.0960 | 0.0991 | 0.0748 | 0.1254 | 0.0513 | 0.0645 | 0.0424 | 0.0526 | 0.0984 | 0.0426 | 0.0186 |
| **Skewness** | -0.3255 | -0.1312 | 0.0412 | -0.4095 | -0.3100 | -0.3113 | -0.5059 | -0.5759 | -0.9348 | -1.0711 | -0.6125 | -0.1947 |
| **Kurtosis** | 4.9470 | 6.2528 | 4.6591 | 5.0140 | 4.4485 | 3.1319 | 3.5012 | 3.7432 | 5.6163 | 6.0362 | 3.7137 | 2.2864 |
| **Jarque-Bera** | 31.9600 | 80.7570 | 20.9265 | 35.8450 | 18.8250 | 3.0718 | 9.6676 | 14.2487 | 78.4185 | 104.7040 | 15.2427 | 5.0118 |
| **Probability** | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.2153 | 0.0080 | 0.0008 | 0.0000 | 0.0000 | 0.0005 | 0.0816 |
| | | | | | | **Panel B: Correlation** | | | | | | |
| **Indonesia** | 1.0000 | | | | | | | | | | | |
| **Malaysia** | 0.5556 | 1.0000 | | | | | | | | | | |
| **Philippines** | 0.5497 | 0.5619 | 1.0000 | | | | | | | | | |
| **Singapore** | 0.5791 | 0.6436 | 0.6351 | 1.0000 | | | | | | | | |
| **Thailand** | 0.5260 | 0.5684 | 0.6664 | 0.6615 | 1.0000 | | | | | | | |
| **Australia** | 0.2862 | 0.3101 | 0.4395 | 0.5414 | 0.5283 | 1.0000 | | | | | | |
| **New Zealand** | 0.3797 | 0.3664 | 0.4023 | 0.5359 | 0.4628 | 0.7060 | 1.0000 | | | | | |
| **US** | 0.2926 | 0.3224 | 0.3755 | 0.5404 | 0.4356 | 0.5558 | 0.4246 | 1.0000 | | | | |
| **Canada** | 0.3828 | 0.4140 | 0.4301 | 0.5339 | 0.4289 | 0.6477 | 0.5213 | 0.7522 | 1.0000 | | | |
| **Mexico** | 0.2921 | 0.3362 | 0.3379 | 0.5119 | 0.3722 | 0.4581 | 0.3603 | 0.5085 | 0.5012 | 1.0000 | | |
| **World** | 0.3179 | 0.4182 | 0.4203 | 0.6277 | 0.4827 | 0.6635 | 0.5688 | 0.8645 | 0.7521 | 0.5381 | 1.0000 | |
| **Treasury Bill** | -0.1618 | -0.1093 | -0.1614 | -0.1105 | -0.1935 | -0.1456 | -0.2375 | 0.0346 | -0.0773 | -0.0085 | -0.0764 | 1.0000 |

# Table 2
## Estimates of the International CAPM (ICAPM), Trading Bloc CAPM (TBCAPM) and Trading Bloc-ICAPM (TB-ICAPM) Models

| | Mean Constant | World | Trading Bloc | Variance Constant | ARCH | GARCH | Q(12) | $Q^2(12)$ | Jarque-Bera | ARCH-LM (12) | Adjusted-$R^2$ | Log-Likelihood | Schwarz Criterion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | AFTA: Indonesia | | | | | | | |
| ICAPM | 0.0093 | 1.2039** | | 0.0012 | 0.2962 | 0.6503** | 10.6940 | 11.1670 | 15.5484** | 1.2026 | 0.1323 | 133.5835 | -1.3250 |
| | (0.3803) | (0.0000) | | (0.2785) | (0.1452) | (0.0017) | (0.5550) | (0.5150) | (0.0004) | (0.2857) | | | |
| TBCAPM# | 0.0061 | | 1.1065** | 0.0003 | 0.2549** | 0.7325** | 5.6604 | 12.1390 | 1.5744 | 1.2346 | 0.4393 | 175.5615 | -1.7863 |
| | (0.3305) | | (0.0000) | (0.1560) | (0.0073) | (0.0000) | (0.9320) | (0.4350) | (0.4551) | (0.2640) | | | |
| TB-ICAPM | 0.0033 | -0.1705 | 1.1608** | 0.0003 | 0.2686** | 0.7246** | 5.6480 | 11.8310 | 0.4392 | 1.1596 | 0.4369 | 175.9277 | -1.7617 |
| | (0.6766) | (0.3390) | (0.0000) | (0.1599) | (0.0026) | (0.0000) | (0.9330) | (0.4590) | (0.8028) | (0.3169) | | | |
| | | | | | | AFTA: Malaysia | | | | | | | |
| ICAPM | -0.0036 | 0.8271** | | 0.0003 | 0.2671 | 0.6956** | 9.2166 | 14.7750 | 2.5804 | 1.2258 | 0.2062 | 219.6611 | -2.2709 |
| | (0.5413) | (0.0000) | | (0.3481) | (0.0522) | (0.0000) | (0.6840) | (0.2540) | (0.2752) | (0.2698) | | | |
| TBCAPM# | -0.0108* | | 0.6851** | 0.0002 | 0.2100* | 0.7556** | 10.3000 | 12.2120 | 1.0073 | 0.9015 | 0.4993 | 253.0222 | -2.6375 |
| | (0.0174) | | (0.0000) | (0.3428) | (0.0138) | (0.0000) | (0.5900) | (0.4290) | (0.6043) | (0.5470) | | | |
| TB-ICAPM | -0.0058 | 0.2221* | 0.6043** | 0.0002 | 0.1955* | 0.7707** | 9.7108 | 10.8210 | 0.3812 | 0.8056 | 0.4990 | 255.3330 | -2.6343 |
| | (0.3112) | (0.0217) | (0.0000) | (0.3183) | (0.0169) | (0.0000) | (0.6410) | (0.5440) | (0.8265) | (0.6443) | | | |
| | | | | | | AFTA: Philippines | | | | | | | |
| ICAPM | -0.0022 | 1.1038** | | 0.0081 | 0.1054 | -0.1113 | 15.3350 | 13.5440 | 1.4785 | 1.1174 | 0.2333 | 181.8212 | -1.8551 |
| | (0.8091) | (0.0000) | | (0.0605) | (0.2421) | (0.8320) | (0.2240) | (0.3310) | (0.4775) | (0.3497) | | | |
| TBCAPM# | -0.0072 | | 0.8193** | 0.0003 | 0.0250 | 0.9124** | 9.0540 | 15.4750 | 0.0069 | 1.2989 | 0.5523 | 230.7688 | -2.3930 |
| | (0.1806) | | (0.0000) | (0.6279) | (0.5077) | (0.0000) | (0.6980) | (0.2160) | (0.9966) | (0.2240) | | | |
| TB-ICAPM | -0.0049 | 0.1035 | 0.7858** | 0.0003 | 0.0180 | 0.9161** | 9.1030 | 15.2450 | 0.0080 | 1.3434 | 0.5530 | 231.0209 | -2.3671 |
| | (0.4479) | (0.4798) | (0.0000) | (0.7231) | (0.6263) | (0.0000) | (0.6940) | (0.2280) | (0.9960) | (0.1993) | | | |

Notes: Figures in the parentheses are *p*-values. * and ** denote significant at the 0.05 and 0.01 levels, respectively. # Model with minimum value of Schwarz criterion. Q(12) and $Q^2(12)$ refer to the Q-test for significance of autocorrelation at lag 12 in the standardized residuals and squared standardized residuals, respectively.

## Table 2 (Continued)
## Estimates of the International CAPM (ICAPM), Trading Bloc CAPM (TBCAPM) and Trading Bloc-ICAPM (TB-ICAPM) Models

| | Mean Constant | World | Trading Bloc | Variance Constant | ARCH | GARCH | Q(12) | $Q^2(12)$ | Jarque-Bera | ARCH-LM (12) | Adjusted-$R^2$ | Log-Likelihood | Schwarz Criterion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | AFTA: Singapore | | | | | | |
| ICAPM | 0.0004 | 1.0157** | | 0.0001 | 0.1793* | 0.7830** | 10.1470 | 18.0450 | 4.1701 | 1.2900 | 0.4433 | 279.9699 | -2.9336 |
| | (0.9249) | (0.0000) | | (0.2011) | (0.0410) | (0.0000) | (0.6030) | (0.1140) | (0.1243) | (0.2293) | | | |
| TBCAPM | -0.0118** | | 0.5905** | 0.0001 | 0.1449 | 0.8039** | 10.2460 | 14.1530 | 16.1397** | 1.0318 | 0.6112 | 304.7755 | -3.2062 |
| | (0.0002) | | (0.0000) | (0.3711) | (0.0575) | (0.0000) | (0.5940) | (0.2910) | (0.0003) | (0.4225) | | | |
| TB-ICAPM# | 0.0019 | 0.5662** | 0.4238** | 0.0001 | 0.1880* | 0.7950** | 7.4412 | 15.1300 | 6.5931* | 1.2920 | 0.6863 | 336.0205 | -3.5210 |
| | (0.5581) | (0.0000) | (0.0000) | (0.2736) | (0.0359) | (0.0000) | (0.8270) | (0.2340) | (0.0370) | (0.2281) | | | |
| | | | | | | | AFTA: Thailand | | | | | | |
| ICAPM | 0.0137 | 1.2994** | | 0.0004 | 0.1107 | 0.8516** | 22.3980* | 15.8370 | 0.7765 | 1.0211 | 0.2789 | 159.0355 | -1.6047 |
| | (0.1135) | (0.0000) | | (0.3866) | (0.0714) | (0.0000) | (0.0330) | (0.1990) | (0.6783) | (0.4322) | | | |
| TBCAPM | 0.0045 | | 1.0928** | 0.0002 | 0.1337 | 0.8427** | 9.3622 | 9.2447 | 53.6602** | 0.6555 | 0.5389 | 198.9708 | -2.0435 |
| | (0.4165) | | (0.0000) | (0.4245) | (0.0802) | (0.0000) | (0.6720) | (0.6820) | (0.0000) | (0.7916) | | | |
| TB-ICAPM# | 0.0142* | 0.4104** | 0.9369** | 0.0003 | 0.1284 | 0.8382** | 9.1872 | 12.4750 | 36.8084** | 0.9035 | 0.5576 | 202.6292 | -2.0551 |
| | (0.0422) | (0.0039) | (0.0000) | (0.4052) | (0.0664) | (0.0000) | (0.6870) | (0.4080) | (0.0000) | (0.5449) | | | |

Notes: Figures in the parentheses are p-values. * and ** denote significant at the 0.05 and 0.01 levels, respectively. # Model with minimum value of Schwarz criterion. Q(12) and $Q^2(12)$ refer to the Q-test for significance of autocorrelation at lag 12 in the standardized residuals and squared standardized residuals, respectively.

**Table 3**
**Estimates of the Multi-factor Trading Bloc ICAPM models**

| | Mean Constant | World | NAFTA | CER | AFTA | Variance Constant | ARCH | GARCH | Q(12) | $Q^2(12)$ | Jarque-Bera | ARCH-LM (12) | Adjusted-$R^2$ | Log-Likelihood | Schwarz Criterion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | AFTA | | | | | | | | |
| Indonesia | 0.0029 | -0.4412* | 0.2210 | 0.0960 | 1.1255** | 0.0003 | 0.2620** | 0.7261** | 6.0696 | 12.1090 | 0.5805 | 1.1753 | 0.4354 | 177.1349 | -1.7178 |
| | (0.7132) | (0.0394) | (0.1027) | (0.5414) | (0.0000) | (0.1562) | (0.0035) | (0.0000) | (0.9130) | (0.4370) | (0.7481) | (0.3052) | | | |
| Malaysia | -0.0058 | 0.2722 | 0.0335 | -0.0995 | 0.6162** | 0.0002 | 0.2012* | 0.7645** | 10.8180 | 10.4860 | 0.5781 | 0.8292 | 0.4961 | 255.9202 | -2.5836 |
| | (0.2901) | (0.0701) | (0.8130) | (0.3755) | (0.0000) | (0.3351) | (0.0124) | (0.0000) | (0.5450) | (0.5730) | (0.7490) | (0.6202) | | | |
| Philippines | -0.0050 | -0.0900 | 0.0918 | 0.1485 | 0.7527** | 0.0003 | 0.0182 | 0.9134** | 9.6116 | 14.5510 | 0.0001 | 1.2301 | 0.5517 | 231.9002 | -2.3196 |
| | (0.4487) | (0.6213) | (0.5111) | (0.2426) | (0.0000) | (0.7062) | (0.6353) | (0.0000) | (0.6500) | (0.2670) | (0.9999) | (0.2669) | | | |
| Singapore | 0.0019 | 0.4355** | 0.0769 | 0.1114 | 0.3931** | 0.0000 | 0.2130* | 0.7840** | 9.2722 | 18.1500 | 1.7479 | 1.5419 | 0.6900 | 338.4237 | -3.4902 |
| | (0.5186) | (0.0000) | (0.2114) | (0.0931) | (0.0000) | (0.2651) | (0.0195) | (0.0000) | (0.6800) | (0.1110) | (0.4173) | (0.1145) | | | |
| Thailand | 0.0146** | 0.2556 | -0.0659 | 0.2775* | 0.8966** | 0.0003 | 0.1286* | 0.8334** | 8.6832 | 14.1260 | 35.3918** | 1.0415 | 0.5659 | 204.4384 | -2.0178 |
| | (0.0350) | (0.2165) | (0.7011) | (0.0373) | (0.0000) | (0.4273) | (0.0465) | (0.0000) | (0.7300) | (0.2930) | (0.0000) | (0.4138) | | | |

Notes: Figures in the parentheses are p-values. * and ** denote significance at the 0.05 and 0.01 levels, respectively. Q(12) and $Q^2(12)$ refer to the Q-test for significance of autocorrelation at lag 12 in the standardized residuals and squared standardized residuals, respectively.

## Table 3 (Continued)
## Estimates of the Multi-factor Trading Bloc ICAPM models

| | Mean Constant | World | NAFTA | CER | AFTA | Variance Constant | ARCH | GARCH | Q(12) | $Q^2(12)$ | Jarque-Bera | ARCH-LM (12) | Adjusted-$R^2$ | Log-Likelihood | Schwarz Criterion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | CER | | | | | | | | |
| Australia | -0.0011 | 0.3534** | 0.1791 | 0.3768** | 0.0307 | 0.0001 | 0.1183* | 0.7885** | 18.0330 | 6.6896 | 1.0402 | 0.8459 | 0.6732 | 371.2835 | -3.8513 |
| | (0.6909) | (0.0008) | (0.0586) | (0.0000) | (0.3178) | (0.2170) | (0.0264) | (0.0000) | (0.1150) | (0.8770) | (0.5945) | (0.6032) | | | |
| New Zealand | 0.0014 | 0.3386** | -0.1168 | 0.7144** | 0.1292** | 0.0002 | 0.0083 | 0.8828** | 28.5530** | 11.2330 | 0.7942 | 0.8994 | 0.6116 | 313.6052 | -3.2175 |
| | (0.6937) | (0.0081) | (0.2691) | (0.0000) | (0.0085) | (0.3954) | (0.8234) | (0.0000) | (0.0050) | (0.5090) | (0.6723) | (0.5490) | | | |
| | | | | | | | NAFTA | | | | | | | | |
| US | -0.0016 | 0.9421** | 0.0873** | -0.1543** | 0.0068 | 0.0002** | 0.6974** | -0.0586* | 11.9930 | 12.1780 | 2.3306 | 0.8731 | 0.7882 | 474.9317 | -4.9903 |
| | (0.2617) | (0.0000) | (0.0008) | (0.0000) | (0.6959) | (0.0000) | (0.0009) | (0.0308) | (0.4460) | (0.4310) | (0.3118) | (0.5756) | | | |
| Canada | -0.0018 | 0.5576** | 0.1263* | 0.2057** | 0.0536 | 0.0002 | 0.1182 | 0.7100** | 10.7960 | 5.6644 | 2.2204 | 0.3704 | 0.6644 | 370.7977 | -3.8460 |
| | (0.4752) | (0.0000) | (0.0223) | (0.0030) | (0.0903) | (0.3156) | (0.0784) | (0.0005) | (0.5460) | (0.9320) | (0.3295) | (0.9721) | | | |
| Mexico | 0.0176** | 0.7760** | 0.2789 | -0.1179 | 0.2615** | 0.0002 | 0.3290 | 0.7084** | 7.6031 | 4.0046 | 106.4049** | 0.3051 | 0.3193 | 215.5866 | -2.1403 |
| | (0.0006) | (0.0066) | (0.3218) | (0.3624) | (0.0005) | (0.2447) | (0.0549) | (0.0000) | (0.8150) | (0.9830) | (0.0000) | (0.9878) | | | |

Notes: Figures in the parentheses are p-values. * and ** denote significance at the 0.05 and 0.01 levels, respectively. Q(12) and $Q^2(12)$ refer to the Q-test for significance of autocorrelation at lag 12 in the standardized residuals and squared standardized residuals, respectively.

## 4. Conclusion

This paper attempts to investigate the impact of regionalism on asset pricing of national stock markets. The pricing convergence of stock markets in the three sub-regional trading blocs of AFTA, CER and NAFTA within APEC is examined using ICAPM that allows for time varying volatility. The results highlight the importance of the trading bloc effect in asset pricing, especially for small and emerging markets. Asset pricing models that incorporate only the world factor are more relevant for the large and developed markets. The international CAPM is sufficient for the markets in NAFTA, but the modified CAPM with the trading bloc factor generally fits better and provides higher explanatory power for AFTA and CER. The exposure to the trading bloc factor is very high for the markets in AFTA and CER, but the impact of the world factor is equally prominent in the relatively developed markets such as Singapore and Australia. The impact of trade regionalism should not be neglected in international asset pricing models to avoid specification problem. The impact of cross-bloc effects on asset pricing is rather minimal. In other words, the pricing of a stock market is highly influenced by the own-bloc and/or world factor, but pricing dynamics of the other trading blocs of which this market is not a member have very little influence. The results suggest that the regionalism is a possible explanation for the cause of segmentation among the financial markets within the APEC region.

This study is limited to a selected number of trade agreements within APEC. A similar study can be conducted for the other trading blocs within and outside APEC. The models included in the study do not take into account of idiosyncratic risks of individual markets. The mildly segmented ICAPM framework can be considered for future research to overcome this shortcoming. A detailed sensitivity analysis of the beta coefficients, which are not included in this study is also useful for understanding the stability of the underlying parameters.

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