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Abstract

This paper examines the possible determinants for the sources of variations in ASEAN stock returns across financial crises. Using a comprehensive data of 4043 firms from six ASEAN countries and 40 industries, we find that lagged country return and concentration are among the determinants that explain the country factors in the region, while size proved to be the determinant of industry factors for both tradable and non-tradable industries. In general, a higher previous return and lower industrial concentration would increase the country factor. We documented the loss of explanatory power of these determinants in the presence of crisis effects.

JEL classification: F21; G11; G15
Keywords: international diversification; country effects; industry effects; determinants; ASEAN

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1. Introduction

To date, debates on country versus industry diversification is still an ongoing subject. The main debate is whether country factors or industry factors facilitate the variation in stock returns. In this context, only a few studies have centered their attention on the determinants of country and industry factors in stock returns. Cavaglia et al. (2001) decomposed the security returns into components of global, domestic and regional industrial sector factors and regressed those factors to firm's foreign sales data, they found that non-domestic factors (the global and regional industrial factors) were positively associated with the firms' foreign sales; while domestic factors were negatively associated with the firms' foreign sales; although only the regional industrial factors were statistically significant. Similarly, Brooks and Del Negro (2006) decomposed equity returns into global, country and industry factors but they investigated a rich set of firms' global operations, proxied by firms' foreign sale ratios, international income ratios, international assets ratios, and whether firms belong to traded or non-traded goods industries. They found that internationalization characteristic have positive impact on their global factors but no significant link is found with the country and industry factors, which are contrary to Cavaglia et al. (2001). Phylaktis and Xia (2006b) who explore the cross-sectional links in these factors using firm accounting data, claimed that the dynamics of firms' global, country and industry factors were different between emerging and developed markets where the country factor were systematically linked to firms' foreign sale ratios and ADR listings, a proxy for its world integration level, Besides, Campa and Fernandes (2006) used a broad sample of 48 countries and 36 industries, found that financial market integration is the main driving force behind the significant rise in global industry factor, while financial market activity appears to be another, albeit in annual frequency.

Different with the above literature, this study aims to explain the evolution of both country and industry variations across time by proposing both the country-level and industry-level data encompassing two major financial crises. This is motivated by some of the findings which have shown that the country and industry effects tend to be higher during crisis period owing to the higher volatility. For instance, Phylaktis and Xia (2006a) found that the Asian crisis has some impact on the country effects in Asia Pacific countries while Bai et al (2012) found greater industry effects during the Asian financial crisis and concluded that the phenomenon is just temporary. Besides, both the effects as well as the explanatory power of the determinants could be influenced by the higher than normal stock market co-movement caused by the financial crises and to certain degree, contagious effect. Thus, accounting for the financial crises would allow us to understand how the explanatory power of the determinants fair against the industry and country factors across extreme event rather than assuming they are homogeneous. In the attempt to explain the variation of stock returns in the Association of Southeast Asian Nations (ASEAN), the possible driving forces used are the lagged return, trading activity, concentration and size.

With the collaborations in economics and investment agreement in place, it could potentially escalate the integration level in the region. Looking at ASEAN alone could yield a different perspective especially on the diversification within region, as the result from Grisolia and Navone (2007) suggested that the general cross-country diversification implied in this line of research was a cross-regional phenomenon. Recently, a report from World Bank highlighted the importance of the region's continuous growth for the rest of the world, shown by the fact that the East Asia and Pacific region's share in the global economy has tripled in the last two decades. Boosted by the news that ASEAN Economic Community (AEC) is to be commenced in 2015, the investments pouring into the region will be massively elevated. Furthermore, ASEAN; sustainable high growth emerging markets in Asia after China has always been one of the preferred diversification hubs for international investors amid the global economic volatilities given its relative young demographic, growing middle

class and increasing government spending. This is true as the investment-to-GDP levels in Thailand, Malaysia and Indonesia are approaching and could even surpass the levels before the Asian Crisis.

In this quest, we also include Vietnam, the fastest emerging ASEAN member since the early 2000s. This is motivated by the rapid surge and increasingly significant stock market. Inclusion of Vietnam would definitely generate a better proxy for the true universe of stocks to study ASEAN markets, which is highly lacking in the literature. With Vietnam, our sample size has a total of 4043 firms that allow us to extract more vigorous country and industry factors. In the second stage analysis on the determinants, our panel regression is on monthly series which yield 1295 observations for our panel regression on country factors, and 4357 and 4238 observations for our panel regression on the industry factors on both tradable and non-tradable industries, respectively. We account the potential biasedness by using more robust estimators for our long panel that was not addressed in most of the previous studies.

2. Methodology

We start with the standard decomposition model made popular by Heston & Rouwenhorst (1994) to decompose stock returns into global, country, industry and firm-specific factors. Given that:

$$R_{kt} = \alpha_t + \beta_{ct} + \gamma_{it} + \varepsilon_{kt} \quad (1)$$

where R_{kt} is the return for firm k at period t which belongs to industry j and country k, α_t represents the common factor at period t, β_{ct} is the country factor, γ_{it} is the industry factor and ε_{kt} is a firm specific disturbance. In order to obtain the country and industry factors, a cross-sectional regression of the following can be employed:

$$R_k = \alpha + \sum_{c=1}^{C} \beta_c D_{kc} + \sum_{i=1}^{I} \gamma_i D_{ki} + \varepsilon_k \quad (2)$$

where C is the number of countries and I is the total number of industries in ASEAN from the sample. D_{kc} and D_{ki} are the country dummies and industry dummies respectively, where $D_{kc} = 1$ if firm k belongs to country c, and zero otherwise, and $D_{ki} = 1$ if firm k is from industry i, and zero otherwise. To avoid perfect multicollinerity problem between the repressors, it is more appropriate that the factors are benchmarked relative to the average firm as shown in Heston and Rouwenhorst (1994). In order to come to the pure country and industry factors from Equation (2), restrictions and deviant industry corrections are needed. [1] After the decomposition and correction, time series of corrected country and industry factors are obtained, where $\hat{\gamma}_i$ is the corrected industry's excess return over ASEAN value-weighted market due to industry specific factors and $\hat{\beta}_c$ represents the corrected country excess return over ASEAN value-weighted market due to country specific factors.

Using the concept of mean absolute deviation (MAD) proposed by Rouwenhorst (1999), we compare the relative importance of country and industry factors. This measure can be interpreted as the value-weighted average tracking error (shocks) indicator for average return in each period. Basically, the higher the industry or country MADs, the higher the dispersion of industry or country factors. MAD is considered as less biased as MAD does not square the distance from the mean, thus it is less affected by the extreme observation. The country and industry MADs are defined as

[1] To conserve space, the detail on the regression, restrictions and correction for the estimation procedure can be found in their paper.

$$\sum_{c=1}^{C} WC_c \, |\hat{\beta}_c| \tag{3}$$

$$\sum_{i=1}^{I} WI_i |\hat{\gamma}_i| \tag{4}$$

where and $|\hat{\gamma}_i|$ and $|\hat{\beta}_c|$ are the absolute industry and country factors respectively.[2] By computing Equation (3) and (4) monthly, time series of value-weighted country and industry MAD is obtained. Noted that $\hat{\gamma}_i$ and $\hat{\beta}_c$ can be either positive or negative and Equations (3) and (4) would become zero without taking absolute values.

[Insert Figure 1 about here]

Figure 1 clearly shows that the country and industry MADs are higher during crises period like Asian crisis in year 1997 and subprime crisis in year 2008. Nonetheless, the country and industry MADs declined after the peaking at 6.22% and 3.35% respectively in year 2000 when ASEAN economies and stock markets were in the stage of gradual recovery from the crises. Yet, from Figure 1, it is noticeable that the higher MADs compared to normal time is due to the fragility to any external shocks and unfavorable news. On the other hand, the graph also shows that the magnitude of the country MADs dominance is in a diminishing trend since year 2004 due to increasing financial convergence and market integration between the countries.

Our results differ from the findings of Wang et al. (2003), where they focus on the Asian countries and U.S. They found that the industry factors have already been somewhat larger than the country factors since early 1995 and have significantly dominated the country factors from the second half of 1999 onwards. The inconsistency of the results could be affected by time period, countries, and the breadth of industrial classifications as well as currencies denominated in the sample. Wang et al. (2003) used narrower industry classification on data spanning from January 1990 through February 2001 which could potentially understate the importance of industry factors. As pointed out by Baca et al. (2000), the relative contributions of country and industry components are affected by the degree of integrations among markets. Besides, they denoted the stock price in U.S. currencies while we employed data using local-denominated currencies to avoid nominal currency factors influence the country factors. Yet the results showed that country factors are still dominant despite the absence of currency factors. Despite the fact that financial markets have become more and more integrated, our results confirmed that country factors still play a dominant role in explaining variation of stock returns, while certainly not neglecting the importance of industry factor. Bai et al. (2012) focused their study on the 13 emerging markets and concluded that increased industry effects is found between 1997 and 2002; however it is likely a temporary phenomenon.

In the second stage analysis, we proceed to examine the driving forces behind the evolution of the country and industry factors. This would allow us to understand the reason behind the high deviations (strong country factor) or low deviations (low country factor) for some of the countries, as well as the high (low) deviation for some of the industries (strong industry factors). A major concern in international diversification strategy for an investor is depending on the risk and return that a particular country (industry) poses. The ultimate objective of an investor is to maximize the return and minimizing the risk. Thus, it is

[2] We use the terms pure country (industry) effects, country (industry) effects and country (industry) shocks interchangeably.

important for an investor to understand the possible driving forces behind a country (industry)'s variation in order to achieve the objective. Whether the pure country (industry) factors can be explained by the country (industry) specific variables will be tested using the following model:

$$|\hat{\beta}_{ct}| = \delta + \theta Z_{ct} \quad (5)$$

$$|\hat{\gamma}_{it}| = \delta + \theta Z_{it} \quad (6)$$

where subscript t is month, and Z_{ct} and Z_{it} are the vector of possible determinants for the country and industry factors. δ is the average effect and θ are the parameters to be estimated. The absolute value of the pure country (industry) factors will be used to capture both positive and negative country (industry) factors. Equation (5) and (6) will be estimated using panel analysis.

Synchronizing the variables for the country and industry factors, the focus of this study would be on the measures of lagged return, trading activity, size and concentration in explaining the country and industry shocks. First, employing lagged return as one of the explanatory variables is motivated by the momentum theory in stock returns as shown in Carrieri et al. (2004). If there is a momentum in stock returns, higher current returns in a given country (industry) may lead to a positive country (industry) shock next period. Likewise, negative current returns in a given country (industry) may spur a negative country (industry) shock in the next period. The existent of momentum in stock returns is endorsed by both theoretical and empirical evidences throughout the years. Motivated by the use of lagged global industry return to explain the time-varying price of industry risk in Carrieri et al. (2004), this study would examine the existence of momentum in the both country and industry return of ASEAN countries. In particular, the explanatory power of past country and industry returns on the pure country and industry factors remains the key focus. To be exact, lagged one month return is used and given that the pure factors to be used in this stage of analysis are all taken absolute to capture both the positive and negative dispersion in measuring the shocks; likewise, absolute value will also taken on the lagged return to be in the same dimension for estimation purpose.

$$LR_{c,t-1} = |RI_{c,t-1}| \quad (7)$$
$$LR_{i,t-1} = |RI_{i,t-1}| \quad (8)$$

where $\mathrm{RI}_{\mathrm{c,t\text{-}1}}$ is the return index of country *c* while $\mathrm{RI}_{\mathrm{i,t\text{-}1}}$ is the return index of industry *i* on month *t* minus the number of lagged months.

The second determinant proposed is the trading activity. The relationship between trading activity and volatility has been tested empirically using various market microstructure models over many years[3], which has been discussed extensively in Karpoff (1987). Typically, dollar volume and share volume are the most frequently and widely used proxy for liquidity or trading activity. Dollar volume is the share volume multiplied by dollar value of the share price in a given period. Each has its own shortcomings as using share volume would raise a potential biasedness where the price of the shares is not taken into consideration. One might overstate the importance of the share volume on volatility for a market with small market capitalization while dollar volume has its own issue where there is a potential of understating the explanatory of volume has on volatility for a country with small stock market. In this

[3] More recent evidences can be found in Huang and Masulis (2003), Chan and Fong (2006), Chuang, Kuan, and Lin (2009), Giot et al. (2010).

study, turnover is used as the proxy for trading activity in explaining the variation in country factors. Turnover is not uncommon in measuring liquidity or trading activity, Rouwenhorst (1998) employ turnover as the proxy of liquidity in explaining return factor while Campa and Fernandes (2006) employ turnover as a proxy for the degree of trading activity in a market to explain the country factors. Turnover is known as the number of shares traded over the number of outstanding shares, and it is computed as

$$Turnover_{ct} = \frac{VT_{ct}}{MV_{ct}} \tag{9}$$

$$Turnover_{it} = \frac{VT_{it}}{MV_{it}} \tag{10}$$

where *VT* is the value traded of all securities at month *t*, while *MV* represents the market capitalization at month *t.*

The empirical evidences of size effect in stock market have long been verified in various markets using various methods throughout the years[4]. Generally, size effect prevailed when small size (market capitalization) firms have higher average returns than large size firms. Although the use of size in explaining stock return and volatility is no stranger in empirical finance, the great debate behind the theory justification is still ongoing. In a recent comprehensive study by Dijk (2011), he identified three different aspects of theoretical literature of size. Firstly, he attributed the size effect to firm-level investment decisions. Secondly, size which explained by liquidity factors is an important factor in asset pricing to compensate for liquidity risk undertaken, while the third suggestions is that the size effect could be originated from incomplete information and investor behavior. In most empirical studies, size is often referred to the firm size in the model. In this study the log of market capitalization (end-period) as a measure of size will be used in explaining the country and industry factors as proposed by Campa and Fernandes (2006) in a similar study. By employing market value as a measure of size, natural log is taken on market value of each country and industry to normalize the series in a comparable metric. It is believed that a larger size of a country (industry) would be more stable because it would be better off in weathering crises, thus resulting lower shock. It is also justifiable that most fund managers would prefer to invest in larger market instead of smaller market given its liquidity, stability and market information available.

$$Size_{ct} = \ln(MV_{ct}) \tag{11}$$

$$Size_{it} = \ln(MV_{it}) \tag{12}$$

where MV_{ct} represents the market capitalization of country *c* at month *t* and MV_{it} is the market capitalization of industry *i* at month *t*.

The use of concentration as one of the possible explanatory variables on the country and industry shocks is encouraged by Campa and Fernandes (2006), where they found higher industrial concentration would increase country factors. The industry concentration measures the extent to which the listed stocks in a market disperse across industries. It is believed that a more concentrated country is more likely to have a larger country factor as the country is less diversified and more likely subject to specific shocks. On the other hands, the geographical (country) concentration measures the extent to which the listed stocks in an industry disperse across countries. In general, an industry is better diversified if it is geographically spread, and

[4] see, for example (Banz, 1981, Basu,1983, Heston et al., 1999, Barry et al., 2002)

would have a smaller industry factor as it will less vulnerable to potential shocks than highly concentrated industry. Following Roll (1992) and Xing (2004), Herfindahl industry and country (geographical) concentration variable is used to explain the country and industry shocks. Generally, the bigger the industry concentration measure, the more concentrated the country is in certain industries. The concentration measures of country and industry are computed at each month as

$$Con_{ct} = \sum_{i=1}^{I} \left(\frac{MV_{ict}}{MV_{ct}}\right)^2 \tag{13}$$

$$Con_{it} = \sum_{c=1}^{C} \left(\frac{MV_{cit}}{MV_{it}}\right)^2 \tag{14}$$

where MV_{ict} is the market value of industry *i* in country *c* at month *t*, while MV_{ct} is the total market capitalization of country *c* at month *t*. MV_{cit} is the market value of country *c* that is from industry *i* at month *t*, while MV_{it} is the total market capitalization of industry *i* at month *t*.

3. Data

In the first stage analysis, the sample consists of stock prices and market capitalizations of a total of 4043 firms across ASEAN countries with monthly frequency from January 1990 to December 2010 obtained from Thomson Datastream. Stock price are then converted to percentage returns. Stock prices are obtained in local currency[5], while market capitalizations are obtained in U.S. dollars to allow accurate estimation in assigning relative weights to the ASEAN market as a whole. Monthly frequency is used because it reduces the problems of thin trading that plague penny stocks and small markets. Instead, to avoid survivorship bias, as many firms as possible will be retained to create a better proxy for the total market along the period. Individual firms are grouped using Level-4 industry listings based on the industry classification benchmark (ICB).[6]

In the second stage analysis, lagged return proxied by the return index (RI) of each market and South East Asia industry, respectively, obtained at monthly frequency from Datastream. As for the trading activity, both the value traded and market capitalization of each market and South East Asia industry is obtained directly from Datastream which expressed in U.S. dollar. The measurement of size is proxied by the market capitalization of each market and South East Asia's industry respectively. The monthly market value of each industry in a particular country and the total market capitalization of each country will be manually calculated by summing up all the market capitalization of each firm that included in our sample. Similarly, the monthly market value of a country from a particular industry and the total market capitalization of each ASEAN country's industry will be manually calculated by summing up all the market capitalization of each firm that are included in our sample. The market capitalization of every single firm is obtained from Datastream and in U.S. dollar. Due to the unavailability of data for Vietnam, the turnover and size is computed manually

[5] Stock prices are obtained in local currency to avoid country and industry effects being induced by currency fluctuations. Gerard, Hillion and de Roon (2005) pointed out that exposure to currency risk is a major determinant of international equity returns (see, for example, Dumas and Solnik, 1995, De Santis and Gerard, 1997), however, Heston and Rouwenhorst (1994) and Griffin and Karolyi (1998) found that exchange rates do not significantly explain the return variation.

[6] The Industry Classification Benchmark ("ICB") is jointly owned by FTSE International Limited ("FTSE") and Dow Jones & Company.

using aggregated individual firm data and the country return index is obtained from MSCI. Similarly, return indexes are then computed into return in percentage.

4. Empirical Results

4.1 Determinants of Country Factors

Given the fact that the data of Vietnam are only available since December 2006, inclusion of Vietnam in the sample might distort the results of the estimation. Besides, making an inference from the full sample and generalizing to Vietnam might be incorrect as the estimation from year 1990 to 2006 only includes the other five countries. In order to account for this issue, we estimated two sub-sample periods to account for the pre- and post-availability of Vietnam's data, i.e. 1990-2006 and 2007-2010.
Below is the basic specification of pure country factors and country specific variables.

$$|\hat{\beta}_{ct}| = \delta + \theta_1 LR_{ct} + \theta_2 TRAD_{ct} + \theta_3 SIZE_{ct} + \theta_4 CONC_{ct} \qquad (15)$$

The estimation of pooled and panel regressions with fixed-effects are presented in the following table along with estimations from the two sub-sample periods. Theoretically, both cross-section and period effects needs to be controlled to account for the unobserved heterogeneity across country and across time. Cross-section fixed-effects can take into account the presence of heterogeneity in country characteristics, ranging from macroeconomic variables such as FDI, GDP, interest rate, currency and national account to political condition such as corruption, political stability and institution quality and efficiency. Taking into account the fixed effect would greatly reduce the biasedness of variable omission. Meanwhile, period fixed-effects can account for omitted variables that vary over time such as technology changes and improved education level.

From Table 1, Equation (15) is first estimated using a pooled regression; while the second model shows the result of two-way fixed effects model. Overall, both the models demonstrate consistent results, with except for the significance of "size" effect. Three separate diagnostic tests are carried out (one for each set of effects, and one for the joint effects) to establish the presence of cross sectional and period effects. We also account for heterochedasticity and correlations to ensure we do not understate the standard errors, a common bias in panel data analysis of many articles in leading finance journals as noted in Petersen (2009).[7] Our residual diagnostics tests show that both the contemporaneous correlation and heterochedasticity are present in our estimation.[8] Hence, we report only the White (1980) cross-section standard error that is robust to cross-equation (contemporaneous) correlation and heterochedasticity.

The significance of the lagged country return suggests that there are momentum effects in stock returns. Generally, a higher current return in a given country may lead to a positive country shock next period. Likewise, negative current returns in a given country may spur a negative country shock in the next period. The evidence found is consistent with the hypothesis put down in the first place where positive relation is expected. The results are true for both pooled regression and two-way fixed effects model despite at a lower degree in the latter. However, no significant relationship is found in the two sub-samples.

[7] Peterson (2009) pointed out that the standard error might be biases if the number of cluster is too small (less than 10) and the results of clustered by the more frequent cluster are similar to clustered by two dimensions.
[8] We follow the Breusch-Pagan LM test of independence and a modified Wald statistic for groupwise heteroskedasticity in the residuals of a fixed-effect regression model, as proposed in Baum (2001).

Secondly, trading activity, which is proxied by the turnover, shows positive relationship with the pure country factors though not significant. Unlike the findings from the study of Campa and Fernandes (2006), who found significant positive relation between turnover and the magnitude of country shocks, the results are consistent in the sub-sample period from 1990 to 2006. Next, negative relation is found on size to country shocks, suggesting on average the larger the market size the lower the magnitude of country shocks. This is true as a larger size market is more stable and less sensitive to market turbulence thus resulting a negative relation. This finding prevails in the sub-sample period of 1990-2006, but not in the full sample and during 2007-2010.

Industry concentration is found to decrease the country factors. This finding is contradicted to the result of Campa and Fernandes (2006). Negative coefficient on concentration to the pure country factor means a country which is concentrated in certain industries has lower country shocks. Except for the period covering 2007-2010, all the findings are consistent and robust. Similar finding was found in Xing (2004), where he argued that Spain, in contrast to all other countries, has a very heavy weight on utilities industry, which is a very stable industry. In this study, most of the countries in ASEAN have a heavy weight on banking industry, a relatively stable and anchor industry in the region because ASEAN countries has a bank–based financial system. Banks in this region have been building the capital ever since the Asian crisis in 1997 and are well-placed to weather the effects of subprime crisis. This is supported by the fact that the revenues of banking industry in the region is still growing where the growing rate has been flat in the western market since 2008. Hence, our result suggests that on average, the higher the industrial concentration in a country, the lower the magnitude of the country shock.

[Insert Table 1 about here]

4.2 Determinants of Industry Factors

4.2.1 Tradable and Non-tradable Industries

Griffin and Karolyi (1998) classified firms into traded and non-traded industries to measure the relative importance of industry and country factors. They defined non-traded industries as those for where high transportation costs prevented international trade. Previously, there are studies on how the market values of firms in traded and non-traded industries are influenced by exchange-rate fluctuations differently, such as Adler and Dumas (1984), Levi (1994) and Allayannis and Uhlrig (1996). Theoretically, common industry source of variation is more prominent to tradable industries as they are perceived to be exposed to the same exposure such as the fluctuations of input and output price as well as the fluctuations of exchange rate. Not surprisingly, empirical evidences show significant dissimilarity between tradable and non-tradable industries, despite not univocal.[9] Griffin and Karolyi (1998) found higher industry factors on tradable industries. In Brooks and Del Negro (2004), they showed that tradable industries have higher international sales ratio, higher ratio of international asset while firms in non-tradable industries are more exposed to country factors. In addition, higher industry factors are discovered on tradable industries in Campa and Fernandes (2006) reconfirm the presence of distinction between tradable and non-tradable industries. From here, it is known that the industry factors for both industry groups might react differently to respective industry specific variables. In order to account for the distinction, it is wise to distinguish the industries into two panels which are tradable and non-tradable to test on

[9] Both Brooks and Del Negro (2006) and Bai et. al. (2012) found no clear distinction between traded and non-traded goods industries

determinants of industry factors independently. Similar to the industry classification (ICB level 4) used in Campa and Fernandes (2006); this study followed the classification into tradable and non-tradable as of Campa and Fernandes (2006), which are tabulated in Table 2.

[Insert Table 2 about here]

As for determinants of industry factors, industry-specific variables such as lagged industry return, trading activity, size and concentration will be employed as the possible determinants of the pure industry factors. Similar procedures that were carried for country factors shall apply. All 39 industries[10] are divided into tradable and non-tradable industries as per discussed and the estimation is done separately for these two groups of industries. The basic specification for determinants of industry factors are shown as below:

$$|\hat{\gamma}_{it}| = \delta + \theta_1 LR_{it} + \theta_2 TRAD_{it} + \theta_3 SIZE_{it} + \theta_4 CONC_{it} \qquad (16)$$

4.2.2 Tradable Industries

The first set of results presented in Table 3 is the results for the comparable model used. Using a pooled regression in the first model, significant relation is found on lagged industry return, size and concentration to pure industry factors. Similar to the case of the country factors, theoretically, both the cross-section and period effects are needed in order to account for the unobserved heterogeneity across industry and across time in this case. It is believed that there are omitted variables that might affect the pure industry factors. There are immeasurable factors that could affect the pure industry factors of a particular industry over time, not limited to industry life cycles, industry R&D activities, skill level of labor force, technology changes and regulation level. Hence, the control of cross-section effect and period effect are needed in the specification. Thus, two-way fixed effects model is then estimated in the second model and the presence of cross sectional and period effects are established as shown in the diagnostic tests. Similarly, in order to achieve a robust and valid statistical inference using panel model, all the models are using White (1980) cross-section method as the robust estimator. [11]

In general, significant positive relationship is found on size and pure industry factors; while negative relationship is observed on all the other variables despite not significant. Besides that, a change in the sign of a size is observed as compared to the pooled model shows that without controlling for the unobserved effects, the findings may be biased. This is true as we noticed a negative sign in Campa and Fernandes (2006), which they do not control for fixed effects in the estimation for both subsets. Thus, size is the only variable to have significant effect on the pure industry factors for tradable industries, and the same goes to the sub period of 1990-2006. A positive coefficient indicates that industry with larger size is more volatile, which is different from the findings from the country factors. Alternate explanation could be linked to the hypothesis where as larger size of industry is theoretical more liquid compared to smaller market as it attracts more investors, thus more volatile. The results for the two sub-samples are similar to those observed in the determinants of country factors; in such where size remains significantly affecting the industry shocks in the earlier period of 1990-2006. Meanwhile, the explanatory power of size becomes insignificant during sub-sample 2007-2010 when Vietnam is taken into account in the model.

[Insert Table 3 about here]

[10] "Unclassified" industry is excluded

[11] The residual diagnostic tests show the errors exhibit both heteroskedasticity and contemporaneous correlation

4.2.3 Non-tradable Industries

From Table 4, significant relation is found on all explanatory variables to pure industry factors in the pooled regression model. Nevertheless, the model is susceptible as it does not control for the unobserved heterogeneity. Thus, two-way fixed effects model is then estimated and both period fixed effect and cross-section fixed effect are controlled. We observe significant negative relationship on size to pure industry factors, which is the opposite of the results from tradable industries. This result suggests on average the larger the non-tradable industry size the lower the magnitude of industry shocks, signifying an industry with larger size is more stable and less sensitive to turbulence thus resulting a negative relation.

Notably, Campa and Fernandes (2006) also found different signs on the size factors in tradable and non-tradable industries, despite being the opposite of ours. The reason behind the different findings for tradable and non-tradable industries is due to the different nature of the industries. Most of the tradable industries are more sensitive and vulnerable to industry turbulence, thus it is understandable that positive relationship is found. On the other hand, most of the non-tradable industries including banks, electricity, leisure goods, support services, etc. are considered non-cyclical industries, where they are less sensitive to industry shocks. Different from tradable industries, the volatility is lower in non-tradable industries as they are less sensitive to industry shocks and industry cycles. Thus, a larger size of the industry would be more stable as compared to a smaller size industry, as uncovered in the results. Scrutinizing the sub-sample period, size is significantly affecting the pure industry factors in the sub-period of 1990-2006 however not robust to contemporaneous correlation and heteroskedasticity. Similarly, the latter sub-period which contains Vietnam shows no explanatory power on all the variables.

[Insert Table 4 about here]

4.3 The Impact of Crisis

Looking at the result of the sub-sample period during 2007-2010, we observed that the explanatory powers of all variables are not robust. This is true for three set of panels consisting of country, tradable and non-tradable industries. A natural convenient explanation could be put down to the fact of the inclusion of Vietnam in the sub-sample of 2007-2010. Alternately, we could also attribute this phenomenon to the subprime crisis which hit the global economy and stock markets severely. It is logical that all the variables are unable to explain the country shocks during crisis period as the market downturn happened at a macro-level and is increasingly affected by external factors.

[Insert Table 5 about here]

To examine whether crisis effect affect the result, we re-estimate the model in a sub-sample period of 1997-2000, covering the Asian crisis and compared it to the sub-sample period of 2007-2010, which is covering the subprime crisis for further verification and robustness. From Table 5, none of the possible determinants are able to provide meaningful statistical inference on the country factors during the two major crises. This establishes the fact that crisis effect do exist in the specification. Thus, the results for determinants of both country and industry factors could not generalized to crises period.

5. Conclusion

In view of the regional diversification prospect in ASEAN stock market, we reconfirm the evidence on the dominance of country over industry factors. Different from previous studies that focus in ASEAN region, where Vietnam is often excluded from the analysis; we took the initiative to include Vietnam in our analysis given their rapid rise and fast developing stock market and overall economy. On the other hand, the dominance of country factors in a lesser scale in recent subprime crisis compared to the Asian crisis signifies the improved market structure and the increasing convergence of stock markets among ASEAN.

In the second stage analysis, the importance of the driving forces behind both the pure country and the pure industry factors are examined. For the determinants of pure country factors, there are momentum effects observed in stock returns. The lagged return shows that a higher current return in a given country may lead to a positive country shock next period. Besides, industry concentration is found to decrease the country factors and this suggests that a higher industrial concentration of a country would tend to have a lower magnitude of country factors, given it is a relatively more stable industry. For the tradable industries, an industry with larger size would have larger industry shocks, as a larger industry would tend to be more liquid thus more volatile. However, for the non-tradable industries, a larger industry signifying lower industry shocks. The reason of the dissimilarity is because a larger industry is more stable and also due to the fact where the non-tradable industries are less sensitive to the industry turbulence and industry cycles, whereby most of the non-tradable industries are non-cyclical industries. We also uncover that none of the variable is able to explain the country shocks during crises period. This is also true for the industry level results. The loss of explanatory power on the variations of stock returns can be attributed to the fact where the general market would tend to fall as a whole during crises period coupled by the irrational exuberance among investors.

Our findings imply traditional top-down approach in asset allocation has not lost its ground in the region. The importance of the country specific factors remains in the variation of stock returns in ASEAN. However, with the continuation in the trend toward global integration of economic and financial market, the importance of the country factors are diminishing, and this means that looking at the country specific factors alone might not be sufficient. Furthermore, our second stage analysis results proved that country and industry shocks during crises period are unexplained by these variables. Apart from extreme events, a more concentrated country would have smaller country shocks. Thus, if one were to look for countries that possess lower country factors, concentration measure is one of the determinants they might want to scrutinize. Besides that, the presence of momentum effects in the variations of stock returns does give some insight to investors on what to expect for the next period. As for the industry factors, a larger industry would increase the industry shocks of tradable industries while lower the industry shocks of non-tradable industries. These results implied that the tradable and non-tradable industries are driven by different determinants. If one wishes to go for an industry with lower shocks, a lower size of a tradable industry and larger size of a non-tradable industry might be their preference. Hence, the changes in the magnitude of industry factors are driven by the size of the industry.

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APPENDICES

Restrictions shown in Equation (A.1) will be imposed on Equation (2) to normalize the value-weighted sums to zero as suggested by Suits (1984) and Kennedy (1985). Under these restrictions, all of the coefficients from Equation (2) can now be fully identified; whereby the regression intercept represents the proxy for the ASEAN value-weighted index, which is free from country and industry factors.

$$\sum_{c=1}^{C} WC_c\,\beta_c = 0 \qquad and \qquad \sum_{i=1}^{I} WI_i\,\gamma_i = 0 \tag{A.1}$$

where WC_c and $WI_i$are the value weights of country *c* and industry *i* in the ASEAN markets, respectively, and $\sum_c WC_c = \sum_i WI_i = 1$. We will then come to

$$R_k = \alpha + \sum_{c=1}^{C-1} \beta_c\,(D_c - \frac{WC_c}{WC_{BC}} D_{cBC}) + \sum_{i=1}^{I-1} \gamma_i\,(D_i - \frac{WI_i}{WI_{BI}} D_{iBC}) + \varepsilon_k \tag{A.2}$$

where BI and BC are the (arbitrary) specific industry *i* and country *c* on which the restrictions are normalized. By estimating Equation (A.2) across time will generate time series of pure industry factors and pure country factors. However, it is worth noting that both the factors carry the weights that are proportional to their market value and there are significant differences between the industry (country) weights in country c (industry i) and the industry (country) weights in ASEAN. If a country's industry weights differ from the weight in the overall ASEAN market and a industry's country weights differ from the weight in the ASEAN market, the deviant industry structure is corrected as per

$$\hat{\beta}_c = R_c - \hat{\alpha} - \sum_{c=1}^{C} (WI_{ic} - WI_i)\,\hat{\gamma}_i\,D_{ic} \tag{A.3}$$

$$\hat{\gamma}_i = R_i - \hat{\alpha} - \sum_{i=1}^{I} (WC_{ci} - WC_c)\,\hat{\beta}_c D_{ci} \tag{A.4}$$

Table 1 Determinants of Country Factors

This table shows the regression results of equation (15). The robust standards errors (in parenthesis) are corrected using White (1980) cross-section, which is robust to both contemporaneous correlation and heteroskedasticity. Redundant F-test is used in the redundant fixed effects test assume a null hypothesis of no fixed effect. *, **, *** Indicates statistical significance at the 10% and 5% and 1% level, respectively.

$$|\hat{\beta}_{ct}| = \delta + \theta_1 LR_{ct} + \theta_2 TRAD_{ct} + \theta_3 SIZE_{ct} + \theta_4 CONC_{ct} \quad (15)$$

where subscript t is the month, $\hat{\beta}_c$ represents the country factors, LR_c is the lagged one month country's index return, $TRAD_c$ is the trading activity of the country's stock market, $SIZE_c$ is the size of the market in capitalization and $CONC_c$ measures the industry concentration of the country's stock market.

(Country)	Pooled OLS	Two-way Fixed	1990-2006 (pre-Vietnam)	2007-2010 (post-Vietnam)
	Coef (S.E.)	Coef (S.E.)	Coef (S.E.)	Coef (S.E.)
Intercept	12.7603 (1.9878)***	11.7898 (6.6421)*	17.3534 (6.0911)***	36.3167 (28.6186)
Index Return (lag 1)	0.1226 (0.0322)***	0.0866 (0.0480)*	0.0774 (0.0507)	0.0671 (0.1164)
Trading Activity	0.0963 (0.0757)	0.0518 (0.1432)	0.1493 (0.0919)	-0.0107 (0.2594)
Size	-0.8322 (0.1697)***	-0.7437 (0.6419)	-1.2897 (0.5843)**	-2.6670 (2.3816)
Concentration	-5.8610 (1.0946)***	-3.3724 (1.5396)**	-3.0025 (1.3730)**	-20.4399 (20.3861)
R-Squared	0.0957	0.4858	0.5020	0.4783
Adjusted R-Squared	0.0929	0.3577	0.3715	0.3518
Obs	1295	1295	1007	288
Cross-section fixed effect		35.2747***	25.2267***	1.4917
Period fixed effect		2.4248***	2.8619***	1.4534**
Cross-section/Period		3.0939***	3.4611***	1.4458**

Table 2 List of tradable and non-tradable industries

Tradable	Non-Tradable
Aerospace & Defense	Banks
Alternative Energy	Construction & Materials
Automobiles & Parts	Electricity
Beverages	Financial Services (Sector)
Chemicals	Fixed Line Telecommunications
Electronic & Electrical Equipment	Food & Drug Retailers
Food Producers	Gas, Water & Multiutilities
Forestry & Paper	General Retailers
General Industrials	Health Care Equipment & Service
Household Goods & Home Construction	Industrial Transportation
Industrial Engineering	Leisure Goods
Industrial Metals & Mining	Life Insurance
Mining	Media
Oil & Gas Producers	Mobile Telecommunications
Oil Equipment & Services	Nonlife Insurance
Personal Goods	Real Estate Investment & Services
Pharmaceuticals & Biotechnology	Real Estate Investment Trusts
Software & Computer Services	Support Services
Technology Hardware & Equipment	Travel & Leisure
Tobacco	

Table 3: Determinants of Industry factors (Tradable Industries)

This table shows the regression results of equation (16) for 20 tradable industries. The robust standards errors (in parenthesis) are corrected using White (1980) cross-section, which is robust to both contemporaneous correlation and heteroskedasticity. Redundant F-test is used in the redundant fixed effects test assume a null hypothesis of no fixed effect. **, *** Indicates statistical significance at the 5% and 1% level, respectively.

$$|\hat{\gamma}_{it}| = \delta + \theta_1 LR_{it} + \theta_2 TRAD_{it} + \theta_3 SIZE_{it} + \theta_4 CONC_{it} \qquad (16)$$

where subscript t is the month, $\hat{\gamma}_i$ represents the industry factors, LR_i is the lagged one month South East Asia industry return, $TRAD_i$ is the trading activity of the South East Asia industry, $SIZE_i$ is the size of the South East Asia industry capitalization and $CONC_i$ measures the country concentration of the South East Asia industry.

(Tradable Industries)	Pooled OLS	Two-way Fixed	1990-2006 (pre-Vietnam)	2007-2010 (post-Vietnam)
	Coef (S.E.)	Coef (S.E.)	Coef (S.E.)	Coef (S.E.)
Intercept	2.3075	1.1079	0.6308	0.7564
	(0.2852)***	(0.4960)**	(0.6283)	(1.7938)
Index Return (lag 1)	0.0191	-0.0014	-0.0040	0.0092
	(0.0062)***	(0.0053)	(0.0061)	(0.0103)
Trading Activity	-0.0051	-0.0030	-0.0003	-0.0078
	(0.0032)	(0.0033)	(0.0028)	(0.0310)
Size	-0.1277	0.1975	0.1899	0.1099
	(0.0270)***	(0.0554)***	(0.0753)**	(0.2136)
Concentration	2.2736	-0.4744	0.9173	0.9472
	(0.3228)***	(0.5007)	(0.5868)	(2.0556)
R-Squared	0.0326	0.2402	0.2375	0.3341
Adjusted R-Squared	0.0318	0.1895	0.1838	0.2811
Obs	4357	4357	3407	950
Cross-section fixed effect		23.5106***	17.8118***	8.9061***
Period fixed effect		2.9170***	2.8128***	2.2934***
Cross-section/Period		4.1615***	4.1015***	4.0114***

Table 4: Determinants of Industry Factors (Non-Tradable Industries)

This table shows the regression results of equation (16) for 19 non-tradable industries. The robust standards errors (in parenthesis) are corrected using White (1980) cross-section, which is robust to both contemporaneous correlation and heteroskedasticity. Redundant F-test is used in the redundant fixed effects test assume a null hypothesis of no fixed effect. **, *** Indicates statistical significance at the 5% and 1% level, respectively.

$$|\hat{\gamma}_{it}| = \delta + \theta_1 LR_{it} + \theta_2 TRAD_{it} + \theta_3 SIZE_{it} + \theta_4 CONC_{it} \qquad (16)$$

where subscript t is the month, $\hat{\gamma}_i$ represents the industry factors, LR_i is the lagged one month South East Asia industry return, $TRAD_i$ is the trading activity of the South East Asia industry, $SIZE_i$ is the size of the South East Asia industry capitalization and $CONC_i$ measures the country concentration of the South East Asia industry.

(Non-tradable Industries)	Pooled OLS	Two-way Fixed	1990-2006 (pre-Vietnam)	2007-2010 (post-Vietnam)
	Coef (S.E.)	Coef (S.E.)	Coef (S.E.)	Coef (S.E.)
Intercept	1.8376 (0.2271)***	3.4523 (0.6291)***	3.7541 (0.8599)	2.4683 (1.8572)
Index Return (lag 1)	0.0338 (0.0075)***	-0.0060 (0.0075)	-0.0119 (0.0092)	0.0060 (0.0111)
Trading Activity	-0.0181 (0.0048)***	-0.0045 (0.0064)	-0.0042 (0.0046)	-0.0272 (0.0261)
Size	-0.1444 (0.0220)***	-0.1262 (0.0605)**	-0.1227 (0.0935)	-0.1179 (0.1609)
Concentration	3.0912 (0.2301)***	0.1010 (0.4719)	-0.1874 (0.5891)	0.9582 (1.4455)
R-Squared	0.0908	0.2916	0.2901	0.2805
Adjusted R-Squared	0.0899	0.2434	0.2394	0.2216
Obs		4258	3346	912
Cross-section fixed effect		22.5322***	19.0718***	5.3067***
Period fixed effect		2.7282***	2.6217***	2.7907***
Cross-section/Period		4.2314***	4.1174***	3.6275***

Table 5: Determinants of Country and Industries Factors (Crises periods)

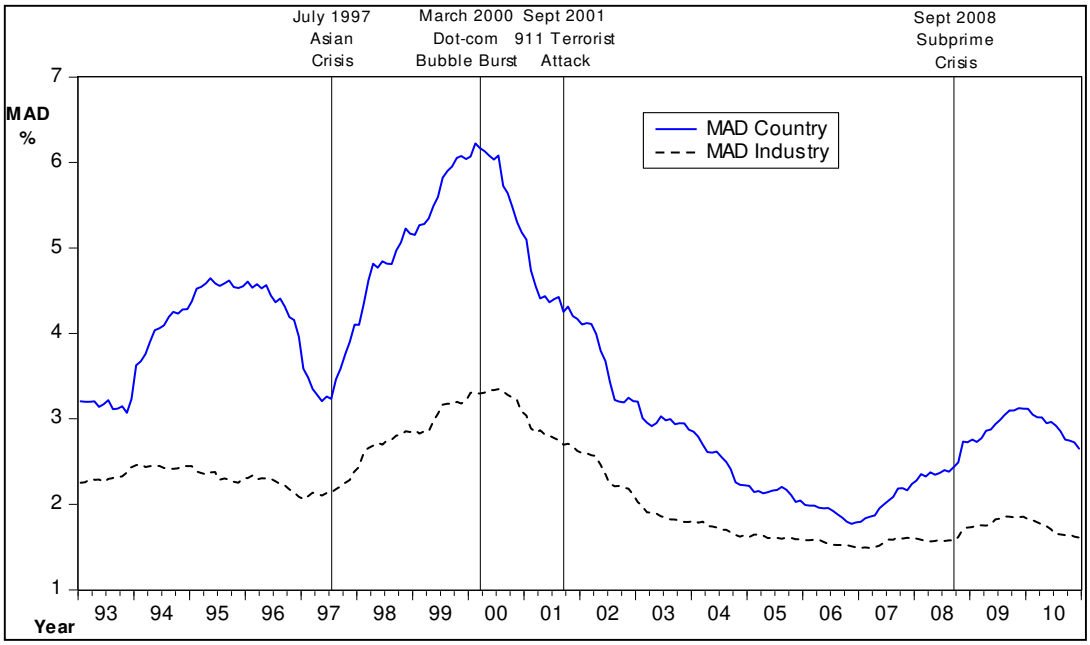
This table shows the regression results of all variables on for six ASEAN countries, 20 tradable industries and 19 non-tradable industries during crises period. The first three models from the left are the results from the sub-sample period of 2007-2010 covering the Sub-Prime Crisis, while the latter three models are the sub-sample periods of 1997-2000 covering the Asian Crisis. The robust standards errors (in parenthesis) are corrected using White (1980) cross-section, which is robust to both contemporaneous correlation and heteroskedasticity. Redundant F-test is used in the redundant fixed effects test assume a null hypothesis of no fixed effect. **, *** Indicates statistical significance at the 5% and 1% level, respectively.

$$|\hat{\beta}_{ct}| = \delta + \theta_1 LR_{ct} + \theta_2 TRAD_{ct} + \theta_3 SIZE_{ct} + \theta_4 CONC_{ct} \quad (15)$$

$$|\hat{\gamma}_{it}| = \delta + \theta_1 LR_{it} + \theta_2 TRAD + \theta_3 SIZE_{it} + \theta_4 CONC_{it} \quad (16)$$

where subscript t is the month, $\hat{\beta}_c$ represents the country factors, $\hat{\gamma}_i$ is the industry factors, LR is the lagged one month return, $TRAD$ is the trading activity, $SIZE$ is the size of the country and industry capitalization respectively, and $CONC$ is the industry concentration and country concentration, respectively.

Sub-periods (Crisis)	2007-2010 (S.P. Crisis)	2007-2010 (S.P. Crisis)	2007-2010 (S.P. Crisis)	1997-2000 (A. Crisis)	1997-2000 (A. Crisis)	1997-2000 (A. Crisis)
	Country	Tradable	Non-Tradable	Country	Tradable	Non-Tradable
Two-way Fixed	Coef (S.E.)	Coef (S.E.)	Coef (S.E.)	Coef (S.E.)	Coef (S.E.)	Coef (S.E.)
Intercept	36.3167	0.7564	2.4683	24.8824	0.4149	-0.8121
	(28.6186)	(1.7938)	(1.8572)	(17.0761)	(1.5157)	(3.5463)
Index Return (lag 1)	0.0671	0.0092	0.0060	0.0138	0.0060	-0.0090
	(0.1164)	(0.0103)	(0.0111)	(0.0892)	(0.0111)	(0.0148)
Trading Activity	-0.0107	-0.0078	-0.0272	0.2892	-0.0080	-0.0113
	(0.2594)	(0.0310)	(0.0261)	(0.4688)	(0.0267)	(0.0653)
Size	-2.6670	0.1099	-0.1179	-1.5746	0.2476	0.4945
	(2.3816)	(0.2136)	(0.1609)	(1.7080)	(0.1708)	(0.4099)
Concentration	-20.4399	0.9472	0.9582	-17.9519	1.9339	0.1622
	(20.3861)	(2.0556)	(1.4455)	(13.2866)	(2.6132)	(1.7680)
R-Squared	0.4783	0.3341	0.2805	0.4856	0.2728	0.3570
Adjusted R-Squared	0.3518	0.2811	0.2216	0.3318	0.2055	0.2958
Obs	288	950	912	240	804	772
Cross-section fixed effect	1.4917	8.9061***	5.3067***	9.8578***	6.0454***	8.0443***
Period fixed effect	1.4534**	2.2934***	2.7907***	2.0712***	2.9116***	2.7085***
Cross-section/Period	1.4458**	4.0114***	3.6275***	3.0780***	3.7606***	4.5686***



Note: This figure plots the cross-country value-weighted average of the mean absolute deviations (MADs) of the pure country and cross-industry value-weighted average of the mean absolute deviations (MADs) of pure industry factors calculated using 36-month rolling window. Returns are measured in percentage per month.

Figure 1: Mean absolute deviations (MADs) of the pure country and pure industry factors