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Review Paper

Dynamics Relationship of ASEAN-Financial Center Stock Market Valuation: A Cointegration Study

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ABSTRACT

This study investigates dynamic relationship of stock market valuation between ASEAN and financial center. Dynamic relations between stock market valuation reflects fundamental changes in stock that are driven by common global factors across markets. We model the relations in form of error correction model using two popular valuation proxies: Price to Earnings (PE) and Price to Book value (PB) with growth differential, inflation differential and global policy uncertainty index as the control variables. We estimate the model using the methodology developed by Kripfganz and Scheneider (2018) on a monthly dataset of 5 ASEAN countries and 4 financial centers between March 2010 to December 2021. We find positive and highly significant long-run relations and error correction mechanisms between ASEAN stock market valuation and those of financial center. The pattern is quite varied at country level perhaps due to country specific characteristics.

HIGHLIGHTS

- This paper looks at the long-term relationship of the financial center stock market valuation to the stock market valuation of ASEAN countries by looking at the pattern of relationships in the aggregate market and between countries using stock market valuation.
- Our finding is important to improve our current understanding on relationship that subsequently critical for better policy design.

Keywords: Stock market valuation, global policy uncertainty index, error correction model, ASEAN and financial center

Jorion dan Schwartz (1986) stated that the capital market is considered internationally integrated if assets with the same or identical risk will have the same price even though they are traded in different capital markets. Almost the same opinion was also said by Bekaert, *et al.* (2007) who stated that in a market with a high level of integration and contagion effect, the market will move together and have a high degree of relations. Therefore, the stock market is known to influence one another, especially from Financial Center to emerging countries, as stated by Ramdhan, *et al.* (2016) who discussed how leaders in the global stock market indirectly affect the world's stock market, or are influenced by them, to some extent.

In this paper, stock market integration is defined based on two well-established theorems, namely the law of one price, and the absence of arbitrage (Rubinstein 1976); (Ross 1978); (Harrison and Kreps 1979). The law of one price states that two assets with identical payoffs (in every state of nature) should not be priced differently. If the law fails to hold, profit opportunity arises from buying the cheaper asset and selling the more expensive one. In other words, a stochastic discount factor that price all payoffs exists. However, profit opportunity is still possible in the presence of zero or negatively priced

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assets, which always yield non negative payoffs and positive payoffs with positive probability. Thus, the absence of arbitrage requires the discount factor to be strictly positive in order to rule out non positive prices in practice. In the general international context, integrated stock markets should assign the same positive price to assets in different markets yielding the same payoffs both with the law of one price and in the absence of arbitrage opportunities (Chen and Knez 1995). Consequently, markets are integrated if there exists a strictly positive discount factor, which summarizes the pricing structure of a market, and is common across markets (Tam and Tam 2012).

Stock market integration in the global context manifests in the same degree of stock valuation. Stock valuation in one region is generally the same as in other regions as well as between countries. We consider using two valuation proxies namely Price to Earning (PE) and Price to Book (PB) ratio. PE and PB are the most popular methods to calculate stock valuations for investors, which is why most of them will use these two methods as a reference in calculating stock valuations to date. Tam and Tam (2012) indicate the existence of different specific market characteristics, for example, while PE is important for valuation in the US market, book value appears to be a better measure for Japan (Bildersee, Cheh and Lee 1990).

Empirical valuation relationship was first identified by Bekaert *et al.* (2007) who tested market integration and segmentation by linking local and global PE ratios to relative economic growth. The results demonstrated that null of market integration is only rejected for segmented countries using investment growth regression, and null of market segmentation is rejected for integrated countries. Eun and Lee (2010) examined the pattern of historical evolution of international earnings-to-price ratios for a sample of 17 developed markets. Their analysis indicated that the convergence in earnings-to-price ratios reflects increasing capital market integration rather than more alignment in industrial structure among these markets.

Other researchers who tested the cointegration valuation were King and Segal (2008), who examined whether Canadian and U.S. equity markets are integrated or segmented by comparing the valuation multiples (PE and PB) of firms in both markets. The result demonstrated that Canadian and U.S. equity markets remain segmented and not integrated. The next researcher is Tam and Tam (2012) who shed light on global stock market integration at both the total market and the individual industrial sector levels use PE and PB ratio. Feldmann and Laosirirat (2015) used the corporate value growths and GDP growths. The research of Tam and Tam (2012) and Feldmann and Laosirirat (2015) revealed the time-varying nature of the global stock market integration process characterized by heterogeneous transition experience of markets, both at the total market and the disaggregated industrial sector levels.

We revisit the issue of valuation cointegration. The novelty of this study from existing literatures are as follows. First, the researcher conducts empirical investigation on market integration and builds a unified conceptual framework based on previous work by Tam & Tam (2012). We then estimate and evaluate the relationship between the valuation of the ASEAN markets and the financial center markets. The framework essentially comprises a working definition of market integration, an operational measure of it, and an appropriate methodology for its assessment. First and foremost, although there is no formal definition, it is commonly understood that markets are integrated when the law of one price and the no arbitrage condition are held (Baele, et al., 2004); (Chen, et al., 1995). Accordingly, assets with the same return and risk characteristics should be priced identically across markets. The relationship between asset characteristics and the pricing of an asset can be formulated in a standard stock valuation model (Tam & Tam, 2012). Second, our study uses the latest Error Correction Model estimation technique developed by Kripfganz and Schneider (2018). The main improvements from this technique are (a) the bound test is flexible and allows variable integrated at the order I (0) and 1 (1) to be utilized in the model; (b) the method generates long-run unbiased estimation; (c) compared to the conventional cointegration tests, small sample size can be estimated using ARDL bound test, (Kirikkaleli, *et al.* 2021), and (d) its popularity also stems from the fact that cointegration of nonstationary variables is equivalent to an error-correction (EC) process and the ARDL model has a reparameterization in EC form (as in Engle and

Granger, 1987; Hassler and Wolters, 2006; Bahhouth *et al.* 2022; Okumu *et al.* 2022).

The first question is the long-term relations between the market valuations of financial center countries and ASEAN countries in aggregate valuation. Over the past few decades, we have witnessed important changes in the world financial markets. Eun and Lee (2010) said that three such changes are of interest: (1) integration of the capital markets, (2) increasing similarity of industrial structures across countries, and (3) moving towards international harmonization of accounting practices. At the local market level, economic theory suggests that firms in the same country should have similar valuation fundamentals. Therefore, it is only logical that the preposition prevails at aggregate i.e., country level, financial center - ASEAN countries.

The second question is which financial center countries have integration in the long term with market valuations of ASEAN countries. International PE and PB ratios may converge as international capital markets become more integrated. This is in line with the statement of Tam and Tam (2012) that reactive stock fundamentals in valuation ratios are driven by common global factors across markets. Capital markets have become more integrated over the last few decades because there are no barriers to international capital flows. Capital market integration would imply that sources of systematic risk are common, and that risk is measured internationally. As a result of this integration, industry-specific revenue-to-price ratios will be similar worldwide as growth opportunities (reflected in PE and PB ratios) will be rewarded in internationally integrated markets. Countries that have strong economies will easily influence emerging countries in the long-term. For this reason, we would like to see the integration relationship between the financial center and ASEAN countries in synthesizing index valuation models between countries and to find out which countries are both integrated in the long term. Tam and Tam (2012), Feldmann and 30 Laosirirat (2015) and Eun and Lee (2010), concluded on their research that stock index valuations have a significant long-term relationship, which contradicts the research of Bekaert *et al.* (2007) and King and Segal (2011) that demonstrated how the valuation of international stock indices is segmented.

Macroeconomics variables used as control variables in this study are the difference of real GDP growth and the difference of inflation in ASEAN and FC countries. We also use global economic policies uncertainty (GEPU) index (Baker, Bloom and Davies, 2016). Salamat *et al.* (2021) and Setiawan *et al.* (2019) found positive relations between economic growth and stock price index of MENA Countries while stock price index was negatively affected by inflation. Alqathani & Martinez (2020) found that GEPU of US and has a significant and long-term negative effect on stock prices in Bahrain and Kuwait. Li & Peng (2017) found that the GEPU index of the US had a negative impact on the joint movement of Chinese stock market.

We found a positive and highly significant long-run and dynamic relationship between ASEAN stock market valuation and financial center market, but not supported by the integration of control variables in aggregate valuation. This is in line with previous research where strong country valuations have an influence on emerging country valuations, conducted by Tam and Tam (2012). We also found different patterns of relationship at the country level, which supports the research by Eun and Lee (2010); Tam and Tam (2012); and Feldmann and Laosirirat (2015). Hence, it is important to identify the stock market integration of these countries where it can provide an impact to investor's portfolio diversification and international asset management.

DATA AND METHODOLOGY

Our dataset comprised of monthly stock market valuation (PE and PB ratio) from March 2010 to December 2021 for five ASEAN countries and four financial center countries. The use of two valuation proxies also serves as robustness check. ASEAN stock market indexes are JCI (Indonesia), KLCI (Malaysia), STI (Singapore), SET (Thailand), VNINDEX (Vietnam); while financial center indices are SPX (United States), SHCOMP (China), NKY (Japan), UKX (United Kingdom). We use growth differential, inflation differential and Global Economic Policy Uncertainty as control variables. We construct indices to aggregate market valuation for both financial center and ASEAN using weighted average method with constant market capitalization.

Our empirical modelling is inspired by Tam and Tam (2012). This study uses an empirical model of aggregate valuation (ASEAN-FC Level) and country valuation. The aggregate valuation model to see the aggregate integration of the Financial Center's valuation to ASEAN's valuation. The country level is important to see which financial center country units have integration with ASEAN countries, so it can be seen which of the four financial center countries in this study are integrated with ASEAN countries bivariately.

In this study, there are 2 sets of regression estimates for ASEAN-FC level model and 48 sets of regression estimates for country level model. ASEAN-FC level model consists of 1 PE regression and 1 PB regression. There are 40 regressions Country-FC level (4 FC × 5 ASEAN × 2 valuation proxies: PE and PB). The country level model also includes relationship of each Financial Center countries to the ASEAN aggregate which consists of 8 regression estimates (4 FC × ASEAN × 2 valuation proxies). Therefore, there are 48 regression estimates. The short run equation for this valuation model are given by:

$$\Delta VAL\_ASEAN_t = \alpha_1 + \alpha_1 \Delta VAL\_FC_t + \alpha_2 DIFG\_ASEAN\_FC_t + \alpha_3 DIFINF\_ASEAN\_FC_t + \alpha_4 \Delta GEPU_t + \delta e_{t-1} + \varepsilon_t \quad \ldots(1)$$

The short-term coefficients are denoted by α's while the long-term coefficients are denoted by β's. Error correction term (ECT) coefficient (δ) measures how long it takes to adjust for new equilibrium value after an occurrence of a shock. This coefficient must be negative with absolute value less than one and statistically significant. In this study, we looked at the short-run relationship using only the ECT coefficient. Long run relationship equation of valuation model inspired by Tam and Tam (2012) is as follows:

$$VAL\_ASEAN_t = \beta_0 + \beta_1 VAL\_FC_t + \beta_2 DIFG\_ASEAN\_FC_t + \beta_3 DIFINF\_ASEAN\_FC_t + \beta_4 GEPU_t + e_t$$

Where:

$VAL\_ASEA_N t$: stock valuation PE and PB of ASEAN countries

α_0 : intercept

$\alpha_1, \alpha_2, \alpha_3, \alpha_4$: short run relationship parameters

$\beta_1, \beta_2, \beta_3, \beta_4$: long run relationship parameters

VAL_{FC}: aggregate stock valuation of Financial Center countries

DIFG_ASEAN_FC: difference growth of ASEAN FC

DIFG_INFASEAN_FC: difference inflation of ASEAN FC

GEPU: global economic policy uncertainty index

e_t: error term or residuals

Variables Description

Variables Description can be seen in Table 1.

We perform the following five steps of analysis:

1. Descriptive Statistics

Descriptive statistics are used to provide an overview or description of the data. If the standard deviation of a variable is getting higher, then the data in that variable is more spread out from its mean value, indicating that the data is heterogeneous and vice versa. Variables containing outliers are data whose value is greater than the mean + (2 × standard deviation) or data whose value is less than the mean – (2 × standard deviation).

2. Unit Root Test

Stationarity test is used to determine whether the data is stationary or not. Non stationary data can be determined from the absolute value of Augmented Dickey Fuller (ADF) statistics < MacKinnon's critical value, and can also be seen from the probability value > alpha 0.05, and vice versa (Bhattacharjee and Das 2021; Selvaraj, 2021; ÖZYEŞİL, 2021).

3. Lag Optimum

Lag can be defined as the time required to generate a response (Y) due to an influence (action or decision). Selection of the right lag for the model can be done using the basis of Akaike Information Criteria (AIC) or using other criteria information. A good model has the smallest criterion information value. The ARDL model with the most negative AIC value is selected for further analysis (Bhattacharjee and Das 2021).

4. Bound Test

This test is conducted to determine the existence of a long-term relationship (cointegration) and causality between the variables used in the model. Cointegration Bound Test method with ARDL

Table 1: Variables Description

The variables in this study consisted of 12 dependent, 10 independent, and 51 control variables

Variable	Variable Code		Description
Dependent Variable of Aggregate Valuation	VAL_ASEAN: PE_ASEAN PB_ASEAN		Stock market valuation data from bloomberg.com. Aggregated valuation is Calculated using a weighted average valuation: $VAL_{ASEANFC} = \frac{\sum_{i=1}^{n} x_i w_i}{\sum_{i=1}^{n} w_i}$ where x_i is stock market valuation to i, w_i is weight of market capitalization to i base on constant 2010 and 2021 US dollars from source bloomberg.com. Then n is number of data to i
Independent Variable of Aggregate Valuation	VALFC: PE_FC PB_FC		
Dependent Variable of Country Valuation	PE_JCI PB_JCI PE_FBMKLCI PB_FBMKLCI PE_STI PB_STI PE_SET PB_SET PE_VNINDEX PB_VNINDEX		PE valuation data for each country are obtained from the source of bloomberg.com. ***Calculated PE Ratio:*** $PE_{i,t} = \frac{P_{i,i}}{EA_{i,t}}$ where for each time period, the stock market of current price by $P_{i,i}$ and earnings of the stock market by $EA_{i,t}$..
Independent Variable of Country Valuation	PE_SPX PB_SPX PE_SHCOMP PB_SHCOMP PE_NKY PB_NKY PE_UKX PB_UKX		PE valuation data for each country are obtained from the source of bloomberg.com. ***Calculated PB Ratio:*** $PB_{i,t} = \frac{P_{i,i}}{BV_{i,t}}$ where for each time period, the stock market of current price by $P_{i,i}$ and BVt is the book value of the stock market.
Control Variable of Dif macro and GEPU	DIFG_ASEAN_FC DIFINF_ASEAN_FC DIFG_ASEAN_US DIFG_ASEAN_CN DIFG_ASEAN_JP DIFG_ASEAN_UK DIFINF_ASEAN_US DIFINF_ASEAN_CN DIFINF_ASEAN_JP DIFINF_ASEAN_UK GEPU, DIFG_ID_US DIFG_ID_CN DIFG_ID_JP DIFG_ID_UK DIFG_MY_US DIFG_MY_CN DIFG_MY_JP DIFG_MY_UK DIFG_SG_US DIFG_SG_CN DIFG_SG_JP DIFG_SG_UK DIFG_TH_US DIFG_TH_CN DIFG_TH_JP	DIFG_TH_UK DIFG_VN_US DIFG_VN_CN DIFG_VN_JP DIFG_VN_UK DIFINF_ID_US DIFINF_ID_CN DIFINF_ID_JP DIFINF_ID_UK DIFINF_MY_US DIFINF_MY_CN DIFINF_MY_JP DIFINF_MY_UK DIFINF_SG_US DIFINF_SG_CN DIFINF_SG_JP DIFINF_SG_UK DIFINF_TH_US DIFINF_TH_CN DIFINF_TH_JP DIFINF_TH_UK DIFINF_VN_US DIFINF_VN_CN DIFINF_VN_JP DIFINF_VN_UK	Macroeconomics in this study are GDP growth and inflation from source of worldbank.com. As For GEPU index from policyuncertainty.com. Where t is time period, and t–1 is time period previously. *Aggregated is Calculated using a weighted average:* $MacroGINF_t = \frac{\sum_{i=1}^{n} x_i w_i}{\sum_{i=1}^{n} w_i}$ Where x_i is growth and inflation to i. w_i is weight of GDP real to i base on constant 2010 and 2021 US dollars from source of worldbank.com. Then is calculated difference of macroeconomics ASEAN and FC. $difmac_t = \sum_{i=1}^{n} (macASEAN - macFC)$ Where $difmac_i$ is difference of macroeconomics, $macASEAN$ is macroeconomics of ASEAN to i, and then $macASEAN$ is macroeconomics of FC to i.

approach was introduced by Pesaran *et al.* (2001). This method is carried out by comparing the calculated F-statistic value with the critical value compiled by Kripfganz and Scheneider (2018). If the F-statistic value obtained from the computational results of the Bound Test is greater than the upper critical value I(1), H_0 is rejected, and there is a long-term relationship or cointegration in the model. If the F-statistic value is below the lower critical value I(0), H_0 is not rejected, and there is no long-term relationship or cointegration in the model (Bhattacharjee dan Das 2021).

ECM estimation

ECM is a dynamic linear model to correct imbalances. The important thing in estimating the ECM model is that the error correction term (ECT) must be negative with absolute value less than one. A negative and statistically significant ECT value indicates that the estimated model is valid, and a long-term relationship between the estimated variable exists. The ECT indicates the speed of adjustment and demonstrates the speed at which the variable returns to long-run equilibrium.

EMPIRICAL RESULTS AND DISCUSSION

Descriptive Statistics and Unit Root Test

We winsorize variables that contain outliers (data whose value is greater than Mean +/- 2 × standard deviation). Descriptive statistics can be seen in table 2 and table 3.

Based on the descriptive statistical table of stock market valuations in Table 2, data containing outliers include the PE_UKX variable with max > 2x standard deviation. We conduct winsor2 by replacing the min-max numbers with p1 and P95. This result shows that PE_UKX has the highest mean of 28.3 with a standard deviation of 30,849. This shows that the standard deviation value is greater than the mean, which indicates that the PE_UKX variable is heterogeneous. Meanwhile, PB_SHCOMP has the lowest mean of 2.673 with a standard deviation of 0.191. This shows that the standard deviation value is smaller than the mean, indicating that the PE_SHCOMP variable is homogeneous.

Table 2: Descriptive Statistics of ASEAN and FC Stock Market Valuation

Variable	Mean	Med.	S.D.	P1	P95	Min	Max	Obs.
PE_ASEAN	18.067	17.541	4.354	12.614	23.349	11.999	37.667	142
PE_FC	19.535	18.320	5.318	13.551	31.913	12.761	44.118	142
PB_ASEAN	2.844	2.834	0.193	2.486	3.133	2.442	3.570	142
PB_FC	2.919	2.895	0.196	2.600	3.344	2.538	3.488	142
PE_JCI	23.256	22.439	6.023	16.078	29.772	16.028	50.087	142
PE_FBMKLCI	17.482	17.074	1.997	14.508	22.023	14.417	24.412	142
PE_STI	13.926	12.446	6.444	7.699	22.998	7.620	57.283	142
PE_SET	18.030	17.591	4.494	11.559	24.223	10.661	38.632	142
PE_VNINDEX	14.088	14.181	2.746	8.760	18.092	8.639	21.421	142
PE_SPX	19.115	18.528	3.978	13.470	27.280	12.677	30.952	142
PE_SHCOMP	14.737	14.949	2.740	9.802	18.382	9.537	22.249	142
PE_NKY	20.894	20.045	5.053	14.779	33.222	14.739	39.284	142
PE_UKX	25.516	18.018	18.274	10.220	82.850	10.220	82.850	142
PB_JCI	3.121	3.111	0.218	2.777	3.394	2.774	3.914	142
PB_FBMKLCI	2.855	2.838	0.108	2.675	3.092	2.668	3.195	142
PB_STI	2.574	2.521	0.307	2.041	3.135	2.031	4.048	142
PB_SET	2.867	2.867	0.217	2.447	3.187	2.367	3.654	142
PB_VNINDEX	2.626	2.652	0.201	2.170	2.896	2.156	3.064	142
PB_SPX	2.931	2.919	0.197	2.600	3.306	2.540	3.432	142
PB_SHCOMP	2.673	2.705	0.190	2.283	2.911	2.255	3.102	142
PB_NKY	3.015	2.998	0.211	2.693	3.503	2.691	3.671	142
PB_UKX	3.094	2.891	0.597	2.324	4.417	2.256	5.448	142

Table 3: Descriptive Statistics of Control Variable

Variable	Mean	Med	S.D.	P1	P95	Min	Max	Obs.
DIFG_ASEAN_FC	0.971	1.368	1.266	-2.772	2.298	-2.878	3.312	142
DIFINF_ASEAN_FC	1.656	1.264	2.753	-2.317	7.981	-2.325	13.197	142
DIFG_ASEAN_US DIFG_	2.203	2.365	1.718	-3.089	4.402	-3.349	5.804	142
ASEAN_CN DIFG_ASEAN_	-2.964	-2.626	1.231	-5.697	-1.731	-5.709	-1.274	142
JP DIFG_ASEAN_UK	3.565	3.882	1.092	1.082	5.067	1.080	5.177	142
DIFINF_ASEAN_US	2.722	3.048	2.812	-10.511	6.602	-12.392	7.092	142
DIFINF_ASEAN_CN	1.696	1.135	3.134	-2.184	9.357	-2.185	14.166	142
DIFINF_ASEAN_JP DIFINF_	0.607	0.364	1.831	-1.717	2.738	-1.743	9.440	142
ASEAN_UKGEPU	3.526	2.840	4.148	-2.403	12.864	-2.422	16.820	142
DIFG_ID_US	1.674	1.387	4.029	-6.710	10.470	-6.720	13.947	142
	176.744	156.935	68.812	88.732	313.810	86.302	430.177	142
	2.585	2.843	1.689	-3.642	4.607	-4.066	4.705	142
DIFG_ID_CN	-2.582	-2.192	1.174	-4.896	-0.967	-4.906	-0.536	142
DIFG_ID_JP	3.946	4.162	1.264	0.823	6.173	0.143	6.518	142
DIFG_ID_UK	3.104	3.421	2.949	-11.065	7.259	-13.109	8.236	142
DIFG_MY_US	2.144	2.803	2.199	-3.077	4.372	-3.081	5.061	142
DIFG_MY_CN	-3.023	-2.385	2.004	-8.415	-1.042	-8.430	-0.572	142
DIFG_MY_JP	3.506	3.982	1.910	-1.622	5.718	-1.637	5.939	142
DIFG_MY_UK	2.663	3.049	2.502	-9.185	4.696	-10.518	5.957	142
DIFG_SG_US	2.190	1.933	2.995	-1.402	9.056	-1.406	14.577	142
DIFG_SG_CN	-2.977	-3.372	2.395	-6.986	2.311	-7.010	7.037	142
DIFG_SG_JP	3.552	2.966	2.596	-0.308	9.533	-0.318	11.818	142
DIFG_SG_UK	2.709	2.490	3.183	-3.992	9.318	-5.219	15.472	142
DIFG_TH_US	0.450	0.551	2.570	-4.308	5.193	-4.315	8.057	142
DIFG_TH_CN	-4.717	-4.119	2.547	-9.317	-0.427	-9.326	0.518	142
DIFG_TH_JP	1.812	1.799	1.994	-2.039	5.837	-2.056	6.286	142
DIFG_TH_UK	0.969	1.031	3.278	-11.730	6.066	-13.358	8.953	142
DIFG_VN_US	3.854	4.301	2.604	-8.979	6.214	-10.598	7.518	142
DIFG_VN_CN	-1.313	-0.567	2.181	-9.092	1.250	-10.048	1.876	142
DIFG_VN_JP	5.216	5.554	2.108	-2.876	7.535	-3.915	8.503	142
DIFG_VN_UK	4.373	4.490	4.381	-16.401	12.363	-19.641	13.755	142
DIFINF_ID_US	2.808	2.412	3.480	-1.936	10.785	-1.953	17.352	142
DIFINF_ID_CN	1.719	0.940	2.440	-1.596	4.597	-1.612	12.626	142
DIFINF_ID_JP	4.637	3.987	4.421	-2.172	14.292	-2.201	20.006	142
DIFINF_ID_UK	2.786	2.543	4.438	-6.461	12.324	-6.490	17.133	142
DIFINF_MY_US	0.443	0.218	2.315	-2.484	5.482	-2.488	6.645	142
DIFINF_MY_CN	-0.645	-0.996	1.552	-3.056	1.900	-3.060	3.291	142
DIFINF_MY_JP	2.273	0.930	3.509	-2.728	9.254	-2.756	13.163	142
DIFINF_MY_UK	0.421	0.064	3.571	-6.923	6.168	-6.934	15.031	142
DIFINF_SG_US	-0.817	-0.875	1.818	-4.508	2.202	-4.508	3.517	142
DIFINF_SG_CN	-1.906	-1.570	2.630	-7.464	3.017	-7.472	3.423	142
DIFINF_SG_JP	1.013	0.957	2.799	-4.728	4.069	-4.731	12.412	142
DIFINF_SG_UK	-0.839	-0.946	3.462	-9.033	2.894	-9.045	14.280	142
DIFINF_TH_US	-0.132	-0.258	1.486	-2.739	2.585	-2.746	3.173	142
DIFINF_TH_CN	-1.221	-1.263	1.688	-4.673	1.174	-4.687	1.685	142
DIFINF_TH_JP	1.698	1.771	2.451	-2.627	6.036	-2.632	7.307	142
DIFINF_TH_UK	-0.154	0.002	2.506	-7.006	2.823	-7.022	9.175	142
DIFINF_VN_US	5.382	1.391	11.024	-3.054	33.361	-3.068	48.860	142
DIFINF_VN_CN	4.294	0.731	9.138	-3.334	26.741	-3.811	44.134	142
DIFINF_VN_JP	7.212	3.300	11.805	-4.266	36.868	-4.292	51.514	142
DIFINF_VN_UK	5.360	11.096	-3.933	1.668	33.231	48.641	-3.952	142

Descriptive Statistics of Control Variable

Table 3 reports descriptive statistics of the control variables used in the study. The control variables in the table are defined as follows: (1) growth is the annual GDP growth rate; (2) inflation is the annual inflation rate; (3) GEPU index are expressed in US dollars and in monthly frequency. GDP Growth and inflation annual are expressed in percentage and interpolated into monthly data which is calculated the difference between each ASEAN countries and financial center. Aggregate difference of growth and inflation are based on weighted average difference, using real GDP as the weight based on the constant of US dollars in 2010 and 2021.

Based on Table 3, the highest mean is GEPU of 176,744 with a standard deviation of 68,812. This shows that the standard deviation value is smaller than the mean, which means that the GEPU variable is homogeneous. Meanwhile, DIFG_TH_CN has the lowest mean of -4.717 with a standard deviation of 2.547. This shows that the standard deviation value is greater than the mean, which means that the DIFG_TH_CN variable is heterogeneous.

Unit Root Test

Table 4: Unit Root Test Results

This table reports unit root test of the variables used in the study using Augmented Dickey Fuller Test.

Variable	ADF	Prob.	Description
PE_ASEAN	-2.597	0.0937	Non Stationary
PE_FC	-1.852	0.3550	Non Stationary
PB_ASEAN	-2.109	0.2410	Non Stationary
PB_FC	-1.497	0.5350	Non Stationary
PE_JCI	-2.537	0.1067	Non Stationary
PE_FBMKLCI	-2.229	0.1958	Non Stationary
PE_STI	-3.586	0.0060	Stationary
PE_SET	-2.502	0.1149	Non Stationary
PE_VNINDEX	-1.801	0.3802	Non Stationary
PE_SPX	-1.059	0.7312	Non Stationary
PE_SHCOMP	-3.193	0.0204	Stationary
PE_NKY	-4.017	0.0013	Stationary
PE_UKX	-2.902	0.0451	Stationary
PB_JCI	-4.597	0.0001	Stationary
PB_FBMKLCI	-1.181	0.6818	Non Stationary
PB_STI	-2.037	0.2708	Non Stationary
PB_SET	-2.382	0.1467	Non Stationary
PB_VNINDEX	-1.624	0.4705	Non Stationary
PB_SPX	-0.369	0.9151	Non Stationary
PB_SHCOMP	-3.116	0.0254	Stationary
PB_NKY	-1.758	0.4013	Non Stationary
PB_UKX	-3.239	0.0178	Stationary
DIFG_ASEAN_FC	2.428	0.9990	Non Stationary
DIFINF_ASEAN_FC	-9.661	0.0000	Stationary
DIFG_ASEAN_US	3.965	1.0000	Non Stationary
DIFG_ASEAN_CN	-1.366	0.5986	Non Stationary
DIFG_ASEAN_JP	-1.204	0.6718	Non Stationary
DIFG_ASEAN_UK	6.486	1.0000	Non Stationary
DIFG_ASEAN_FC	2.428	0.9990	Non Stationary
DIFINF_ASEAN_FC	-9.661	0.0000	Stationary
DIFG_ASEAN_US	3.965	1.0000	Non Stationary
DIFG_ASEAN_CN	-1.366	0.5986	Non Stationary
DIFG_ASEAN_JP	-1.204	0.6718	Non Stationary
DIFG_ASEAN_UK	6.486	1.0000	Non Stationary
DIFINF_ASEAN_US	-12.689	0.0000	Stationary
DIFINF_ASEAN_CN	-7.779	0.0000	Stationary
DIFINF_ASEAN_JP	-3.520	0.0075	Stationary
DIFINF_ASEAN_UK	-1.162	0.6897	Not Stationary
GEPU	-3.063	0.0294	Stationary
DIFG_ID_US	8.324	1.0000	Non Stationary
DIFG_ID_CN	-1.581	0.4929	Non Stationary
DIFG_ID_JP	-2.929	0.0421	Stationary
DIFG_ID_UK	7.912	1.0000	Non Stationary
DIFG_MY_US	-0.264	0.9304	Non Stationary
DIFG_MY_CN	-0.979	0.7609	Non Stationary
DIFG_MY_JP	-1.182	0.6813	Non Stationary
DIFG_MY_UK	10.612	1.0000	Non Stationary
DIFG_SG_US	-10.750	0.0000	Stationary
DIFG_SG_CN	-3.305	0.0147	Stationary
DIFG_SG_JP	-1.796	0.3824	Non Stationary
DIFG_SG_UK	-3.865	0.0023	Stationary
DIFG_TH_US	-2.379	0.1478	Non Stationary
DIFG_TH_CN	-2.184	0.2120	Non Stationary
DIFG_TH_JP	-1.953	0.3076	Non Stationary
DIFG_TH_UK	1.492	0.9975	Non Stationary
DIFG_VN_US	10.851	1.0000	Non Stationary
DIFG_VN_CN	5.087	1.0000	Non Stationary
DIFG_VN_JP	2.358	0.9990	Non Stationary
DIFG_VN_UK	6.847	1.0000	Non Stationary
DIFINF_ID_US	-10.414	0.0000	Stationary
DIFINF_ID_CN	-6.766	0.0000	Stationary
DIFINF_ID_JP	-3.812	0.0028	Stationary
DIFINF_ID_UK	-1.510	0.5285	Non Stationary
DIFINF_MY_US	-2.260	0.1852	Non Stationary
DIFINF_MY_CN	-0.330	0.9212	Non Stationary
DIFINF_MY_JP	1.058	0.9948	Non Stationary

DIFINF_MY_UK	2.476	0.9990	Non Stationary
DIFINF_SG_US	-0.047	0.9545	Non Stationary
DIFINF_SG_CN	-0.511	0.8899	Non Stationary
DIFINF_SG_JP	3.082	1.0000	Non Stationary
DIFINF_SG_UK	3.026	1.0000	Non Stationary
DIFINF_TH_US	-2.214	0.2014	Non Stationary
DIFINF_TH_CN	-0.853	0.8030	Non Stationary
DIFINF_TH_JP	-0.129	0.9465	Non Stationary
DIFINF_TH_UK	1.654	0.9980	Non Stationary
DIFINF_VN_US	-20.871	0.0000	Stationary
DIFINF_VN_CN	-18.690	0.0000	Stationary
DIFINF_VN_JP	-16.475	0.0000	Stationary
DIFINF_VN_UK	-15.368	0.0000	Stationary

Table 4 shows valuation variables of 7 stationary variables and 15 non-stationary variables at the level. Meanwhile, the control variables consist of 16 stationary variables and 35 non-stationary variables at the level. Overall, there are 25 stationary variables and 48 non-stationary variables.

Table 5: ASEAN-FC Long Run Estimates

Variable	PE ASEAN	PB ASEAN
FC	0.683***	0.890***
	(0.104)	(0.259)
ADIFG_ASEAN_FC	-0.042	-0.004
	(0.415)	(0.039)
ADIFINF_ASEAN_FC	-0.242	-0.008
	(0.209)	(0.018)
GEPU	-0.001	-0.000
	(0.001)	(0.001)
ECT	-0.356***	-0.147***
	(0.071)	(0.051)
Bound Test	6.385***	2.260
R Square	0.472	0.469
O. Lag	(1,4,0,0,1)	(4,1,0,0,3)

*Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels,respectively, O. Lag is Optimum lag.*

From Table 5, our study shows some interesting relationships. The results of the ASEAN-FC Aggregate research show that the PE and PB financial center valuations have a positive and very significant long-term relationship to the ASEAN PE and PB valuations. These results support the research of Tam and Tam (2012) which argued that the valuation of developed countries has a long-term relationship with the valuation of developing countries in the aggregate, but does not support that of Bekaert *et al.* (2007) and King and Segal (2011) who claimed that the international index valuation is segmented. A positive integration relationship can reduce the benefits of international diversification. It is necessary to develop appropriate diversification strategies by looking at country-level valuations and expose countries in the region to increased contagion risk.

Based on the Bound test or F test, the financial center's PE valuation model shows that the independent variables together have a very significant effect (at alpha 1%) on the ASEAN PE valuation. This is different from the financial center's PB valuation model that shows that the independent variables together have no significant effect on the ASEAN PB valuation. Thus, from the results of the partial and simultaneous significance tests above, it can be stated that the financial center PE valuation variables, i.e., changes in ASEAN-FC GDP, changes in ASEAN-FC inflation and GEPU, have a long-term effect on ASEAN PE valuations, while the PB valuation estimation model shows no relationship.

Furthermore, it was also found that the two coefficients of PE and PB in the ASEAN-FC aggregate showed a positive significance but were less responsive (less than 1 equals less responsive). However, the PB response in this aggregate model is greater than the PE response. This shows that in the long term, the PB valuation of financial center is appreciated by 1%, and the ASEAN PB responds to an increase of 0.890%. This also applies to the PE valuation of financial center, which, if appreciated by 1%, will garner an increased response of 0.683% from the ASEAN PB.

The ECT values in both the PE and PB models above are highly significant (at alpha 1%) and the ECT coefficient is less than -1 so that the requirements for the ECM method have been met and the model is valid. This shows that if there is disequilibrium of 1% in the past, then ASEAN PE will adjust to a decrease of -0.356% while ASEAN PB will adjust to a decrease of -0.147%. Therefore, it can be interpreted that the ASEAN PE adjustment process towards the long term takes 3 months, while the ASEAN PB takes 7 months, to achieve the full balance of the ASEAN valuation changes. Thus, ASEAN PB has a longer adjustment duration than ASEAN PE.

This contrasts the results of the control variable in the ASEAN-FC Aggregate, which shows no long-term relationship and is not significant in the ASEAN valuation. The results of the test of the difference between GDP growth and inflation of ASEAN-FC do not support the research of Salamat *et al.* (2021), Setiawan *et al.* (2019), Acha and Akpan (2019) and Verma and Bansal (2021). The GEPU index does not support the research of Li & Peng (2017), Alqathani & Martinez (2020), Thomas C. Chiang (2019) and Istiak & Alam (2020). It is interesting to see the effect of the control variable at country level.

Country Level Long Run Estimates

This country level result shows that ECT coefficients is valid and significant in every country regression (can be seen in the table 8). This is an important finding in our study; there is an Error correction adjustment mechanism among stock market valuation (i.e., they are integrated). Certainly, this finding should be further confirmed by significant corresponding stock market valuation. The following is a country level ECT summary table.

Table 6: Summary Results of Country Valuation Error Correction Term (ECT)

Market Valuation	US		China		Japan		UK	
	PE	PB	PE	PB	PE	PB	PE	PB
ASEAN	5	7	6	8	5	7	5	7
Indonesia	3	4	6	7	6	8	4	4
Malaysia	7	7	6	7	6	6	9	8
Singapore	4	8	10	14	5	8	4	7
Thailand	6	6	8	7	5	4	4	5
Vietnam	1	11	9	10	16	10	11	10

Table 6 reports the summary of ECT between ASEAN and country level stock market valuation with Financial Center (US/China/Japan/UK). The adjustment period is expressed in months.

From table 6, we can see the results of the ECT summary which shows that there are variations in the market adjustment process. The ECT value in the country level research model shows that the overall model is significant with a number less than -1, meaning that the requirements for the ECM method have been met and all models are valid. The longest duration for the long-term adjustment process of country level valuation lies in Vietnam's valuation, with a duration of 16 months against the Japan valuation. The adjustment period of Vietnam's valuation relations with other Financial Center valuations takes a long time, with a duration of 9-11 months for Chinese valuations and UK valuations. On the contrary, Indonesia has the fastest adjustment process of index valuation towards the long term, which is 3-4 months on US and UK valuations.

Thailand has the fastest duration of valuation adjustment in Japan and UK valuations, with 4-5 months to achieve full balance of changes in Thailand's index valuation. Meanwhile, the Malaysian valuation has a long enough duration of 6-8 months to achieve a full balance of changes in the Financial Center index valuation, with UK valuation having the longest duration. The results of the overall ECT model in the country level show that the ECT coefficient value of the PE valuation is greater than the ECT coefficient of the PB valuation, so that the PE ratio has the fastest adjustment process towards the long term. Furthermore, it is interesting to see the long-term relationship between country valuations.

Table 7: Summary Results of Long Run Country Valuation

Market Valuation	US		China		Japan		UK	
	PE	PB	PE	PB	PE	PB	PE	PB
ASEAN	+	+	NS	NS	+	+	+	+
Indonesia	+	+	+	NS	+	+	+	+
Malaysia	NS	NS	NS	NS	NS	NS	NS	NS
Singapore	+	-	NS	NS	+	+	+	+
Thailand	+	+	NS	NS	+	+	+	NS
Vietnam	+	NS	NS	NS	NS	NS	NS	NS

The sign + means positive and significant relationship; - means negative and significant relationship and NS: Not significant.

From Table 7, we can see index valuation variables in the US, Japan, and UK have a positive and very significant long-term relationship to ASEAN index valuation. These results support the research of Tam and Tam (2012) arguing that US, Japanese and UK valuations have a long-term relationship with developing country valuations, but do not support the research of Bekaert *et al.* (2007) and King and Segal (2011) who argued that the international index valuation is segmented.

This is different from the results of China's index valuations, which demonstrate no long-term and insignificant relationship with ASEAN's index valuations. These results support the research of Bekaert *et al*. (2007) and King and Segal (2011) who argued that the international index valuation is segmented. It will be interesting to see which financial countries exert influence on each ASEAN country as seen in Table 6.

The country-level valuation test shows that the index valuations of the US, Japan, and UK countries have a positive and significant long-term relationship with the index valuations of Indonesia, Singapore, and Thailand. These results support the research from Tam and Tam (2012), Feldmann and Laosirirat (2015), Eun and Lee (2010) that showed a long-term relationship between index valuations. This positive pattern of relations reduces the benefits of international diversification in positively integrated countries.

From table 8, we can see the result which shows that there are differences to the index valuations to the index valuations from the financial center in China, that does not have a long-term relationship with all ASEAN countries. It is interesting to see that there are two valuations from ASEAN countries, namely Malaysia and Vietnam, which are not influenced by any Financial Center. This is in line with the research of Bekaert *et al.* (2007) and King and Segal (2011) who argued that the international index valuation is segmented, and does not support research from Tam and Tam (2012), Feldmann and Laosirirat (2015), Eun and Lee (2010).

The results of the Bound Test or F test demonstrates that the results of long-term relationships that vary between models (can be seen in the table 8). This is because not all independent variables have a long-term relationship with ASEAN PE and PB valuations. As we can see, the valuation variable shows a lot of significance, but not the control variable.

In the long term, the control variables of the difference in GDP and inflation between the ASEAN financial center and GEPU have no relationship and are not significant to the ASEAN PE and PB in the aggregate. This means that there is no long-term relationship between macro variables and ASEAN PE and PB. The results of the test of the difference between GDP growth and inflation do not support the research of Salamat *et al.* (2021), Setiawan *et al.* (2019) Acha and Akpan (2019) and Verma and Bansal (2021). The GEPU index does not support the research of Li & Peng (2017), Alqathani & Martinez (2020) Thomas (2019) and Istiak & Alam (2020).

The GEPU index has a significant positive effect on the valuations of the countries of Indonesia, Malaysia, and Thailand. This suggests that when there is uncertainty in global economic policies, it will affect increasing stock market valuations of ASEAN countries. This is due to the shift in investment to ASEAN countries from the influence of GEPU. The effect of GEPU is in line with research of Alqathani and Martinez (2020), Li and Peng (2017), Thomas (2019) and Istiak and Alam (2020).

The effect of the difference in inflation between Japan and Indonesia, Malaysia, and Thailand shows a significant negative relationship in the long term. The difference in growth between Japan and Singapore has a negative influence, which is in line with the research of Salamat *et al.* (2021), Setiawan *et al.* (2019), Bekaert *et al.* (2007), Acha and Akpan (2019) and Verma and Bansal (2021), while in Thailand it has a positive influence. This shows that the Japanese economy has a strong influence on the valuations of the three ASEAN countries. The extent of asymmetric integration between markets can be caused by certain characteristics of each country, such as local risk, degree of openness, growth potential, and the relationship between economies.

This valuation model uses a proxy of the PE and PB ration using market index data. This interpretation requires credence in the simplest form of residual income theory, where the price-earnings ratio measures risk-adjusted returns with a suitable interpretation of the firm's asset value. The market-book ratio then reflects various sources of uncertainty about the true rate of return, including the extent to which the market believes that accounting practices reflect realistic values for income and assets. These two ratios of PE and PB are used as a robustness check at the ASEAN market index and financial center levels.

This study includes time-variable investigations, which provide a better understanding of integration than static assessments. Based on several dimensions in our analysis, the influence of financial centers has

Table 8: Result of Long Run Country Valuation

This long run result table of the variables used in the study

FC	Variable	ASEAN		Indonesia		Malaysia		Singapore		Thailand		Vietnam	
		PE	PB	PE	PB	PE	PB	PE	PB	PE	PB	PE	PB
US	SPX	1.237***	0.615**	1.626***	1.101***	0.091	0.194	1.602***	- 1.040**	0.775***	0.534*	0.634**	0.446
		(0.332)	(0.275)	(0.318)	(0.263)	(0.206)	(0.191)	(0.302)	(0.527)	(0.279)	(0.281)	(0.266)	(0.476)
	DIFG	1.056	0.011	0.868	0.025	0.229	0.023	0.181	0.000	0.452	0.026	-0.228	0.019
		(0.878)	(0.037)	(0.696)	(0.029)	(0.392)	(0.019)	(0.466)	(0.033)	(0.394)	(0.020)	(0.339)	(0.052)
	DIFINF	-0.143	-0.012	-0.218	-0.006	-0.246	-0.013	-1.349**	-0.075	-0.929	-0.065*	-0.051	-0.012
		(0.344)	(0.016)	(0.290)	(0.013)	(0.224)	(0.012)	(0.649)	(0.051)	(0.726)	(0.036)	(0.080)	(0.008)
	GEPU	-0.006	0.000	-0.025**	-0.001*	0.009	0.000	-0.031	-0.000	-0.008	0.000	-0.016	-0.001
		(0.013)	(0.001)	(0.011)	(0.000)	(0.008)	(0.000)	(0.019)	(0.002)	(0.148)	(0.001)	(0.014)	(0.001)
	ECT	-0.185***	-0.152***	-0.294***	-0.231***	-0.145***	-0.149***	-0.265***	-0.118**	-0.168***	-0.158***	-0.888**	-0.093**
		(0.057)	(0.055)	(0.064)	(0.057)	(0.045)	(0.044)	(0.077)	(0.051)	(0.047)	(0.046)	(0.036)	(0.027)
	Bound Test	2.680	2.882	4.565**	3.902*	2.578	2.739	2.510	2.046	2.817	2.991	1.997	1.617
	R Square	0.409	0.409	0.425	0.331	0.369	0.339	0.399	0.320	0.432	0.368	0.239	0.291
	O. Lag	(1,3,0,0,0)	(4,1,0,0,1)	(4,3,0,0,0)	(4,1,0,0,0)	(4,4,3,0,0)	(4,4,3,0,0)	(2,3,0,0,0)	(2,2,0,0,1)	(2,2,0,0,2)	(2,1,0,0,2)	(1,1,0,0,0)	(1,1,4,0,0)
	SHCOMP	0.325	0.075	0.866*	0.436	0.091	0.085	1.285	0.176	0.371	0.145	0.634	0.475
		(0.354)	(0.228)	(0.452)	(0.274)	(0.159)	(0.132)	(1.320)	(0.802)	(0.415)	(0.257)	(0.422)	(0.398)
	DIFG	-0.813	-0.020	-0.570	-0.014	-0.028	0.000	-3.175	-0.141	-0.480	-0.012	-0.444	-0.017
		(0.756)	(0.033)	(1.043)	(0.044)	(0.236)	(0.014)	(2.721)	(0.121)	(0.460)	(0.019)	(1.022)	(0.071)
	DIFINF	0.821	0.059	0.921	0.036	-0.296	-0.019	-0.889	-0.025	0.962	0.052*	0.278	0.016
		(0.838)	(0.038)	(0.761)	(0.033)	(0.288)	(0.017)	(1.368)	(0.064)	(0.698)	(0.029)	(0.259)	(0.018)
CN	GEPU	0.049**	0.003***	0.054**	0.002*	0.013*	0.001	0.054	0.004	0.046**	0.002***	-0.001	-0.000
		(0.019)	(0.001)	(0.024)	(0.001)	(0.008)	(0.000)	(0.050)	(0.003)	(0.018)	(0.001)	(0.015)	(0.001)
	ECT	-0.159***	-0.122***	-0.173***	-0.136***	-0.154***	-0.143***	-0.101*	-0.067*	-0.128***	-0.140***	-0.106***	-0.104***
		(0.038)	(0.029)	(0.037)	(0.034)	(0.044)	(0.043)	(0.053)	(0.035)	(0.038)	(0.040)	(0.036)	(0.035)
	Bound Test	4.523**	5.116***	5.179***	3.619*	2.953	2.669	3.102	3.682*	2.794	3.112	3.005	3.044
	R Square	0.266	0.311	0.216	0.206	0.303	0.281	0.268	0.260	0.270	0.283	0.223	0.253
	O. Lag	(4,1,0,0,1)	(4,1,0,0,1)	(4,0,0,0,1)	(4,1,0,0,1)	(4,1,0,0,4)	(4,1,0,0,4)	(3,1,0,0,1)	(2,1,0,0,1)	(2,1,0,0,2)	(2,1,0,0,4)	(1,1,4,4,0)	(1,1,4,3,0)

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Table 8 (*Continued*)

FC	Variable	ASEAN		Indonesia		Malaysia		Singapore		Thailand		Vietnam	
		PE	PB	PE	PB	PE	PB	PE	PB	PE	PB	PE	PB
	NKY	0.727***	0.938*	1.140**	0.838*	-0.027	-0.114	1.524***	1.887***	0.632***	0.544***	0.254	0.190
		(0.264)	(0.497)	(0.491)	(0.493)	(0.133)	(0.188)	(0.445)	(0.547)	(0.194)	(0.170)	(0.325)	(0.328)
	DIFG	0.281	0.035	-0.137	-0.023	-0.348	-0.028	-1.588	-0.082*	0.297	0.023*	-0.894	-0.022
		(1.014)	(0.069)	(1.440)	(0.058)	(0.429)	(0.027)	(0.845)	(0.044)	(0.339)	(0.014)	(0.718)	(0.030)
	DIFINF	-0.568**	-0.033**	-0.724	-0.052***	-0.228*	-0.012	0.415	0.016	-0.946***	-0.057***	-0.145	0.004
		(0.243)	(0.013)	(0.423)	(0.019)	(0.125)	(0.008)	(0.672)	(0.037)	(0.274)	(0.011)	(0.114)	(0.010)
JP	GEPU	0.027**	0.002**	0.020	0.000	0.013	0.001	0.031	0.002**	0.019*	0.001**	0.014	0.000
		(0.012)	(0.001)	(0.021)	(0.001)	(0.009)	(0.001)	(0.021)	(0.001)	(0.010)	(0.000)	(0.020)	(0.001)
	ECT	-0.211***	-0.146***	-0.158***	-0.121***	-0.166***	-0.156***	-0.214***	-0.133***	-0.218***	-0.244***	-0.061***	-0.097***
		(0.047)	(0.044)	(0.042)	(0.038)	(0.050)	(0.050)	(0.051)	(0.034)	(0.045)	(0.048)	(0.032)	(0.035)
	Bound Test	7.238***	8.197***	5.646***	6.536***	3.131	3.090	9.220***	8.688***	8.119***	8.462***	1.539	2.366
	R Square	0.377	0.405	0.289	0.237	0.382	0.362	0.411	0.361	0.403	0.404	0.118	0.159
	O. Lag	(1,4,2,0,1)	(4,3,2,0,1)	(1,4,1,0,1)	(1,0,2,0,1)	(4,3,1,1,4)	(4,4,1,1,4)	(3,3,0,0,1)	(2,3,0,0,1)	(2,3,0,1,2)	(2,3,0,2,2)	(1,1,0,0,1)	(1,1,0,3,1)
	UKX	0.234***	0.170**	0.337***	0.333***	-0.008	0.023	0.389***	0.389***	0.146***	0.110	0.967	0.170
		(0.047)	(0.081)	(0.060)	(0.060)	(0.036)	(0.056)	(0.080)	(0.138)	(0.044)	(0.071)	(0.074)	(0.127)
	DIFG	0.013	0.060	-0.053	-0.005	0.171	0.006	0.057	0.002	0.174	0.016	-0.199	-0.010
		(0.318)	(0.041)	(0.417)	(0.015)	(0.259)	(0.014)	(0.456)	(0.030)	(0.253)	(0.014)	0.466	(0.026)
	DIFINF	-0.034	0.001	0.043	-0.001	-0.028	-0.001	-0.343	-0.041	-0.860**	-0.047**	-0.155*	-0.013
		(0.263)	(0.015)	(0.362)	(0.013)	(0.196)	(0.011)	(0.400)	(0.029)	(0.366)	(0.021)	(0.100)	(0.007)
UK	GEPU	0.008	0.000	-0.002	-0.000	0.014	0.000	0.001	0.001	-0.004	0.000	-0.000	0.000
		(0.012)	(0.001)	(0.016)	(0.001)	(0.008)	(0.001)	(0.018)	(0.001)	(0.011)	(0.001)	(0.015)	(0.001)
	ECT	-0.201***	-0.138***	-0.228***	-0.225***	-0.113***	-0.120***	-0.249***	-0.142***	-0.233***	-0.195***	-0.089***	-0.097***
		(0.056)	(0.051)	(0.060)	(0.062)	(0.038)	(0.040)	(0.057)	(0.047)	(0.051)	(0.047)	(0.032)	(0.032)
	Bound Test	4.227**	4.723***	4.353***	4.044**	3.224	2.268	7.967***	3.831*	5.377***	4.118**	2.149	2.292
	R Square	0.459	0.436	0.387	0.370	0.472	0.417	0.474	0.368	0.340	0.352	0.182	0.217
	O. Lag	(1,4,0,0,1)	(1,4,0,3,2)	(1,4,0,0,1)	(1,4,0,0,1)	(1,4,0,0,0)	(1,4,0,0,4)	(2,3,0,0,1)	(2,4,0,1,1)	(2,3,0,2,2)	(2,4,0,2,2)	(1,0,4,0,0)	(1,0,4,0,0)

*Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively, O. Lag is Optimum lag.*

an impact on the ASEAN market during the study period. However, our research concentrates on the effect of financial center integration in terms of market valuation. In order to understand the overall effect of integration in ASEAN, our literature review provides some contradictory and supportive evidence about the influence of financial centers in different dimensions.

The results of this study are in line with the research of Tam and Tam (2012) which shows that differences in integration between countries are caused by the fact that different valuation ratios are reactive from a collection of similar but not exactly the same valuation fundamentals. With more intensive market integration, individual valuation fundamentals across markets are becoming increasingly driven by global common factors, and there is a tendency for the same valuation fundamentals to converge across markets. However, different bases converge at varying speeds due to heterogeneous transition dynamics of different markets, giving rise to conflicting evidence for market integration across different valuation ratios. Overall, with the start of the ASEAN and financial center integration process, we provide evidence that ASEAN corporate values are becoming more integrated with financial center fundamentals under our conceptual and integrated valuation framework.

The aggregate ASEAN-FC level, the results show that ASEAN-FC valuation market are cointegrated. This implies the operation of the law of one price (LOOP). As a result, the potential of international investors for obtaining abnormal profits through portfolio diversification is limited in the long-run. So it is important to look at the relationship between countries which show a varied relationships. ASEAN market valuation that is integrated in the long term with the Financial Center market valuation because abnormal profits will be arbitraged away in the long-run. The coefficients of ECM indicate that the speed of adjustment is slow in several countries which means the short-term can last for a longer period, and there is a high possibility of achieving arbitrage profits as the LOOP may not hold. Malaysia and Vietnam are not affected by any Financial Center. China does not seem to affect ASEAN countries as Financial Center. This means that there is no long-run impact from Financial Center valuation markets towards these valuation markets. Based on these results, there are opportunities for international investors to obtain long-run gains through international portfolio diversification in Malaysia, Vietnam and China valuation markets.

In the long run, integration will result in a larger and more diverse market with a pool of investors. Policymakers and regulators can rely on these results to improve stock market valuations. Thus, the empirical findings in this study have important implications for international investors to design appropriate international diversification strategies and coordinated inter-market monetary policies, and are also useful for academics and policy makers in ASEAN markets and the Financial Center.

CONCLUSION

This paper contributes to existing stock market integration literature by investigating the important issues of stock market valuation across Financial Centers and ASEAN markets in the midst of the ongoing globalization process. We formulate a unified conceptual framework that embeds global common factors across markets by synthesizing stock valuation models in finance. This study looks at the long-term relationship of the financial center stock market valuation to the stock market valuation of ASEAN countries by looking at the pattern of relationships in the aggregate market and between countries using the ARDL Error Correction method.

In aggregate level model, we find that there is a positive long-term relationship between the valuation of ASEAN and the financial center. Nevertheless, we do not find empirical support for the control variables. In country level model, we find rather varied results: it is country specific. Malaysia and Vietnam are not affected by any financial center. China does not seem to affect ASEAN countries as Financial Center even though its GEPU has an influence on the three ASEAN countries, namely Indonesia, Malaysia, and Thailand. The macroeconomic results of growth and inflation difference have no long-term relationship with ASEAN valuations.

The implications of these results are discussed on two levels: ASEAN-FC level model and the country level model. On ASEAN-FC level, the potential of international investors for obtaining abnormal profits through portfolio diversification is limited in

the long-run as abnormal profits will be arbitraged away. However, investors can still achieve arbitrage profits through portfolio diversification in the ASEAN-FC valuation markets in the short run. This depends on the speed of adjustment which is represented by the error correction model (ECM). On the country level, there are opportunities for international investors to obtain long-run gains through international portfolio diversification in the ASEAN-FC valuation markets. Also at the same time, investors have opportunities to obtain long-run gains through investing in segmented countries, namely China, Malaysia and Vietnam.

Our empirical investigation finds positive and highly significant dynamic relationships between ASEAN and Financial Center Stock Market Valuation. Nevertheless; our study does not provide sufficient theoretical and empirical answer for "why question" of this empirical phenomenon. Therefore, for future research we encourage ventures to be directed toward this avenue. We also find that macro-economic performance difference (inflation and growth) does not provide satisfactory explanatory power in most models i.e. their significance are weak. This finding warrants for further investigation.

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