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Effect of Geographical Diversification on Informational Efficiency in Malaysia

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Abstract
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Keywords: Informational efficiency, Price delay, Geographical diversification, Malaysia
JEL Classification: F23, G14, G15

1. Introduction

Over the past 25 years, the increasingly integrated capital markets and globalization have lowered the cost of companies doing business in foreign markets. Foreign investment made by corporations in the industrialized nations has grown dramatically. Firms prevalently adopt geographical diversification, similar business operations in different countries, as a main corporate strategy to gain competitive advantages (Barney and Hesterly, 2008; Chang and Wang, 2007; Hitt et al., 1997). For example, large publicly traded US and EU firms operate their businesses, on average, in more than three different geographic markets. (Bodnar et al., 1999; Pavelin & Barry, 2005).

This paper departs from the traditional focus of geographical diversification on benefits and costs of firm values to a relatively less explored area, the informational efficiency of stock markets. Market efficiency can be defined as the extent and speed of market prices of tradable assets incorporate available information. High market efficiency means the process of incorporating information into market prices is fast and complete.

Since the price delay measure has been proposed by Hou and Moskowitz (2005), a lot of studies have been done to investigate the determinants of the informational efficiency. For example, Callen et al. (2013) examine the effect of accounting quality on informational efficiency for stocks listed in CRSP across the period of 1981 to 2006. Chen and Rhee (2010), Boehmer and Wu (2013), and Saffi & Sigursson (2011) examine the relationship between short sales constraints and price discovery process at the firm level. Bae et al. (2012) examines the effect of

market liberalization on asymmetry informational market efficiency for 21 emerging stock markets.

Malaysia presents an interesting case study for geographical diversification related topic because, among ASEAN countries, Malaysia is the country with second largest outflows of foreign direct investments (OFDI) after Singapore. Besides that, Malaysia experiences high growth of foreign direct investment outflow during 2000s. OFDI from Malaysia exceeded inward flows for the first time in 2006. Since then Malaysia has emerged as a net investor with OFDI growing steadily, except in 2009, and OFDI flows have exceeded inward flows in each subsequent year. (ASEAN Investment Report 2012).

This study focuses on investigating the effect of geographical diversification on informational efficiency. Four different indicators that are used to represent the degree of geographical diversification of a firm are foreign sales dummy, number of foreign countries, foreign sales ratio and Herfindahl Index. These indicators capture different aspects of a firm geographical diversification. International sales dummy only can determine whether a company involved in geographical diversification.

According to investor recognition hypothesis introduced by Merton (1987), when a company or stock is recognized by more investors, its informational efficiency will be higher than those comparable companies that are less recognized by investors. This hypothesis is actually consistent with the Efficient Market Theory, which states that in an efficient market, there should be indefinite investors that independently do research on the stock. In this study, we make an assumption that when a company undergoes geographical diversification; its recognition to the foreign investors will be higher.

On the other sides, based on cost of information hypothesis (Shapiro, 2002), when the information of a company or stock is hard to acquire, its informational efficiency will decrease. Chen (2005) suggests that individual investors and institutional investors favor information which is easy to understand and widely available. When a company undergoes geographical diversification, its business coverage area becomes larger and the company is exposed to other countries' risk where its business involved in. Its business structure becomes more complex than company that only focuses its sales locally (Morck & Yeung, 1991). Such a complex business structure of geographically diversified firm will eventually decrease the potential investors.

The purpose of this study is to determine the overall effect of geographical diversification on informational efficiency. By using regression method, our analysis shows that geographical diversification will actually decrease informational efficiency (increase price delay) of a stock. In other words, the cost of information effect is higher than investor recognition effect for a geographical diversified firm.

The remainder of the paper is structured as follows. Section 2 discusses the variables, model specification, the sample selection process and provides descriptive statistics for the sample data. Section 3 discusses about empirical results. Section 4 will discuss about conclusion.

2. Methodology and Data

2.1 The Local and Global Stock Price Delay Measures

In a completely efficient market, stock prices will react instantly to the arrival of new information. However, in reality, there are many market frictions that delay the price adjustment process. The price delay measure that can be used to measure the lag between the release of new information and price adjustment process is first introduced by Mech (1993) and later popularized by Hou and Moskowitz (2005). Bae *et al*. (2012) constructs price delay with respect to local and global common factor information because they postulate that foreign investors are likely to have better expertise and resources to process global information.

Our construction of the local and global price delay measures follows the framework of Bae *et al*. (2012), which involves the following unrestricted model:

$$r_{i,t} = \alpha_i + \sum_{k=0}^{4} \beta_{i,k} r_{m,t-k} + \sum_{k=0}^{4} \delta_{i,k} r_{w,t-k} + \varepsilon_{i,t} \quad (1)$$

where $r_{i,t}$ is the return on stock i at week t, $r_{m,t-k}$ and $r_{w,t-k}$ denote the contemporaneous and four weekly lagged returns on the local and world market indices, respectively.

The construction requires the following two restricted models:

$$r_{i,t} = \alpha_i + \beta_{0i} r_{m,t} + \sum_{k=0}^{4} \delta_{i,k} r_{w,t-k} + \varepsilon_{i,t} \quad (2)$$

$$r_{i,t} = \alpha_i + \sum_{k=0}^{4} \beta_{i,k} r_{m,t-k} + \delta_{0i} r_{w,t} + \varepsilon_{i,t} \quad (3)$$

For each year from 2002 through 2009, we estimate equations (1) through (3) for every firm in the sample. Their respective *R*-squares are used to calculate the scaled version of stock price delay for firm *i* in year *t*:

$$DELAY_{LC} = 1 - \frac{R^2_{Eq.2}}{R^2_{Eq.1}} \quad (4)$$

$$DELAY_{GB} = 1 - \frac{R^2_{Eq.3}}{R^2_{Eq.1}} \quad (5)$$

$DELAY_{LC}$ $\left(DELAY_{GB}\right)$ captures how much the variation in contemporaneous individual stock returns that is explained by the lagged returns on local (world) market index, where the latter is used as a market-wide information signal. The greater the explanatory power of these lags, the longer the delay in responding to market-wide news that has common effects across firms. The value of $DELAY$ is bounded between zero and one, with a value closer to zero (one) indicates

faster (slower) speed of information incorporation, and hence higher (lower) degree of stock price efficiency.

2.2 Key Independent Variables of Geographical Diversification

The data used to construct geographical diversification indicators in this study is gathered from Osirus. International diversification has typically been measured in terms of the intensity of international involvement and in terms of the geographic scope of international operations as highlighted by (Lu & Beamish, 2004). This study employs several types of geographical diversification indicators in order to capture different aspects of geographical diversification.

Four different methods are used to measure geographical diversification in this study. The first indicator used is foreign sales dummy variable (DUMSALES). Firms are classified as 'diversified' or 'focused' based on the number of segments disclosed. Firms that fulfill the following conditions are classified as diversified: with more than a single segment and where the sales in the largest segment are less than 90% of total sales. Firms that do not fulfill the conditions are classified as focused (Fauver *et al*., 2003).

The second indicator used is number of foreign countries (FCOUNTRY). This indicator shows the total number of foreign countries that a company diversifies to (Tallman & Li, 1996).

The third indicator used is foreign sales ratio (FSALES). All the sales recorded outside the company registered country are perceived as foreign sales (Tallman & Li, 1996).

$$\text{FSALES} = \text{Foreign Sales}/\ \text{Total Sales} \tag{6}$$

The fourth variable used is Herfindahl Index (HERFINDAHL) which is constructed from foreign sales in each foreign country which is a common measure used in many previous studies examining diversification issues (Hitt et al., 1997; Denis et al., 2002).

The Herfindahl index is calculated as follows for each firm *i*:

$$\text{HERFINDAHL} = 1 - \Sigma(\text{Sales per segment}/\text{Total sales})^2 \tag{7}$$

The Herfindahl Index ranges from 0 to 1. The closer Herfindahl Index is to 1, the more a firm's sales diverse geographically, and the closer it is to 0, it means the firm's sales only concentrate in a few countries.

2.3 Control Variables

The literature review of informational efficiency shows that there are many researchers focus on finding the determinants of price delay since Hou & Moskowitz (2005) propose a price delay model to measure informational efficiency. Therefore, there are several variables which are commonly being used as control variables in price delay model. The four control variables that are used in this study are firm size, trading volume, liquidity/transaction costs and the number of sell-side security analysts.

2.4 Model Specification

Multiple regressions based on ordinary least squares (OLS) estimation technique are used to test the hypotheses in this study. OLS is appropriate as it is the most straightforward regression technique and the estimation is reliable as long as common regression problems are accounted for. We follow the common practice in the price delay literature in choosing the control variables and estimator. The pooled ordinary least squares (OLS) regression model is specified as follows:

$$DELAY_{i,t} = \alpha_i + \beta_{1i}\ln(\text{MCAP})_{i,t} + \beta_{2i}\ln(\text{VOL})_{i,t} + \beta_{3i}\text{ZERO}_{i,t} + \beta_{4i}\ln(\text{ANALYSIZE})_{i,t} + \beta_{5i}GEOGRAPHICAL\ DIVERSIFICATION_{i,t} + \varepsilon_{it} \quad (8)$$

2.5 Sample firms

Our samples initially include all the public companies in Malaysia range from year 2002 until year 2009 and set several criteria to eliminate inappropriate companies.

The first criterion in our sample construction is to ensure that those selected firms are in existence throughout the 8-year sample period. There are only 654 firms that fulfill the first criterion. Second, we find that a significant amount of our sample firms have stale closing prices for a long period of time. It is hence important to determine whether they are suspended by the stock exchange, and this information can be obtained from *Bursa Malaysia*'s website under "Company Announcements". The verification process shows that most firms with prolonged periods of identical prices are due to suspension. We hence exclude those firms that are suspended for more than 2 years, though they later resume trading with a new company name mainly due to acquisitions (but retain the same stock code). As a result of these filters and checks, our final sample comprises 602 stocks over the 8-year period from 2002 to 2009. Third, we exclude all the companies that do not provide complete geographical diversification data in Osirus. This step further decreases the numbers of company to 254 companies.

2.6 Descriptive Statistics

Table 1 provides the descriptive statistics for all the variables in the baseline model (6). In the emerging market sample of Bae *et al*. (2012), the mean for $DELAY_{LC}$ is 0.145 and $DELAY_{GB}$ is 0.158. With an exclusive focus on the Malaysian market, it shows that the delay measures with respect to local and global common information are higher at 0.2537 and 0.2552, respectively. This implies that the prices of Malaysian individual stocks take longer time to incorporate market-wide news than the average of emerging market firms. The local delay for Malaysia is also higher than those reported for the developed U.S. market whose value is below 0.10 (Hou & Moskowitz, 2005; Callen *et al*., 2013). The delayed price adjustment to information across developed and emerging markets challenges the assumption of frictionless capital markets in traditional asset pricing models where new information is instantaneously incorporated into stock prices (Griffin *et al*., 2010). This phenomenon warrants a thorough investigation on those market frictions or information imperfections that impede the price discovery process in the Malaysian stock market.

Table 1: Descriptive Statistics

Variables	Mean	Median	Minimum	Maximum	Standard Deviation
DELAYL	0.2537	0.2131	0.0042	0.9677	0.1804
DELAYG	0.2552	0.2145	0.0017	0.9914	0.1779
MCAP	828.6535	126.5100	3.2000	39236.1600	2913.7110
VOL	694.8754	123.4000	1.8800	26726.0200	1935.7860
ZERO	0.4034	0.3740	0.1145	0.9580	0.1601
ANALYST	2.2991	0.0000	0.0000	47.0000	5.7291
FCOUNTRY	1.5146	0.0000	0.0000	20.0000	2.2310
FSALES	0.1562	0.0000	0.0000	0.9918	0.2362
HERFINDAHL	0.1788	0.0000	0.0000	0.8433	0.2372

Notes: DELAYL and DELAYG refer to the local and global delay measures, computed from Eqs. (4) and (5), respectively. MCAP is market capitalization at year end. VOL is average daily share volume. ZERO is the proportion of zero daily returns in a year. ANALYST refers to the number of analysts issuing earnings forecasts for a firm over the year. FCOUNTRY refers to number of foreign countries that a firm diversifies to. FSALES is foreign sales ratio calculated from Eqs. (6). HERFINDAHL is Herfindahl Index calculated form Eqs.(7).

3. Results and Discussions

3.1 Baseline Pooled OLS Results

The baseline pooled OLS results in Table 2 use DELAYL as the dependent variable. For local stock price delay, firm size is a strong determinant of local delay with the expected negative sign which is consistent with previous studies. This implies that smaller stocks take longer time than larger stocks in responding to local market-wide news. The proxy for liquidity/transaction costs is statistically significant with its expected sign, suggesting that the existence of trading frictions impedes the swift incorporation of common factor information into Malaysian stock prices. Analyst coverage after adjustment of firm size effects poses a positive and significant relationship to local price delay measure.

For different geographical diversification indicators, only foreign sales ratio indicator poses a positive and significant relationship with local price delay. This result can explained as the cost of information effect outrun the investor recognition effect when a company undergoing geographical diversification.

For global stock price delay, firm size is always a significant determinant, an indisputable result in the price delay literature. The proxies for trading volume and liquidity/transaction costs are found to exert significant negative effects on global price delay. For different geographical diversification indicators, 10% dummy foreign sales, foreign sales ratio and Herfindahl index pose positive and significant relationship with global price delay. This result shows that geographical diversification does decrease the informational efficiency of a firm. Complexity effect outweighs foreign recognition effect and increase the price delay of geographical

Table 2: Price Delay and Geographical Diversification Indicators

	DELAYL					DELAYG				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
lnMCAP	-0.0137***	-0.0145***	-0.0145***	-0.0146***	-0.0146***	-0.0129***	-0.0140***	-0.0136***	-0.0140***	-0.0141***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
lnVOL	-0.0047	-0.0032	-0.0031	-0.0034	-0.0031	-0.0078***	-0.0072***	-0.0071**	-0.0075**	-0.0070**
	(0.1112)	(0.3044)	(0.3164)	(0.2740)	(0.3154)	(0.0063)	(0.0179)	(0.0183)	(0.0132)	(0.0199)
ZERO	0.2552***	0.2504***	0.2503***	0.2511***	0.2527***	0.2158***	0.2275***	0.2228***	0.2277***	0.2302***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
lnANALYSIZE	0.0116**	0.0123**	0.0118**	0.0125**	0.0124**	0.0019	0.0038	0.0003	0.0040	0.0004
	(0.0274)	(0.0262)	(0.0309)	(0.0234)	(0.0239)	(0.7160)	(0.4921)	(0.5939)	(0.4727)	(0.4768)
CONSTANT	0.1961***	0.2009***	0.2004***	0.2011***	0.1994***	0.2590***	0.2585***	0.2627***	0.2595***	0.2568***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
DUMSALES		0.0077					0.0144*			
		(0.3472)					(0.0877)			
FCOUNTRY			0.0010					-0.0003		
			(0.5605)					(0.8509)		
FSALES				0.0277*					0.0423**	
				(0.0984)					(0.0186)	
HERFINDAHL					0.0241					0.0372**
					(0.1672)					(0.0411)
N	1736	1736	1736	1736	1736	1736	1736	1736	1736	1736
Adjusted R^2	0.1654	0.1584	0.1582	0.1593	0.1590	0.1223	0.1249	0.1234	0.1235	0.1257

Notes: The descriptions for all the variables listed above are given in the notes of Table 2. This table presents the estimation results for the pooled OLS model in Eq. (8). Year dummies are included in the regressions but not reported for brevity. .P-values are reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

diversified firms. Number of foreign countries indicator does not pose any significant result whether to local and global price delay. This result shows that number of foreign countries that a firm diversified to does not matter to informational efficiency but the percentage of the foreign sales does matter.

3.2 Robustness Test

3.2.1 OLS with Clustered Firms and Years

We would like to investigate whether the results from Table 2 are biased due to unobserved firm and time effect. In this study, we follow Peterson (2009) by clustering the standard errors by firm, time and both dimensions, respectively. White standard errors serve as benchmark and the year dummies are removed from the equation because it is almost similar to time clustering. By comparing white standard errors and clustering standard errors, if clustering standard errors are higher, this indicates there are biases exist and the result with highest standard errors should be used. The results from Table 2 are found robust with clustered firms and years and the results are not shown in this paper for abbreviation.

3.2.2 KLCI Index Acts as Moderator

To further prove investor recognition effect, a moderator has been added into the regression model. KLCI dummy is a dummy that indicates whether a company has been listed on KLCI index. KLCI dummy is given 1 if a company is indexed in KLCI and otherwise 0. KLCI dummy is added into the regression model in equation (8) as both independent variable and moderator to geographical diversification indicators. The new equation is shown in equation (9).

$$\begin{aligned} DELAY_{i,t} = {} & \alpha_i + \beta_{1i}\ln(\mathrm{MCAP})_{i,t} + \beta_{2i}\ln(\mathrm{VOL})_{i,t} + \beta_{3i}\mathrm{ZERO}_{i,t} + \beta_{4i}\ln(\mathrm{ANALYSIZE})_{i,t} \\ & + \beta_{5i}\mathrm{LCI}_{i,t} + \beta_{6i}GEOGRAPHICAL\ DIVERSIFICATION_{i,t} \\ & + \beta_{7i}(GEOGRAPHICAL\ DIVERSIFICATION_{i,t} * \mathrm{KLCI})_{i,t} + \varepsilon_{it} \end{aligned} \tag{9}$$

From Table 3, the result shows that although KLCI dummy does not pose direct significant relationship with price delay measure but it actually does moderate the relationship between geographical diversification indicators and global price delay. Both N_country*KLCI and and Herfindahl*KLCI have significant and negative effect on global price delay measure. In another word, KLCI-indexed firms will have higher investor recognition effect which will reduce price delay when undergoing geographical diversification when comparing to the firms which do not indexed in KLCI.

Table 3: KLCI Dummy Moderator for Global Delay Measure

	DELAYG				
	(1)	(2)	(3)	(4)	(5)
lnMCAP	-0.0116***	-0.0133***	-0.0129***	-0.0130***	-0.0134***
	(0.0011)	(0.0004)	(0.0006)	(0.0005)	(0.0003)
lnVOL	-0.0077***	-0.0070**	-0.0068**	-0.0073**	-0.0066**
	(0.0074)	(0.0218)	(0.0257)	(0.0162)	(0.0285)
ZERO	0.2160***	0.2275***	0.2247***	0.2281***	0.2316***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
lnANALYSIZE	0.0027	0.004	0.0039	0.0044	0.0036
	(0.5988)	(0.4790)	(0.4849)	(0.4338)	(0.5240)
KLCI	-0.0099	0.0008	0.0172	-0.0022	0.0113
	(0.4312)	(0.9582)	(0.3006)	(0.8873)	(0.4750)
CONSTANT	0.2535***	0.2541***	0.2547***	0.2539***	0.2500***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
DUMSALES		0.0169*			
		(0.0756)			
DUMSALES*KLCI		-0.0165			
		(0.3896)			
FCOUNTRY			0.0011		
			(0.5854)		
FCOUNTRY *KLCI			-0.0080**		
			(0.0152)		
FSALES				0.0488**	
				(0.0213)	
FSALES*KLCI				-0.0310	
				(0.3896)	
HERFINDAHL					0.0504**
					(0.0149)
HERFINDAHL*KLCI					-0.0842**
					(0.0191)
N	1736	1736	1736	1736	1736
Adjusted R^2	0.1221	0.1242	0.1239	0.1258	0.1265

Notes: The descriptions for all the variables listed above are given in the notes of Table 2. This table presents the estimation results for the pooled OLS model in Eq. (9). KLCI is a dummy variable used to indicate whether a firm is indexed in KLCI. Year dummies are included in the regressions but not reported for brevity. P-values are reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

4. Conclusion

Geographical diversification indicators show positive and significant relationship with price delay measures. Only foreign sales ratio shows positive and significant relationship with local delay while dummy for foreign sales, foreign sales ratio and Herfindahl Index show positive and significant relationship with global delay. These results are robust to standard error bias by using standard error clusters estimate.

KLCI Index that acts as moderator to geographical diversification indicators show negative and significant relationship with global price delay measure. This result strengthens the investor recognition hypothesis which states that the firms which possess higher investor recognition will higher informational efficiency.

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