

Does Return Volatility Differs Across Markets After Liberalization? Empirical Test on Market Characteristics and Institutions

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ABSTRACT

This study has two objectives, (i) examine the impact of market liberalization on return volatility, (ii) answer why return volatility differs across market by considering different level of market characteristics and institutional frameworks for 80 stock indices across the globe for year 2008. By using unconditional volatility as a proxy of return volatility and the countries, we find that volatility decreases in the gradual and on-going liberalization process. Following, we relate the volatility changes to market characteristics and the quality of institutions. The results show that impact of market liberalization on market return volatility becomes not significant when we consider market characteristics and institutions. Market characteristics do not significantly affect return volatility but institutions do significantly affect return volatility. Volatility decreases with higher quality of institutions whereas volatility increases with lower quality of institutions. Therefore by strengthening the market characteristics and institution, it is able to insulate markets from outside adversities.

Keywords: stock market liberalization; stock return volatility; market characteristics; quality of institutions; threshold

INTRODUCTION

Over last two decades, many countries have taken steps to open their stock markets. Once the countries announce to liberalize their stock market, this starts to give foreign investors the opportunity to invest in domestic equity securities and domestic investors the right to transact in foreign equity securities. Most empirical studies have shown that liberalization will bring positive effects, such as decreased the cost of equity, increased returns and increased private physical investment. However, liberalization could make a country more vulnerable to economic and political turmoil abroad. It will cause the domestic stock markets more volatile. Therefore, return volatility may change due to the gradual and on-going liberalization process.

Stock return volatility represents variability of stock price changes during a period of time. According to Sami Khedhiri and Naeem Muhammad (2008), volatility is a measure of risk and different participants of the financial markets need this measure for various purposes. For example, volatility is needed as an input in portfolio management by portfolio managers and investors. It is needed in the pricing of derivatives securities (pricing of options in particular). Volatility makes investors more adverse to hold stocks due to uncertainty. It also may distort the role of financial markets and systems in channelling funds from surplus to deficits units. Therefore, knowing effect of market liberalization on stock return volatility is very crucial so that suitable measures can be taken to dwindle the problem of volatility.

Various studies have shown that return volatility may increase, decrease or remain unchanged due to market liberalization. Grabel (1995) investigated the impact of financial liberalization on stock market volatility in selected developing countries. He found that during financial liberalization experiments market volatility increased, and in some cases this increase in volatility was found to be statistically significant. The findings of increased volatility are consistent across all measures of volatility in the cases of Chile, Colombia, Venezuela, and Korea, while the evidence for Argentina and the Philippines is mixed.

Levine and Zervos (1998) investigated on the topic of capital control liberalization and stock market development. Firstly, they evaluated the effect of capital liberalization on market size, liquidity, volatility and international integration in 16 emerging market economies from year 1976 to 1993 using monthly data. Secondly, they examined the empirical relationship between stock market size, liquidity, volatility and international integration and regulations concerning information disclosure, accounting

standard and investor protection. The results indicated that stock markets tend to become larger, more liquid, more volatile and more integrated following the liberalization. In addition, countries with firms that widely publish comprehensive information have larger, more liquid and more internationally markets.

Bekaert and Harvey (1997) had done time-series and cross-sectional study of 20 emerging markets from 1976 to 1992 by using monthly data. This study analysed the reason why volatility is different across emerging markets, particularly with respect to the timing of capital market reforms. They estimated the world market factor model in both expected returns and conditional variance processes that changed through time using the GARCH model. They stated that understanding volatility in emerging capital markets was important for determining the cost of capital and for evaluating direct investment and asset allocation decisions. The findings showed that capital market liberalization often increased the correlation between local market returns and the world market. However, it did not drive up local market volatility.

Shamila Jayasuriya (2005) examined the effect of market liberalization on stock return volatility for 18 emerging markets by using a variant of the GARCH methodology. She found evidence that a market opening to foreign investors often decreased or increased stock return volatility. Next, she linked post-liberalization volatility with market characteristics and quality of institutions, which was main contribution of this study. Market characteristics that considered inside this study were categorized into three broad groups, such as market transparency, investor protection and market exit openness. While quality of institutions includes five indices, such as risk of repudiation of contracts by government, risk of expropriation, corruption, rule of law and bureaucratic quality. The results showed that countries which experienced lower post-liberalization volatility were in general characterized by favourable market characteristics and better quality of institution.

Law and Wan Azman Saini Wan Ngah (2008) examined the impact of stock market liberalization on stock return volatility in the small open economy of Malaysia by using the EGARCH model combined with sudden changes of variance during the period of 1985 to 2006. This period was divided into pre-liberalization, post-liberalization before 1997-98 East Asian financial crisis, post-liberalization during crisis and post-liberalization during capital control periods. The findings showed that stock return volatility fell after the Bursa Malaysia (Stock Exchange of Malaysia) was opened up to foreign investors. This might due to increase foreign participation and the deepening of markets, which allowed more investors to share a given amount of risk. However, the volatility increased during the financial crisis period. The selective capital controls and pegging of the currency had led to upswing in the Kuala Lumpur Composite Index, which helped to reduce the stock return volatility.

De Saintis and Imrohorglu (1997) analysed the dynamics of stock returns and volatility in emerging financial markets. They had done individual country study of 5 emerging market, such as India, Taiwan, Argentina, Brazil and Colombia from year 1988 to 1996 using weekly data. They found evidence of conditional volatility which exhibited clustering, high persistence and predictability for mature markets. However, emerging markets exhibited higher conditional volatility and conditional probability of large price changes than mature markets. Exposure to high country-specific risk did not appear to be rewarded with higher expected returns. They detected a risk-reward relation in Latin America but not in Asia when they assumed some level of international integration. They did not find support for the claim that market liberalization increased price volatility. There was no obvious relationship between the two variables.

In this paper, we have two objectives. First, examine the impact of market liberalization on return volatility. Due to different results from previous studies, there are no definite answer. Return volatility may increase, decrease or remain unchanged. Hence, we try to examine this issue on 80 countries from developed and developing countries. Second, evaluate why return volatility differs across markets by considering different levels of market characteristics and institutions.

The market characteristics that we consider are market disclosure and investor protection. Market disclosure is a measure of market transparency. Useful information allows investors to take the correct actions or do the correct investments. With the sufficient information, investors will reduce their risks from doing wrong decision. Besides that, investor protection turns out to be crucial because in many countries, expropriation of minority shareholders and creditors by the controlling shareholders is pervasive. Therefore, a good market should have good investor protection laws to protect their rights. Whereas the quality of institutions includes political stability and no violence, government effectiveness, regulatory effectiveness, rule of law, and control of corruption. Good governance indicators indicate good institution. If one country is inefficient in managing the country well, it will lead to financial risk and economic and political instability. Our results suggest that the existence of market characteristic and institutions will insulate the markets from foreign adversities. Better market characteristic and better quality of institution will reduce the return volatility.

METHODOLOGY

This study is using monthly data of 80 countries' stock price indices from January 2006 to December 2010. The closing price indices are collected from the website of Yahoo Finance, Bloomberg, NASDAQ OMX and official homepage of stock exchange in various countries.

Besides that, we use the Chinn-Ito Index (KAOPEN) of year 2008 to measure the degree of liberalization. KAOPEN is an index measuring a country's degree of capital account openness. The index was initially introduced by Chinn and Ito in the Journal of Development Economics 2006. KAOPEN is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). KAOPEN index ranges from -2.5 to 2.5, with higher values indicating greater degree of capital account openness. In other words, the higher the value, the greater the liberalization of the country. The dataset can get from the website.

Data of market characteristic in year 2008 is collected from the website of Doing Business Database under International Finance Corporation and the World Bank. Two indices of market characteristic that we use are (i) extent of disclosure and (ii) strength of investor protection index. The indices are ranged from 0 to 10. Market disclosure allows investors to access useful information. The higher the extent of disclosure index, the information is more comprehensive and publish internationally. Whereas the higher the strength of investor protection index, the more investors are protected by laws.

Data of quality of institution in year 2008 is collected from the website of Worldwide Governance Indicators under the World Bank. Five indices that we use are (i) political stability and no violence, (ii) government effectiveness, (iii) regulatory effectiveness, (iv) rule of law, and (v) control of corruption. The indices are measured in units ranging from -2.5 to 2.5. The higher value indicates better governance outcomes or better quality of institution. All data are presented in Table 1.

After data collection, unconditional volatility is used as a proxy of return volatility for each 80 chosen countries. SPSS 16.0 is used to analyse data using Linear Regression to examine the relationship between return volatility with market liberalization, market characteristic and quality of institutions.

To calculate return volatility, we need to find return and the expected return for each stock index first. The equation of Return, R_i is shown below:

$$R_i = \frac{(P_t - P_{t-1})}{P_{t-1}} \times 100$$

Where P_t is price of stock at period t, whereas P_{t-1} is price of the stock at period t-1.

The equation of Expected Return for each stock, \bar{R}_i can be calculated as follow:

$$\bar{R}_i = \frac{R_i}{n}$$

Where n is the number of sample.

The return volatility that we use in this paper is standard deviation. The equation of Return Volatility is shown below:

$$\sigma_i^2 = \frac{\sum (R_i - \bar{R}_i)^2}{n}$$

$$\sigma_i = \sqrt{\frac{\sum (R_i - \bar{R}_i)^2}{n}}$$

Following, we examine the relationship between Return Volatility and various variables. The purpose is to see

- (i) what effect on Return Volatility when just Market Liberalization exists (shown by Model 1),
- (ii) what effect on Return Volatility when Market Characteristics exist along with Market Liberalization (Model 2)

(iii) what effect on Return Volatility when Institutions exist along with Market Liberalization (Model 3)

To examine the relationship between Return Volatility (SD) and Market Liberalization (KAOPEN), we have formed the **MODEL (1)** which is shown below:

$$SD = \alpha + \beta_1 KAOPEN$$

MODEL (2), we examine the effect of Market Characteristic (MC_i) on Return Volatility (SD) during Market Liberalization (KAOPEN):

$$SD = \alpha + \beta_1 KAOPEN + \beta_2 MC_i + \beta_3 (KAOPEN \times MC_i)$$

Where $i = 1, 2$

MC_1 = Extend of Disclosure Index

MC_2 = Strength of Investor Protection Index

To get the effect of market characteristics on openness, we interact the indices of market characteristics with openness index. It is shown by ($KAOPEN \times MC_i$).

MODEL (3), we examine the effect of Institution ($INST_j$) on Return Volatility (SD) during Market Liberalization (KAOPEN):

$$SD = \alpha + \beta_1 KAOPEN + \beta_2 INST_j + \beta_3 (KAOPEN \times INST_j)$$

Where $j = 1, 2, 3, 4, 5$

$INST_1$ = Political Stability and No Violence

$INST_2$ = Government Effectiveness

$INST_3$ = Regulatory Quality

$INST_4$ = Rule of Law

$INST_5$ = Control of Corruption

Similarly, to get the effect of institutions on openness, we interact the indices of institution with openness index. It is shown by ($KAOPEN \times INST_j$).

FINDINGS

From the SPSS 16.0 result in Table 2, we get the result of Model 1. For two-tailed test to be significant, p-value must be below 0.01 for 99% confidence interval, below 0.05 for 95% confidence interval or below 0.10 for 90% confidence interval. Based on the finding, the p-value of KAOPEN is 0.093. It is significant at the 0.10 level with coefficient of -0.452. This shows that return volatility is significantly affected by market liberalization. When openness index increase 1%, return volatility will decrease by 0.452%. In contrast, when openness index decrease 1%, return volatility will increase by 0.452%. Therefore, return volatility will decrease during the on-going liberalization process.

The results of Model 2 have shown in Table 3. From the outcomes, we find that the aspects of market characteristics are not significantly affected return volatility. However, existence of market characteristic helps to insulate the markets from foreign adversities. This is proved by the evidence where the openness index becomes not significantly affected return volatility when we consider market characteristic. In short, the openness of markets is some sorts being blocked in some ways. The market characteristic plays an important role to avoid transmission of risk from one country to another country. This is very crucial because we are not able to promise that market liberalization surely reduces return volatility in the future due to markets may fluctuate when there is any shock occurs. For instance, wars, disasters, financial crisis and etc. From the literature review of Law and Wan Azman Saini Wan Ngah (2008), though volatility decreased after liberalization, it would increase during the crisis period. Therefore, it is good to emphasize on good market characteristics to protect markets from outside adversity.

Same goes to Model 3 (refer table 4), the effect of market liberalization on return volatility becomes not significant when we take the quality of institutions into consideration. This effect is same as the case when we look into market characteristics. Therefore, institutions will help to prevent the

markets from exogenous risks. Furthermore, we found that almost all aspects of institution significantly affect return volatility, except political and no violence. The coefficients of government effectiveness, regulatory quality, rule of law and control of corruption are -36.527, -1.527, -1.523 and -1.453 respectively. Negative coefficients indicate better quality of institution reduce return volatility. While return volatility will increase if the quality of institution is lower.

CONCLUSION

In this study, we examine (i) the impact of market liberalization on return volatility, (ii) answer why return volatility differs across market by considering different qualities of market characteristics and institutions for 80 countries for year 2008. 5 years of monthly closing price indices are collected from each country to calculate return volatility by using unconditional volatility. Chinn-Ito Index (KAOPEN), indices of market characteristic and indices of institutions are collected too. Following, SPSS 16.0 is used to do Linear Regression analysis.

From the results, we found that return volatility decreases due to market liberalization (in Model 1). But when we consider market characteristics and institutions, impact of market liberalization on market return volatility becomes not significant (in Model 2 and 3). This can be explained when the countries open the markets and at the same time, if they own good market characteristics and institutions, the countries protect their markets from foreign adversities. It is glad to see that return volatility does not influenced heavily by market liberalization in this case because liberalization might lead the countries towards the exogenous risks especially there is any unexpected catastrophe occurs. Hence, measures such as emphasis on better market characteristics and better institutions in the countries are very important.

However, the results do not show that market characteristics significantly affect return volatility in this study. But almost all qualities of institutions do show their significant impact on return volatility. Return volatility will decrease due to the higher quality of institutions. In contrast, return volatility will increase due to lower quality of institution. Therefore by establishing or strengthening the market characteristics and institution, it will be able to insulate markets from outside adversities.

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TABLE 1: Data of Return Volatility (SD), Chinn-Ito Index (KAOPEN), Market Characteristics (MC_i) and Institutions (INST_j)

Country	SD	KAOPEN	MC ₁	MC ₂	INST ₁	INST ₂	INST ₃	INST ₄	INST ₅
Argentina	8.87	-0.78	6	4.7	0.02	-0.23	-0.84	-0.66	-0.45
Australia	4.60	1.17	8	5.7	0.98	1.78	1.75	1.73	2.07
Austria	8.18	2.50	3	4	1.28	1.63	1.56	1.89	1.89
Bahamas	2.31	-1.83	2	4.7	0.80	1.21	1.02	1.19	1.39
Bahrain	10.58	2.23	8	5.7	-0.23	0.48	0.80	0.61	0.35
Bangladesh	7.46	-1.14	6	6.7	-1.47	-0.89	-0.87	-0.72	-1.13
Belgium	6.06	2.50	8	7	0.66	1.23	1.34	1.31	1.34
Bosnia & Herzegovina	9.45	2.50	3	5	-0.50	-0.53	-0.15	-0.40	-0.33
Brazil	7.11	0.71	6	5.3	-0.11	0.06	0.07	-0.34	-0.05
Bulgaria	11.13	2.50	10	6	0.43	0.10	0.69	-0.16	-0.20
Canada	4.85	2.50	8	8.3	1.03	1.75	1.62	1.77	1.99
Chile	4.17	2.23	8	6.3	0.51	1.26	1.59	1.28	1.33
China	10.81	-1.14	10	5	-0.39	0.15	-0.15	-0.33	-0.46
Colombia	6.89	1.17	8	8.3	-1.68	0.08	0.27	-0.47	-0.21
Croatia	10.95	1.17	1	4	0.57	0.64	0.48	0.12	0.07
Cyprus	18.82	2.50	4	5	0.63	1.39	1.35	1.16	1.21
Czech Republic	8.23	2.50	2	5	1.03	0.96	1.14	0.89	0.36
Denmark	6.24	2.50	7	6.3	1.03	2.08	1.85	1.91	2.43
Egypt	10.65	2.50	8	5.3	-0.51	-0.39	-0.15	-0.05	-0.68
Estonia	10.83	2.50	8	5.7	0.61	1.25	1.49	1.16	0.96
Finland	7.43	2.50	6	5.7	1.38	1.95	1.57	1.86	2.36
France	5.43	1.45	10	5.3	0.58	1.51	1.24	1.43	1.40
Germany	5.83	2.50	5	5	0.97	1.41	1.43	1.67	1.73
Greece	12.37	2.50	1	3.3	0.34	0.67	0.83	0.79	0.16
Hong Kong	7.32	2.50	10	9	1.05	1.79	1.99	1.52	1.93
Hungary	8.04	2.50	2	4.3	0.75	0.71	1.22	0.85	0.49
Iceland	12.45	-1.14	5	5.3	1.20	1.56	1.08	1.79	2.25
India	8.52	-1.14	7	6	-0.90	-0.01	-0.29	0.12	-0.36
Indonesia	7.92	1.17	10	6	-0.91	-0.21	-0.23	-0.62	-0.61
Iran	5.61	0.12	5	3	-1.13	-0.75	-1.70	-0.82	-0.72
Iraq	19.96	0.38	4	4.3	-2.55	-1.41	-1.15	-1.93	-1.47
Ireland	7.45	2.50	10	8.3	1.16	1.50	1.86	1.71	1.75
Israel	6.32	2.50	7	8.3	-1.20	1.27	1.16	0.90	0.89
Italy	6.42	2.50	7	5.7	0.58	0.43	0.89	0.38	0.22
Jamaica	4.22	1.97	4	5.3	-0.25	0.18	0.36	-0.46	-0.47

Jordan	5.86	2.50	5	4.3	-0.26	0.33	0.39	0.53	0.45
Kazakhstan	16.01	-1.14	8	6	0.54	-0.47	-0.41	-0.74	-1.01
Korea Republic	6.52	0.18	7	5.3	0.36	1.12	0.71	0.85	0.44
Kyrgyz Republic	6.42	1.70	8	7.7	-0.62	-0.81	-0.37	-1.29	-1.07
Kuwait	6.22	1.17	7	6.3	0.50	0.06	0.22	0.64	0.55
Latvia	7.46	2.50	5	5.7	0.38	0.63	1.02	0.81	0.29
Lithuania	10.01	-1.14	5	5	0.78	0.69	1.11	0.65	0.13
Macedonia	12.81	0.12	9	6.7	-0.24	-0.08	0.27	-0.33	-0.13
Malaysia	4.55	1.17	10	8.7	0.17	1.14	0.41	0.49	0.14
Mexico	6.06	1.17	8	6	-0.63	0.16	0.41	-0.68	-0.21
Nepal	8.67	-1.14	6	5.3	-2.04	-0.91	-0.70	-0.87	-0.75
Netherlands	6.26	2.50	4	4.7	0.91	1.66	1.71	1.72	2.14
New Zealand	4.15	2.50	10	9.7	1.13	1.68	1.77	1.84	2.32
Norway	7.38	2.50	7	6.7	1.25	1.79	1.40	1.94	1.86
Oman	6.82	2.50	8	5	0.89	0.54	0.80	0.77	0.57
Pakistan	8.49	-1.14	6	6.3	-2.66	-0.80	-0.57	-1.00	-0.78
Panama	3.51	2.50	1	4.7	0.03	0.27	0.61	-0.18	-0.14
Peru	12.11	2.50	8	6.7	-0.82	-0.24	0.37	-0.76	-0.22
Philippines	6.57	0.12	2	4	-1.45	0.08	-0.02	-0.53	-0.67
Poland	8.08	0.12	7	6	0.88	0.52	0.80	0.55	0.42
Portugal	6.14	2.50	6	6	0.96	1.10	1.09	1.02	1.02
Qatar	9.44	2.50	5	5	1.05	0.85	0.77	0.89	1.33
Romania	11.04	2.50	9	6	0.26	-0.07	0.56	0.04	-0.03
Russian Federation	10.63	-0.09	6	5	-0.61	-0.26	-0.48	-0.92	-1.02
Saudi Arabia	10.03	1.17	9	7	-0.36	-0.01	0.13	0.21	0.05
Singapore	6.78	2.50	10	9.3	1.30	2.27	1.97	1.65	2.28
Slovak Republic	4.55	1.45	3	4.7	1.03	0.89	1.09	0.60	0.41
Slovenia	7.05	2.23	3	6.7	1.08	1.23	0.82	0.98	0.95
South Africa	5.46	-1.14	8	8	0.17	0.65	0.51	0.04	0.22
Spain	6.26	2.50	5	5	-0.08	0.94	1.20	1.12	1.11
Sweden	5.75	2.50	8	6.3	1.15	1.87	1.65	1.88	2.21
Switzerland	4.14	2.50	0	3	1.20	1.92	1.57	1.79	2.13
Thailand	7.85	-0.09	10	7.7	-1.09	0.19	0.29	-0.06	-0.39
Trinidad and Tobago	3.24	2.50	4	6.7	0.05	0.30	0.61	-0.23	-0.17
Turnisia	4.01	-1.14	5	5.3	0.21	0.43	0.14	0.22	-0.04
Turkey	9.75	0.12	9	5.7	-0.68	0.29	0.27	0.10	0.09
Uganda	8.27	2.50	2	4	-0.99	-0.60	-0.11	-0.42	-0.82
Ukraine	14.76	-1.14	5	4.7	0.09	-0.69	-0.47	-0.66	-0.73
United Arab Emirates	7.61	2.50	4	4.3	0.71	0.88	0.64	0.54	1.08
United Kingdom	4.76	2.50	10	8	0.50	1.58	1.71	1.63	1.68
United States	5.61	2.23	7	8.3	0.52	1.48	1.51	1.63	1.46

Uruguay	6.59	2.50	3	5	0.89	0.58	0.20	0.56	1.20
Venezuela	7.52	-0.76	3	2.3	-1.32	-1.11	-1.49	-1.60	-1.08
Vietnam	14.01	-1.14	6	2.7	0.21	-0.16	-0.52	-0.38	-0.68
Zambia	16.56	2.50	3	5.3	0.41	-0.65	-0.42	-0.47	-0.45

Sources: Yahoo Finance, Bloomberg, NASDAQ OMX, official homepage of stock exchange in various countries, International Finance Corporation and the World Bank.

TABLE 2: Relationship of Return Volatility and Market Liberalization (Model 1)

	Coefficient	t-value	p-value	Regression Fit
Constant	8.670	16.699	0.000***	R ² = 0.036
KAOPEN	-0.452	-1.703	0.093*	F = 2.899

*** significant at the 0.01 level

* significant at the 0.10 level

TABLE 3: Relationship of Return Volatility with Market Liberalization and Market Characteristics (Model 2)

	Coefficient	t-value	p-value	Regression Fit
Constant	7.379	4.808	0.000***	R ² = 0.062
KAOPEN	0.496	0.684	0.496	F = 1.670
MC ₁	0.216	0.913	0.364	
KAOPEN x MC ₁	-0.162	-1.408	0.163	
Constant	11.323	5.455	0.000***	R ² = 0.083
KAOPEN	-0.303	-0.289	0.773	F = 2.301
MC ₂	-0.481	-1.280	0.204	
KAOPEN x MC ₂	-0.010	-0.051	0.959	

*** significant at the 0.01 level

TABLE 4: Relationship of Return Volatility with Market Liberalization and Various Aspects of Institution (Model 3)

	Coefficient	t-value	p-value	Regression Fit
Constant	8.635	15.834	0.000***	R ² = 0.064
KAOPEN	-0.256	-0.864	0.390	F = 1.721
INST ₁	-0.425	-0.844	0.401	
KAOPEN x INST ₁	-0.218	-0.735	0.465	
Constant	94.565	8.935	0.000***	R ² = 0.152
KAOPEN	-1.228	-0.192	0.848	F = 4.540
INST ₂	-36.527	-2.698	0.009***	
KAOPEN x INST ₂	3.487	0.524	0.602	
Constant	8.881	17.215	0.000***	R ² = 0.132
KAOPEN	0.095	0.278	0.781	F = 3.869
INST ₃	-1.527	-2.307	0.024**	
KAOPEN x INST ₃	-0.014	-0.040	0.968	
Constant	8.609	16.948	0.000***	R ² = 0.143
KAOPEN	-0.059	-0.197	0.845	F = 4.230
INST ₄	-1.523	-2.601	0.011**	
KAOPEN x INST ₄	0.168	0.564	0.575	
Constant	8.587	16.926	0.000***	R ² = 0.148
KAOPEN	-0.053	-0.176	0.860	F = 4.414
INST ₅	-1.453	-2.698	0.009***	
KAOPEN x INST ₅	0.182	0.612	0.542	

*** significant at the 0.01 level

** significant at the 0.05 level