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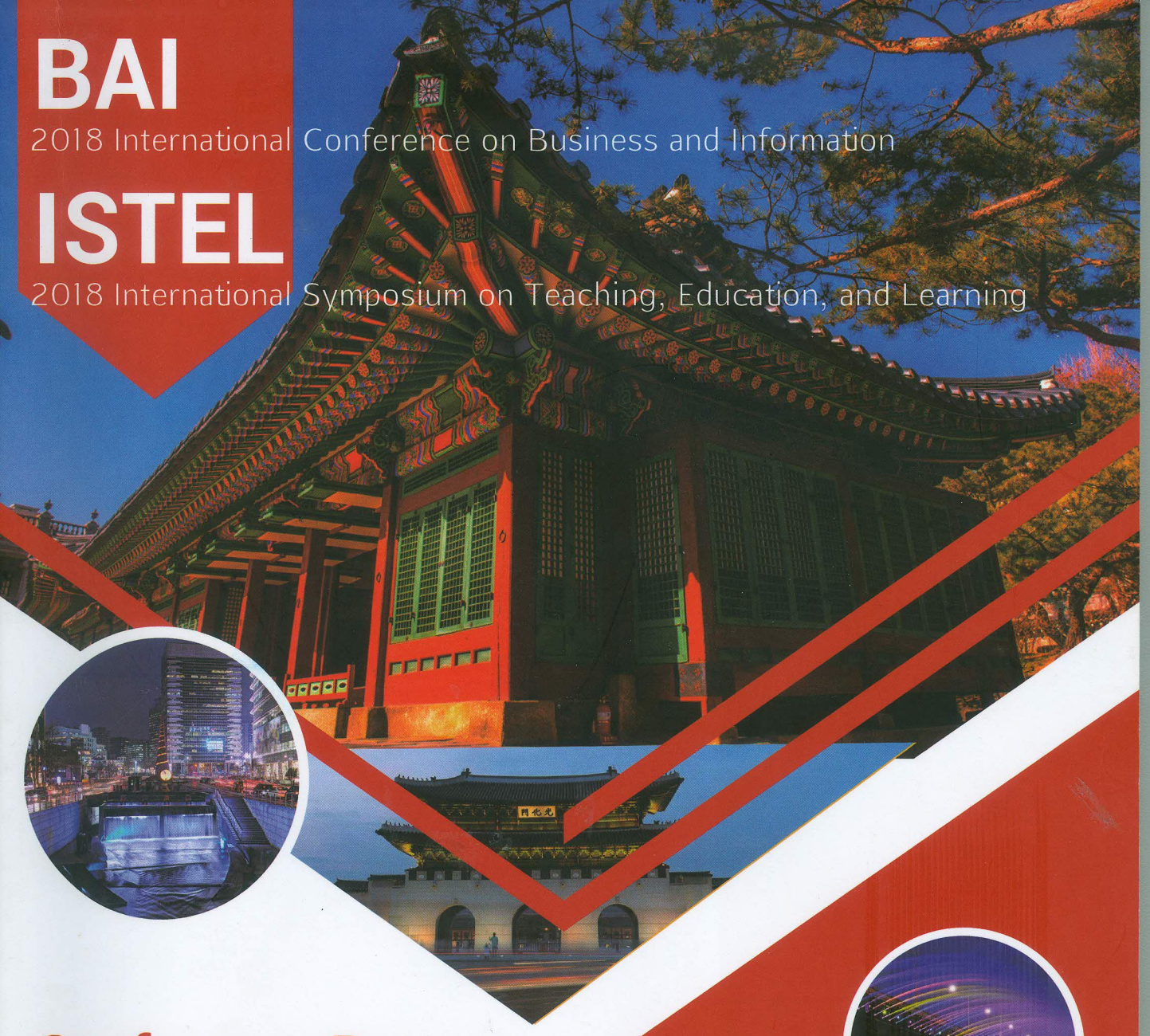

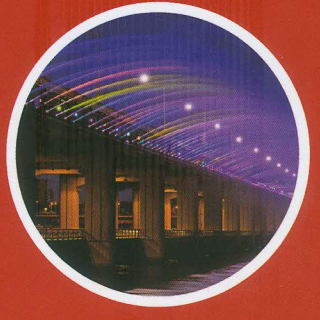

Conference Program

Seoul, Korea

July 6-8, 2018

Conference Organizers

International Business Academics Consortium (iBAC)
Korea Data Strategy Society (KDSS)

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Proceedings of the 2018 International Conference on Business and Information,
ISSN 1729-9322, Published by International Business Academics Consortium.

Message from Conference Chair

On behalf of the Conference Committee, I would like to welcome you to Seoul, Korea and to the International Conference on Business and Information (BAI 2018). The conference provides an opportunity for delegates from around the world to share their ideas and research in the wide range of business, management, and information.

I believe that research is a cooperative enterprise among scholars and practitioners, which is why we strive to providing a collaborative environment that fosters the exchange of ideas and constructive feedback among researchers, practitioners, and related professionals. I want to thank all the authors and committee members whose contributions and participation are essential to creating an inspiring environment at the conference.

The conference committee has brought together a truly unique program that addresses the broad coverage of topics relating to the theory and practice of business and information. Moreover, I would like to express my special thanks to the Local Chair, Professor Namjae Cho, and Co-Chairs, Dr. Wachara Chantatub, H. Keith Edwards, and Ushio Sumita for their contributions in ensuring the quality and success of this conference. I want to thank Professor Kanes Rajah for supporting BAI 2018 by providing us an inspiring speech.

In closing, I hope you will enjoy and learn from the discussions, knowledge sharing and networking over the duration of BAI 2018. I also wish you would have an enjoyable and fruitful stay in Seoul.

Wenchang Fang

Conference Chair
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EXCHANGE RATE VOLATILITY OF EUROPEAN, JAPAN AND SINGAPORE IN THE INFLUENCE OF ASIA EXCHANGE RATE MARKET: EMPIRICAL STUDY OF TAIWAN MARKET

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ABSTRACT

The empirical results show that the AIGARCH (1, 1) model is appropriate in evaluating the volatility model of the Taiwan's exchange rate market. The empirical result also indicates that the Taiwan's exchange rate market has an asymmetrical effect. The exchange rate volatility of the Taiwan exchange rate market receives the influence of the good and bad news of the European, the Japan and the Singapore exchange rate markets. For example, under the $REUER_t > 0$ (good news), the $RJER_t > 0$ (good news) and $RSIER_t \le 0$ (bad news), the variation risk of the Taiwan exchange rate market is the highest ($\beta_{51} = 0.8878$). Under the $REUER_t > 0$ (good news), the $RJER_t \le 0$ (bad news) and $RSIER_t > 0$ (good news), the variation risk of the Taiwan exchange rate market is the lowest ($\beta_{61} = 0.4380$).

Keywords- exchange rate market, volatility rate, asymmetric effect, IGARCH model, AIGARCH model.

INTRODUCTION

We know that Taiwan economical physique belongs to an island economy. We also know that Taiwan is one of Asian four dragons, also Taiwan economy of growth in 2010 is 10.72%, and the forecast value of the grow rate is 3.5% in 2012. Taiwan has a close relationship with the Japan based on the trade and the circulation of capital, and the Japan is the most powerful global economic nation in the Asian. Besides, Taiwan and Singapore have a close relationship based on the trade and the circulation of capital. When the investor has an investment in the international exchange rate market, he/she will usually care about the international capital the motion situation, the international politics and the economical situation change, in particular, in the European, the Japan and the Singapore exchange rate markets' change. There is also a close relationship for Taiwan and European based on the trade and the circulation of capital. We knows that the Singapore, Japan and European are also powerful global economical areas. Therefore, the volatility model of the Taiwan exchange rate market is worth further discussion with the factors of European, Japan and Singapores' exchange rate markets.

The purpose of the present paper is to examine the volatility model of the Taiwan's exchange rate market. This paper also further discusses the affect of the European, the Japan and the Singapore exchange rates' volatility rate for the Taiwan exchange rate market volatilities. And the positive and negative values of European, Japan and Singapore exchange rates' volatility are used as the threshold. The organization of this paper is as follows: Section 2 descibes the data characteristics; Section 3 presents the proposed model; Section 4 presents the empirical results; Section 5 introduces the asymmetric test of the proposed model, and finally Section 6 summarizes the conclusions of this study.

DATA CHARACTERISTICS

Data sources

The research sample period was from January, 2004 to December, 2012, and the material origin takes from DataStream, a database in Taiwan. Among them, the Taiwan's exchange rate price is the exchange rate of Taiwan New to US in New York market, the European's exchange rate price is the exchange rate of Euro to US in the New York market. The Japan's exchange rate price is the exchange rate of Japanese Yen to US in the New York market. The Singapore's exchange rate price is the exchange rate of Singapore to US in the New York market. In the data processing aspect, the markets do not do business on respective Taiwan's holidays; therefore when a exchange rate market is closed, this article deletes the identical time exchange rate price material and conforms to the other exchange rate market's common trading day; therefore four variable samples after processing each will be 2347 from now on.

Returns Calculation and Basic Statistics

To compute the volatility rate of the Taiwan exchange rate market adopts the natural logarithm difference, rides 100 again. The volatility rate of the European exchange rate market also adopts the natural logarithm difference, rides 100 again. The volatility rate of the Japan and Singapore exchange rate markets also adopts the natural logarithm difference, rides 100 again. In Figure 1, the Taiwan, the European, the Japan and the Singapore exchange rate volatility rates shows the clustering phenomenon, so that we may know the four exchange rate markets have certain relevance.

Table 1 presents the four sequences kurtosis coefficients are all bigger than 3, which this result implies that the normal distribution test of Jarque-Bera is not normal distribution. Therefore, the heavy tails distribution is used in this paper. And the four exchange rate markets do have the high correlation in Table 2.

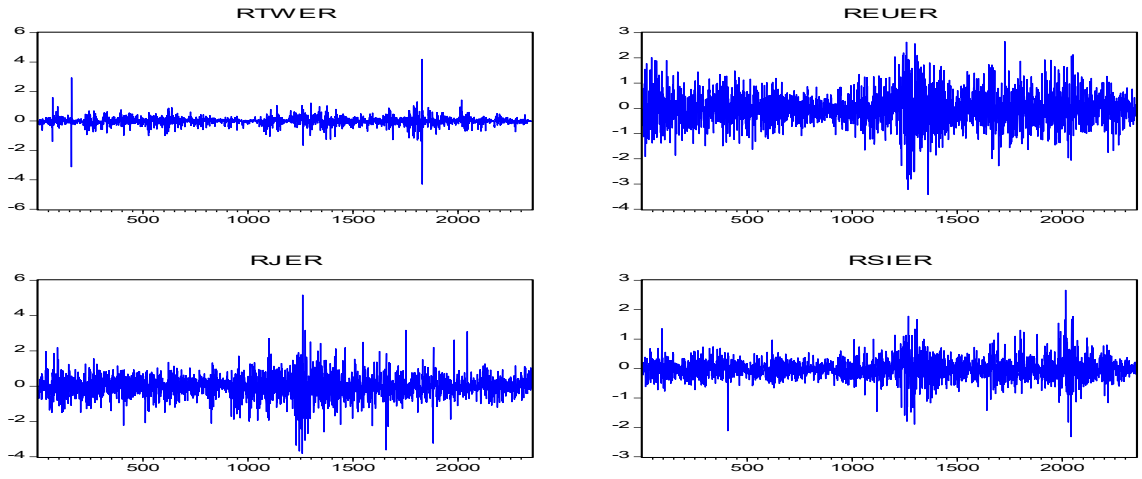

Figure 1. Trend charts of the Taiwan, the European, the Japan and the Singapore exchange rate market volatility rates.

TABLE 1. DATA STATISTICS

Statistics	RTWER	REUER	RJER	RSIER
Mean	-0.006693	-0.002003	-0.009025	-0.014051
S-D	0.314849	0.661663	0.664103	0.359548
Skew	-0.292892	-0.035609	-0.094971	0.135848
Kurtosis	40.03323	4.679542	7.735675	8.393482
J-B N (p-value)	134150.90*** (0.0000)	276.35*** (0.0000)	2196.66*** (0.0000)	2851.94*** (0.0000)
Sample	2347	2347	2347	2347

Notes: (1) J-B N is the normal distribution test of Jarque-Bera.
(2) S-D is denoted the standard deviation. (3)*** denote significance at the level 1%.

TABLE 2. UNCONTIONALAL CORRELATION COEFFICIENT

Coefficient	TWER	EUER	JER	SIER
TWER	1	0.3402	0.7093	0.8102
EUER	0.3402	1	0.2332	0.5354
JER	0.7093	0.2332	1	0.8162
SIER	0.8102	0.5354	0.8162	1

Unit root and co-integration tests

This paper further uses the unit root tests of ADF [13,14] and KSS [1] to determine the stability of the time series data. The ADF and KSS examination results are listed in Table 3. It shows that the Taiwan exchange rate volatility rates, the European exchange rate volatility rates, the Japan exchange rate volatility rates, and the Singapore exchange rate volatility rates do not have the unit root characteristic, this is, the four markets are stationary series data, under $\alpha = 1\%$ significance level.

Using Johansen's [2] co-integration test as illustrated in Table 4 at the significance level of 0.05 (α=5%) does not reveal of $\lambda_{\max}$ statistic. This indicated that the Taiwan exchange rate volatility rate does not have a co-integration relation. Therefore, we do not need to consider the model of error correction.

ARCH effect test

Based on the formula (1) and (2) as below, we uses the methods of LM test [3] and F test [4] to test the conditionally heteroskedasticity phenomenon. In Table 5, the results of the ARCH effect test show that the two markets have the conditionally heteroskedasticity phenomenon exists. This result suggests that we can use the GARCH model to match and analyze it.

TABLE 3. UNIT ROOT TEST OF KSS FOR THE RETURN DATA

ADF	RTWER	REUER	RJER	RSIER
Statistic	-9.352***	-48.657***	-12.192***	-11.717***
Critical value	-3.962	-3.412	-3.128	
Significant level	α=1%	α=5%	α=10%	
KSS	**RTWER**	**REUER**	**RJER**	**RSIER**
Statistic	-28.824***	-24.357***	-22.869***	-22.892***
Critical value	-2.82	-2.22	-1.92	
Significant level	α=1%	α=5%	α=10%	

Notes:*** denote significance at the level 1%.

TABLE 4. CO-INTEGRATION TEST (VAR LAG=5)

H_0	$\lambda_{\max}$	**Critical value**
None	17.2930	32.1183
At most 1	14.7157	25.8232
At most 2	5.2270	19.3870
At most 3	4.2138	12.5180

Notes: The lag of VAR is selected by the AIC rule [5].
The critical value is given under the level 5%.

TABLE 5. ARCH EFFECT TEST

RTWER	**Engle LM test**	**Tsay F test**
Statistic	789.041***	36.771***
(p-value)	(0.0000)	(0.0000)

Notes：*** denote significance at the level 1%.

PROPOSED MODEL

Based on the European, the Japan and the Singapore exchange rate markets can affect the exchange rate volatility of the Taiwan exchange rate market, and the European, the Japan and the Singapore exchange rate markets do have the trade correlations for the Taiwan exchange rate markets. We follows the idea of self-exciting threshold autoregressive (SETAR) model [7], the idea of double threshold GARCH model [8], and the ideas of the papers of Engle [9] and Tse & Tusi [10], and uses the positive and negative values of European, Japan and Singapore exchange rates' volatility rate are as a threshold. After model process selection, in this paper, we may use the asymmetric GARCH (called AGARCH) model to construct the volatility model of the Taiwan's exchange rate market, the AGARCH(1, 1) model is illustrated as follows:

$$RTWER_t = \phi_{10} + \sum_{j=1}^{2}(\phi_{j1} RTWER_{t-j} + \phi_{j2} REUER_{t-j} + \phi_{j3} RJER_{t-j} + \phi_{j4} RSIER_{t-j}) + a_{1,t} \quad (1)$$

$$h_{1,t} = \sum_{j=1}^{8} u_{j,t-1}(\alpha_{j0} + \alpha_{j1} a_{1,t-1}^2 + \beta_{j1} h_{1,t-1}), \quad (2)$$

$$u_{1,t} = \begin{cases} 1, & if \ REUER \le 0, RJER_t \le 0; RSIER_t \le 0 \\ 0 & if \quad others \end{cases}, \quad (3)$$

$$u_{2,t} = \begin{cases} 1, & if \ REUER \le 0, RJER_t \le 0; RSIER_t > 0 \\ 0 & if \quad others \end{cases}, \quad (4)$$

$$u_{3,t} = \begin{cases} 1, & if \ REUER \le 0, RJER_t > 0; RSIER_t \le 0 \\ 0 & if \quad others \end{cases}, \quad (5)$$

$$u_{4,t} = \begin{cases} 1, & if \ REUER > 0, RJER_t \le 0; RSIER_t \le 0 \\ 0 & if \quad others \end{cases}, \quad (6)$$

$$u_{5,t} = \begin{cases} 1, & if \ REUER > 0, RJER_t > 0; RSIER_t \le 0 \\ 0 & if \quad others \end{cases}, \quad (7)$$

$$u_{6,t} = \begin{cases} 1, & if \ REUER > 0, RJER_t \le 0; RSIER_t > 0 \\ 0 & if \quad others \end{cases}, \quad (8)$$

$$u_{7,t}=\begin{cases}1 & if\ \ REUER\le 0, RJER_t>0; RSIER_t>0\\ 0 & if\ \ others\end{cases}, \qquad (9)$$

$$u_{8,t}=\begin{cases}1 & if\ \ REUER>0, RJER_t>0; RSIER_t>0\\ 0 & if\ \ others\end{cases}, \qquad (10)$$

with $REUER_t>0$, $RJER_t>0$ and $RSIER_t>0$ denote good news, $REUER_t\le 0$, $RJER_t\le 0$ and $RSIER_t\le 0$ denote bad news. The white noise of $a_{1,t}$ is obey the Student's t distribution, this is,

$$a_{1,t}\sim T_v(0,(v-2)h_{1,t}/v), \qquad (11)$$

among v is the degree freedom of $a_{1,t}$. The maximum likelihood algorithm method of BHHH [11] is used to estimate the model's unknown parameters. The programs of RATS and EVIEWS are used in this paper.

EMPIRICAL RESULTS

From the empirical results, we know that the Taiwan's exchange rate volatility may be constructed on the AIGARCH (1, 1) model. Its estimate result is stated in Table 6.

The empirical results show that the good news and bad news of the European, the Japan and the Singapore exchange rates' volatility will produce the different exchange rates on the Taiwan's exchange rate market. And the exchange rate volatilities of the European, the Japan and the Singapore also affects the variation risks of the Taiwan exchange rate market. The Taiwan exchange rate volatility receives before 1 period's impact of the Taiwan exchange rate volatility (ϕ_{11}=-0.0860)**.** The Taiwan exchange rate volatility also receives before 2 period's impact of the European exchange rate volatility (ϕ_{12}=0.0628 and ϕ_{22}=0.0137). The Taiwan exchange rate volatility also receives before 2 period's impact of the Singapore exchange rate volatility (ϕ_{14}=0.1343 and ϕ_{24}=0.0381). The Taiwan exchange rate volatility also receives before 1 period's impact of the Japan exchange rate volatility (ϕ_{13}=0.0135). The exchange rate volatility of the European, the Japan and the Singapore exchange rate markets are also truly influent the exchange rate volatility of the Taiwan exchange rate market. In additional, estimated value of the degree of freedom for the Student's t distribution is 3.3319, and is significant under the significance level of 0.01($\alpha=1\%$). This also demonstrates that this research data has the heavy tailed distribution.

TABLE 6. PARAMETER ESTIMATION OF THE AIGARCH(1, 1) MODEL

Parameters	ϕ_{10}	ϕ_{11}	ϕ_{12}	ϕ_{13}	ϕ_{14}
Coefficient	0.0061	-0.0860	0.0628	0.0135	0.1343
(p-value)	(0.0673)	(0.0001)	(0.0000)	(0.0109)	(0.0000)
Parameters	ϕ_{21}	ϕ_{22}	ϕ_{23}	ϕ_{24}	
Coefficient	-0.0209	0.0137	0.0015	0.0381	
(p-value)	(0.2635)	(0.0710)	(0.7765)	(0.0091)	
Parameters	α_{10}	α_{11}	β_{11}	α_{20}	α_{21}
Coefficient	0.0072	0.3084	0.6916	0.0053	0.4410
(p-value)	(0.0056)	(0.0000)	(0.0000)	(0.3288)	(0.0033)
Parameters	β_{21}	α_{30}	α_{31}	β_{31}	α_{40}
Coefficient	0.5590	-0.0002	0.2051	0.7949	0.0133

(p-value)	(0.0000)	(0. 9500)	(0.0029)	(0.0000)	(0.0201)
Parameters	α_{41}	β_{41}	α_{50}	α_{51}	β_{51}
Coefficient	0.3915	0.6085	0.0079	0.1122	0.8878
(p-value)	(0.0014)	(0.0000)	(0.0960)	(0.0234)	(0.0000)
Parameters	α_{60}	α_{61}	β_{61}	α_{70}	α_{71}
Coefficient	0.0112	0.5620	0.4380	-0.0037	0.2894
(p-value)	(0.0062)	(0.0000)	(0.0000)	(0.3238)	(0.0077)
Parameters	β_{71}	α_{80}	α_{81}	β_{81}	v
Coefficient	0.7106	0.0070	0.3971	0.6029	3.3319
(p-value)	(0.0000)	(0.0139)	(0.0000)	(0.0000)	(0.0000)

Notes：p-value< α denotes significance. (α =1%, α =5%).

From the Table 6, the estimated coefficients of the conditional variance equation will produce the different variation risks under the bad news and good news of European, Japan and Singapore exchange rate markets. The empirical results show that the Taiwan exchange rate market conforms the conditionally supposition of the AIGARCH model. This result also demonstrates the AIGARCH (1, 1) model may catch the Taiwan exchange rate volatilities' process. The empirical result shows that the Taiwan exchange rate market has the fixed variation risk under the $REUER_t \le 0$ (bad news), the $RJER_t \le 0$ (bad news) and $RSIER_t \le 0$ (bad news). The Taiwan exchange rate market has also the fixed variation risk under the $REUER_t > 0$ (good news), the $RJER_t > 0$ (good news) and $RSIER_t > 0$ (good news). Besides, under the $REUER_t > 0$ (good news), the $RJER_t \le 0$ (bad news) and $RSIER_t \le 0$ (bad news), the Taiwan exchange rate market has also the fixed variation risk. Under the $REUER_t > 0$ (good news), the $RJER_t \le 0$ (bad news) and $RSIER_t > 0$ (good news), the Taiwan exchange rate market has also the fixed variation risk. In Table 6, the Taiwan exchange rate market does have the different conditional variation risks under the good and bad news. This result demonstrates that the good news and bad news of the European, the Japan and the Singapore exchange rate markets will produce the different variation risks on the Taiwan exchange rate market. For example, under the $REUER_t \le 0$ (bad news), the $RJER_t \le 0$ (bad news) and $RSIER_t \le 0$ (bad news), the empirical result shows that the variation risk of the Taiwan exchange rate market equals $\beta_{11} = 0.6916$. Under the $REUER_t > 0$ (good news), the $RJER_t > 0$ (good news) and $RSIER_t > 0$ (good news), the variation risk of the Taiwan exchange rate market equals $\beta_{81} = 0.6029$. Under the $REUER_t > 0$ (good news), the $RJER_t > 0$ (good news) and $RSIER_t \le 0$ (bad news), the variation risk of the Taiwan exchange rate market is the highest ($\beta_{51} = 0.8878$). Under the $REUER_t > 0$ (good news), the $RJER_t \le 0$ (bad news) and $RSIER_t > 0$ (good news), the variation risk of the Taiwan exchange rate market is the lowest ($\beta_{61} = 0.4380$). Therefore, the explanatory ability of the student t distribution and the AIGARCH(1, 1) model is better than the traditional model of the GARCH (1, 1).

To test the inappropriateness of the AIGARCH(1, 1) model, the test method of Ljung & Box [12] is used to examine autocorrelation of the standard residual error. This model does not show an autocorrelation of the standard residual error. Therefore, the AIGARCH(1, 1) model are more appropriate.

ASYMMETRIC TEST OF THE BIVARIATE AIGARCH(1, 1) MODEL

The AIGARCH(1, 1) model is proposed as above. The asymmetric test methods [6] are used the following four methods as: sign test, negative size bias test, positive size bias test and joint test. By the sign test, the

negative size bias test, the positive size bias test and the joint test shows that the Taiwan exchange rate market does not have the asymmetrical effect in Table 7.

TABLE 7. ASYMMETRIC TEST OF THE DCC AND THE AIGARCH(1, 1)

RTWER	**Sign test**	**Negative size bias test**
F statistic	2.4123	0.0007
(p-value)	(0. 1205)	(0.9791)
RTWER	**Positive size bias test**	**Joint test**
F statistic	1.4280	1.3274
(p-value)	(0.2322)	(0.2637)

Notes: p-value $<\alpha$ denote significance. (α =5%).

CONCLUSIONS

The empirical results show that the Taiwan exchange rate markets' volatility does have an asymmetric effect. The Taiwan exchange rate market volatility may construct in the AIGARCH (1, 1) model with a positive and negative threshold of European, Japan and Singapore exchange rate volatilities. The good and bad news of European, Japan and Singapore exchange rate markets affects the exchange rate volatility of the Taiwan exchange rate market. For example, under the $REUER_t > 0$ (good news), the $RJER_t > 0$ (good news) and $RSIER_t \le 0$ (bad news), the variation risk of the Taiwan exchange rate market is the highest ($\beta_{51} = 0.8878$). Under the $REUER_t > 0$ (good news), the $RJER_t \le 0$ (bad news) and $RSIER_t > 0$ (good news), the variation risk of the Taiwan exchange rate market is the lowest ($\beta_{61} = 0.4380$). The empirical result shows that the variation risk of the Taiwan exchange rate market receives the influence of others exchange rate markets. Therefore, the explanation ability of the AIGARCH (1, 1) is better than the traditional model of GARCH (1, 1).

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THRESHOLD MODEL OF THE JAPAN AND THE SINGAPORE EXCHANGE RATE VOLATILITY IN ASIA TWO EXCHANGE RATE MARKETS: EMPIRICAL STUDY OF THE KOREA AND THE THAILAND MARKETS

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ABSTRACT

The empirical results show that the dynamic conditional correlation (DCC) and the bivariate AIGARCH (1, 1) model is appropriate in evaluating the relationship of the Korea's and the Thailand's exchange rate markets. The empirical result also indicates that the Korea's and the Thailand's exchange rate markets is a positive relation. The average estimation value of correlation coefficient equals to 0.4059, which implies that the two exchange rate markets is synchronized influence. Besides, the empirical result also shows that the Korea's and the Thailand's exchange rate markets have an asymmetrical effect. The exchange rate volatility of the Korea and the Thailand exchange rate markets receives the influence of the good and bad news of the Japan and the Singapore exchange rate markets. For example, under the $RJER_t \le 0$ (bad news) and $RSIER_t \le 0$ (bad news), the empirical result shows that the variation risk of the Thailand exchange rate market is larger than the variation risk of the Korea exchange rate market.

Keywords- stock market returns, asymmetric effect, IGARCH model, AIGARCH model.

INTRODUCTION

We know that Korea economical physique belongs partly to an island economy. We also know that Korea is one of Asian four dragons, also Korea economy of growth in 2006 is 5%, and the forecast value of the grow rate is 4.3% in the future. Thailand has a close relationship with the Korea based on the trade and the circulation of capital, and the Korea is the most powerful global economic nation in the Asian. Besides, Korea and Thailand have a close relationship based on the trade and the circulation of capital. When the investor has an investment in the international exchange rate market, he/she will usually care about the international capital the motion situation, the international politics and the economical situation change, in particular, in the Japan and the Singapore exchange rate market change. There is a close relationship for Korea and Thailand based on the trade and the circulation of capital with the Japan and the European, but the Japan and Singapore are also powerful global economical nations. Therefore, the relationship between the Korea exchange rate market and the Thailand exchange rate market is worth further discussion with the factors of Japan and Singapore's exchange rate markets.

The purpose of the present paper is to examine the relations of the Korea's and the Thailand's exchange rate markets. This paper also further discusses the affect of the Japan and the Singapore exchange rates' volatility rate for the Korea and the Thailand exchange rate market volatilities. And the positive and negative values of Japan and Singapore exchange rates' volatility are used as the threshold. The organization of this paper is as follows: Section 2 descibes the data characteristics; Section 3 presents the proposed model; Section 4 presents the empirical results; Section 5 introduces the asymmetric test of the proposed model, and finally Section 6 summarizes the conclusions of this study.

DATA CHARACTERISTICS

1. Data sources

The research sample period was from January, 2008 to December, 2012, and the material origin takes from DataStream, a database in Taiwan. Among them, the Korea's exchange rate price is the exchange rate of Korean Won to US in New York market, the Thailand's exchange rate price is the exchange rate of Thai Baht to US in the New York market. The Japan's exchange rate price is the exchange rate of Japanese Yen to US in the New York market. The Singapore's exchange rate price is the exchange rate of Singapore to US in the New York market. In the data processing aspect, the markets do not do business on respective Korea's and Thailand's holidays; therefore when a exchange rate market is closed, this article deletes the identical time exchange rate price material and conforms to the other exchange rate market's common trading day; therefore four variable samples after processing each will be 1305 from now on.

2. Returns Calculation and Basic Statistics

To compute the volatility rate of the Korea exchange rate market adopts the natural logarithm difference, rides 100 again. The volatility rate of the Thailand exchange rate market also adopts the natural logarithm difference, rides 100 again. The volatility rate of the Japan and Singapore exchange rate markets also adopts the natural logarithm difference, rides 100 again. In Figure 1, the Korea, the Thailand, the Japan and the Singapore exchange rate volatility rates shows the clustering phenomenon, so that we may know the four exchange rate markets have certain relevance.

Table 1 presents the four sequences kurtosis coefficients are all bigger than 3, which this result implies that the normal distribution test of Jarque-Bera is not normal distribution. Therefore, the heavy tails distribution is used in this paper. And the four exchange rate markets do have the high correlation in Table 2.

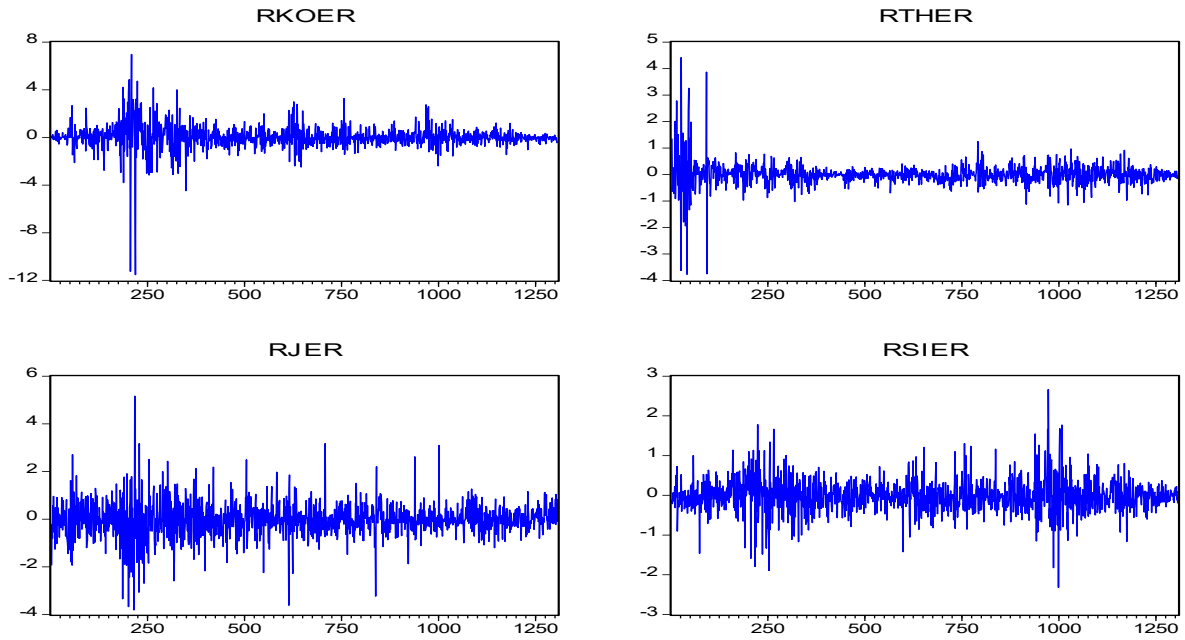

Figure 1. Trend charts of the Korea, the Thailand, the Japan and the Singapore exchange rate market volatility rates.

TABLE 1. DATA STATISTICS

Statistics	**RKOER**	**RTHER**	**RJER**	**RSIER**
Mean	0.009787	0.002289	-0.019517	-0.012620
S-D	1.010670	0.425696	0.736955	0.421676
Skew	-1.619068	0.663494	-0.004793	0.181399
Kurtosis	31.85523	35.40069	8.089935	7.070238
J-B N (p-value)	45808.97*** (0.0000)	57135.08*** (0.0000)	1407.64*** (0.0000)	907.28*** (0.0000)
Sample	1304	1304	1304	1304

Notes: (1) J-B N is the normal distribution test of Jarque-Bera.

(2) S-D is denoted the standard deviation. (3)*** denote significance at the level 1%.

TABLE 2. UNCONTIONALAL CORRELATION COEFFICIENT

Coefficient	**RKOER**	**RTHER**	**RJER**	**RSIER**
RKOER	1	0.2007	-0.1464	0.4396
RTHER	0.2007	1	0.0551	0.3302
RJER	-0.1464	0.0551	1	-0.0137
RSIER	0.4396	0.3302	-0.0137	1

3. Unit root and co-integration tests

This paper further uses the unit root tests of ADF [13, 14] and KSS [1] to determine the stability of the time series data. The ADF and KSS examination results are listed in Table 3. It shows that the Korea exchange rate volatility rates, the Thailand exchange rate volatility rates, the Japan exchange rate volatility rates, and the Singapore exchange rate volatility rates do not have the unit root characteristic, this is, the four markets are stationary series data, under $\alpha = 1\%$ significance level.

Using Johansen's [2] co-integration test as illustrated in Table 4 at the significance level of 0.05 (α =5%) does not reveal of $\lambda_{\max}$ statistic. This indicated that the Korea exchange rate volatility rates and the Thailand exchange rate volatility rates do not have a co-integration relation. Therefore, we do not need to consider the model of error correction.

4. ARCH effect test

Based on the formula (1) and (2) as below, we uses the methods of LM test [3] and F test [4] to test the conditionally heteroskedasticity phenomenon. In Table 5, the results of the ARCH effect test show that the two markets have the conditionally heteroskedasticity phenomenon exists. This result suggests that we can use the GARCH model to match and analyze it.

TABLE 3. UNIT ROOT TEST OF KSS FOR THE RETURN DATA

ADF	**RKOER**	**RTHER**	**RJER**	**RSIER**
Statistic	-9.337***	-7.515***	-7.887***	-8.916***
Critical value	-3.965	-3.413	-3.129	
Significant level	α =1%	α =5%	α =10%	
KSS	**RKOER**	**RTHER**	**RJER**	**RSIER**
Statistic	-15.851***	-27.539***	-18.889***	-18.007***

Critical value	-2.82	-2.22	-1.92	
Significant level	α =1%	α =5%	α =10%	

Notes: *** denote significance at the level 1%.

TABLE 4. CO-INTEGRATION TEST (VAR LAG=3)

H_0	$\lambda_{\max}$	**Critical value**
None	10.1030	14.2646
At most 1	2.0048	3.8415

Notes: The lag of VAR is selected by the AIC rule [5].
The critical value is given under the level 5%.

TABLE 5. ARCH EFFECT TEST

RKOER	**Engle LM test**	**Tsay F test**
Statistic	418.504***	18.660***
(p-value)	(0.0000)	(0.0000)
RTHER	**Engle LM test**	**Tsay F test**
Statistic	543.907***	29.043***
(p-value)	(0.0000)	(0.0000)

Notes： *** denote significance at the level 1%.

PROPOSED MODEL

Based on the Japan and the Singapore exchange rate markets can affect the exchange rate volatility of the Korea and the Thailand exchange rate markets, and the Japan and the Singapore exchange rate markets do have the trade correlations for the Korea and the Thailand exchange rate markets. We follows the idea of self-exciting threshold autoregressive (SETAR) model [7], the idea of double threshold GARCH model [8], and the ideas of the papers of Engle [9] and Tse & Tusi [10], and uses the positive and negative value of Japan and Singapore exchange rates' volatility rate is as a threshold. After model process selection, in this paper, we may use the bivariate asymmetric GARCH (called AGARCH) model to construct the relationships of the Korea's and the Thailand's exchange rate markets, the AGARCH(1, 1) model is illustrated as follows:

$$RKOER_t = \phi_{10} + \sum_{j=1}^{2}(\phi_{j1}RKOER_{t-j} + \phi_{j2}RTHER_{t-j} + \phi_{j3}RJER_{t-j} + \phi_{j4}RSIER_{t-j}) + a_{1,t} \quad (1)$$

$$RTHER_t = \varphi_{10} + \sum_{j=1}^{2}(\varphi_{j1}RKOER_{t-j} + \varphi_{j2}RTHER_{t-j} + \varphi_{j3}RJER_{t-j} + \varphi_{j4}RSIER_{t-j}) + a_{2,t}, \quad (2)$$

$$h_{11,t} = \sum_{j=1}^{4} u_{j,t-1}(\alpha_{j0} + \alpha_{j1}a_{1,t-1}^2 + \beta_{j1}h_{11,t-1}), \quad (3)$$

$$h_{22,t} = \sum_{j=1}^{4} u_{j,t-1}(\alpha'_{j0} + \alpha'_{j1}a_{2,t-1}^2 + \beta'_{j1}h_{22,t-1}), \quad (4)$$

$$h_{12,t} = \rho_t\sqrt{h_{11,t}}\sqrt{h_{22,t}}, \quad (5)$$

$$\rho_t = \exp(q_t)/(\exp(q_t)+1), \quad (6)$$

$$q_t = \gamma_0 + \gamma_1 \rho_{t-1} + \gamma_2 a_{1,t-1} a_{2,t-1} / \sqrt{h_{11,t-1} h_{22,t-1}}, \quad (7)$$

$$u_{1,t} = \begin{cases} 1 & , \ if \ \ RJER_t \le 0; RSIER_t \le 0 \\ 0 & if \qquad others \end{cases}, \quad (8)$$

$$u_{2,t} = \begin{cases} 1 & , \ if \ \ RJER_t \le 0; RSIER_t > 0 \\ 0 & if \qquad others \end{cases}, \quad (9)$$

$$u_{3,t} = \begin{cases} 1 & , \ if \ \ RJER_t > 0; RSIER_t \le 0 \\ 0 & if \qquad others \end{cases}, \quad (10)$$

$$u_{4,t} = \begin{cases} 1 & , \ if \ \ RJER_t > 0; RSIER_t > 0 \\ 0 & if \qquad others \end{cases}, \quad (11)$$

with $RJER_t > 0$ and $RSIER_t > 0$ denote good news, $RJER_t \le 0$ and $RSIER_t \le 0$ denote bad news. The white noise of $\vec{a}_t' = (a_{1,t}, a_{2,t})$ is obey the bivariate Student's t distribution, this is,

$$\vec{a}_t \sim T_v(\vec{0}, (v-2)H_t / v), \quad (12)$$

among $\vec{0}' = (0,0)$ and H_t is the covariance matrix of $\vec{a}_t' = (a_{1,t}, a_{2,t})$, and ρ_t is the dynamic conditional correlation coefficient of $a_{1,t}$ and $a_{2,t}$. The maximum likelihood algorithm method of BHHH [11] is used to estimate the model's unknown parameters. The programs of RATS and EVIEWS are used in this paper.

IV. EMPIRICAL RESULTS

From the empirical results, we know that the Korea's and the Thailand's exchange rate volatility may be constructed on the DCC and the bivariate AIGARCH (1, 1) model. Its estimate result is stated in Table 6.

The empirical results show that the good news and bad news of the Japan and the European exchange rates' volatility will produce the different exchange rates on the Korea and the Thailand exchange rate markets. And the exchange rate volatilities of the Japan and the Singapore also affects the volatility rates of the Korea and the Thailand exchange rate markets. The Korea exchange rate volatility receives before 1 period's impact of the Korea exchange rate volatility (ϕ_{11}=-0.2042)**.** The Korea exchange rate volatility also receives before 1 period's impact of the Japan exchange rate volatility (ϕ_{13}=-0.0653). The Korea exchange rate volatility does not receive before 2 period's impact of the Thailand exchange rate volatility. The Korea exchange rate volatility also receives before 1 period's impact of the Singapore exchange rate volatility (ϕ_{14}=0.4436). The Thailand exchange rate volatility does not receive before 2 period's impact of the Thailand exchange rate volatility. The Thailand exchange rate volatility receives before 1 period's impact of the Korea exchange rate volatility (φ_{11}=-0.0175). The Thailand exchange rate volatility receives before 1 period's impact of the Japan exchange rate volatility (φ_{13}=0.0210). The Thailand exchange rate volatility also receives before 1 period's impact of the Singapore exchange rate volatility (φ_{14}=0.0825). The exchange rate volatility of the Japan and the Singapore exchange rate markets are also truly influent the exchange rate volatility of the Thailand and the Korea exchange rate markets.

On the other hand, the correlation coefficient average estimation value ($\hat{\bar{\rho}}_t$=0.4059) of the Korea and the Thailand exchange rate volatility is significant. This result also shows the Korea and the Thailand exchange rate volatility is mutually synchronized influence. In additional, estimated value of the degree of freedom for the Student's t distribution is 4.5902, and is significant under the significance level of 0.01($\alpha = 1\%$). This also demonstrates that this research data has the heavy tailed distribution.

TABLE 6. PARAMETER ESTIMATION OF THE DCC AND THE BIVARIATE AIGARCH(1, 1) MODEL

Parameters	ϕ_{10}	ϕ_{11}	ϕ_{12}	ϕ_{13}	ϕ_{14}
Coefficient	-0.0226	-0.2042	0.0322	-0.0653	0.4436
(p-value)	(0.0901)	(0.0000)	(0.3430)	(0.0030)	(0.0000)
Parameters	ϕ_{21}	ϕ_{22}	ϕ_{23}	ϕ_{24}	φ_{10}
Coefficient	-0.0206	0.0395	-0.0301	0.0252	-0.00
(p-value)	(0.4870)	(0.2778)	(0.1772)	(0.5850)	(0.3039)
Parameters	φ_{11}	φ_{12}	φ_{13}	φ_{14}	φ_{21}
Coefficient	-0.0175	-0.0265	0.0210	0.0825	0.0023
(p-value)	(0.0059)	(0.3773)	(0.0072)	(0.0000)	(0.7269)
Parameters	φ_{22}	φ_{23}	φ_{24}	α_{10}	α_{11}
Coefficient	0.0100	-0.0025	-0.0004	0.0079	0.1367
(p-value)	(0.7370)	(0.7631)	(0.9814)	(0.4286)	(0.0002)
Parameters	β_{11}	α_{20}	α_{21}	β_{21}	α_{30}
Coefficient	0.8633	0.0328	0.2617	0.7383	0.0007
(p-value)	(0.0000)	(0.0536)	(0.0000)	(0.0000)	(0. 9584)
Parameters	α_{31}	β_{31}	α_{40}	α_{41}	β_{41}
Coefficient	0.1965	0.8035	0.0074	0.1289	0.8711
(p-value)	(0.0000)	(0.0000)	(0.5061)	(0.0016)	(0.0000)
Parameters	α'_{10}	α'_{11}	β'_{11}	α'_{20}	α'_{21}
Coefficient	0.0037	0.1226	0.8774	0.0030	0.2157
(p-value)	(0.0129)	(0.0003)	(0.0000)	(0.1178)	(0.0000)
Parameters	β'_{21}	α'_{30}	α'_{31}	β'_{31}	α'_{40}
Coefficient	0.7843	-0.0014	0.1359	0.8641	0.0020
(p-value)	(0.0000)	(0.4307)	(0.0036)	(0.0000)	(0.3231)
Parameters	α'_{41}	β'_{41}	γ_0	γ_1	γ_2
Coefficient	0.2300	0.7700	-1.9497	3.8532	0.0105
(p-value)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.4633)
Parameters	v	$\overline{\rho}_t$	**min** ρ_t	**max** ρ_t	
Coefficient	4.5339	0.4059	0.3738	0.5408	
(p-value)	(0.0000)	(0.0000)			

Notes：p-value$<\alpha$ denotes significance. (α =1%, α =5%).

min ρ_t denotes the minimum ρ_t and max ρ_t denotes the maximum ρ_t .

From the Table 6, the estimated coefficients of the conditional variance equation will produce the different variation risks under the bad news and good news of Japan and Singapore exchange rate markets. The empirical results show that the Korea exchange rate market conforms the conditionally supposition of the AIGARCH model. The empirical results also show that the Thailand exchange rate market is the

AIGARCH model. This result also demonstrates the DCC and the bivariate AIGARCH (1, 1) model may catch the Korea and the Thailand exchange rate volatilities' process. The empirical result shows that the Korea exchange rate market has the fixed variation risk under the $RJER_t \le 0$ (bad news) and $RSIER_t > 0$ (good news). And the Thailand exchange rate market has also a fixed variation risk under the $RJER_t \le 0$ (bad news) and $RSIER_t \le 0$ (bad news). In Table 6, the Korea and the Thailand exchange rate markets do have the different conditional variation risks. This result demonstrates that the good news and bad news of the Japan and the Singapore exchange rate markets will produce the different variation risks on the Korea and the Thailand exchange rate markets. Under the $RJER_t > 0$ and $RSIER_t \le 0$, the empirical result shows that the variation risk of the Thailand exchange rate market is larger than the variation risk of the Korea exchange rate market. Under the $RJER_t \le 0$ (bad news) and $RSIER_t \le 0$ (bad news), the empirical result shows that the variation risk of the Thailand exchange rate market is larger than the variation risk of the Korea exchange rate market. Besides, under the $RJER_t > 0$ (good news) and $RSIER_t > 0$ (good news), the empirical result also shows that the variation risk of the Korea exchange rate market is larger than the variation risk of the Thailand exchange rate market. Therefore, the explanatory ability of the DCC and the bivariate AIGARCH(1, 1) model is better than the model of the bivariate IGARCH (1, 1).

To test the inappropriateness of the DCC and the bivariate AIGARCH(1, 1) model, the test method of Ljung & Box [12] is used to examine autocorrelation of the standard residual error. This model does not show an autocorrelation of the standard residual error. Therefore, the DCC and the bivariate AIGARCH(1, 1) model are more appropriate.

ASYMMETRIC TEST OF THE BIVARIATE AIGARCH(1, 1) MODEL

The bivariate AIGARCH(1, 1) model is proposed as above. The asymmetric test methods [6] are used the following two methods as: positive size bias test and joint test.

By the positive size bias test and the joint test shows that the Korea exchange rate market does not have the asymmetrical effect and the Thailand exchange rate market does not also have the asymmetrical effect in Table 7.

TABLE 7. ASYMMETRIC TEST OF THE DCC AND THE BIVARIATE-AIGARCH(1, 1)

RKOER	**Positive size bias test**	**Joint test**
F statistic	0.1458	1.1158
(p-value)	(0. 7027)	(0.3415)
RTHER	**Positive size bias test**	**Joint test**
F statistic	1.4455	0.9647
(p-value)	(0.2295)	(0.4086)

Notes: p-value $<\alpha$ denote significance. (α =5%).

CONCLUSIONS

The empirical results show that the Korea exchange rate markets' volatility does have an asymmetric effect and the Thailand exchange rate markets' volatility does have the asymmetric effect. The Korea and the Thailand exchange rate market volatility may construct in the DCC and the bivariate AIGARCH (1, 1) model with a positive and negative threshold of Japan and Singapore exchange rate volatility rates. From the empirical result also obtains that the dynamic conditional correlation coefficient estimation value ($\hat{\rho}_t$=0.4059) of the Korea and the Thailand exchange rate volatility is positive. The good and bad news of Japan and Singapore exchange rate markets affects the exchange rate volatility of the Korea and the Thailand exchange rate markets. Under the $RJER_t > 0$ (good news) and $RSIER_t > 0$ (good news), the empirical result

shows that the variation risk of the Korea exchange rate market is larger than the variation risk of the Thailand exchange rate market. Under the $RJER_t > 0$ and $RSIER_t \le 0$, the empirical result also shows that the variation risk of the Thailand exchange rate market is larger than the variation risk of the Korea exchange rate market. Therefore, the explanation ability of the bivariate AIGARCH (1, 1) is better than the traditional bivariate GARCH (1, 1) model with a DCC.

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THE VALUE AT RISK OF VIRTUAL CURRENCIES

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This research studies the return rate and value at risk of Bitcoin(BTC), Ripple(XRP), and Litecoin(LTC). In terms of return rate, whether it's return rate per day, month, or year, XRP remains the highest, having a max return rate at 179.37% per day, 816.78% per month, and an unbelievable 35564.44% per year. Though being the lowest among the above three, BTC still scores a promising return rate at 25.25% per day, 69.63% per month, and 1368.90% per year.

In terms of value at risk, through 4 methods which are Absolute 99%VAR(%), Relative 99%VaR(%), Historical Simulation, Monte Carlo Simulation, BTC, LTC, and XRP result in 10.12%, 15.55%, and 19.51% in average respectively, telling that BTC has a relatively low VaR, leaving XRP relatively high.

Keywords: Bitcoin(BTC), Ripple(XRP), Litecoin(LTC), VaR(Value at Risk)

INTRODUCTION

In recent years, the rising merchandise for investment is virtual currency. It was originally announced by an America-Born Japanese Satoshi Nakamoto, starting the financial system of Bitcoin, starting a brand new current in the financial market, not only bringing a variety of financial merchandise, but also causing a great impact on the investment market.

Before 2010, bitcoins have always cost less than 1 USD. With its price appreciating recent years, hitting a record at 19000 USD in 2017.12, but depreciated 40% right after. Such tumble caused other virtual currencies to decline, showing that virtual currencies have a high return and risk, and are highly relative to each other. Currently there are over 1300 kinds of virtual currencies, with Bitcoin(BTC), Ethereum(ETH), Bitcoin Cash(BTH), Ripple(XRP), and Litecoin(LTC) being the top 5. This research aims to study Bitcoin(BTC), Ripple(XRP), and Litecoin(LTC), calculating their return rate and value at risk from 2014.1.1 to 2018.3.31 in order to

finish the following two research purposes:

1.Analyze the return rate of the top 3 virtual currencies.

2.Investigating the value at risk of the top 3 virtual currencies.

LITERATURE REVIEW

Fry and Cheah(2016) used the close relationship of Statistical Mechanics and Mathematical Finance to create a model adaptable to Financial Bubbles. It can be used to monitor the stability of financial system and its political influences. Their research emphasizes the timeliness of their contribution with an application to the two largest cryptocurrency markets: Bitcoin and Ripple. Results show the up-and-coming debate of the encrypted currency market's attributes and rival currencies' competition. HamedAl-Yahyaee, Mensi,and Yoon(2018) used MultiFractal Detrended Fluctuation Analysis(MF-DFA) method to assess and compare the efficiency of the Bitcoin market with gold, stock, and foreign exchange markets. Researches show that the Bitcoin market has a greater long-term memorial characteristic and multi-division, thus it has a lower Efficient-market hypothesis. Urquhart(2018) investigated the reason why Bitcoin gained attention of media and investors through examining the relationship between investor attention and Bitcoin fundamentals. Results show that realized volatility and volume are both significant drivers of next day attention of Bitcoin.

Caporale, Gil-Alana and Plastun(2018) examines persistence in the cryptocurrency market. During 2013-2017, by using R/S analysis and fractional integration, the study analyzes BitCoin, LiteCoin, Ripple and Dash. The findings indicate that this market exhibits persistence, meaning that there is a positive correlation between its past and future values, and that its degree changes over time. Corbet, Meegan, Larkin, Lucey and Yarovaya(2018) analyze, in the time and frequency domains, the relationships between three popular cryptocurrencies and a variety of other financial assets, finding that cryptocurrencies may offer diversification benefits for investors with short investment horizons, while time variation in the linkages reflects external economic and financial shocks.

Hendricks(1996) finds that using data of a longer time range can lead to a more precise VaR result, while VaR results under 95% confidence level are more precise than those under 99%. Engle and Gizycki(1999) used Historical Simulation Method, Correlation Method, Extreme Value Theory, and Monte Carlo Method to compare the VaR of foreign currencies in Australian and found that Historical Simulation Method and Extreme Value Theory is better than the others.

Bollerslev and Todorov(2010) provides a new framework for estimating the systematic and idiosyncratic jump tail risks in financial asset prices. It finds that the

distributions of the systematic and idiosyncratic jumps are both generally heavy-tailed and close to symmetric, and show how the jump tail dependencies deduced from the high-frequency data together with the day-to-day variation in the diffusive volatility account for the “extreme” joint dependencies observed at the daily level.

STUDY METHODS

Jorion (2000) proposes that VaR evaluation models can be divided into local evaluation and full evaluation types. The former includes the delta-normal method, equally weighted moving average method, exponentially weighted moving average (EWMA) method, and GARCH model. The latter includes the risk metrics model, historical simulation method and Monte Carlo simulation method. Different models applied under different hypotheses with different parameters will result in dissimilar values at risk. In this paper, the variance-covariance method, historical simulation method and Monte Carlo simulation method will be used to calculate the VaR of the ETFs from the Next 11 nations and 99% confidence level will be adopted. The confidence level can reflect the degree of investment institutions’ risk avoidance. The higher the confidence level, the more conservative an investment institution will be toward risk and the larger the capital needed will be. The VaR calculation under each model is as follows:

(1)Variance-covariance method

The variance-covariance method can be divided into relative VaR and absolute VaR types. When the former is adopted, it means the expected return is taken into consideration in the investment portfolio and the expected return and the minimum return are applied to calculate the loss. When the latter is adopted, the expected return μ is defined as zero. Calculation performed with the variance-covariance method is as follows:

$$\text{relative VaR}(\%)=E(W)-W^* = -W_0(R^*-\mu), \quad (5)$$

$$\text{absolute VaR}(\%)= W_0-W^* = -W_0R^*。 \quad (6)$$

In that, E(W) is the expected rate of return $W_0(1-\mu)$ when the portfolio is due. W_0 is the original amount invested. μ is the expected value of rate of return. W* is the minimum return $W_0(1+R^*)$ when the portfolio is due. R* is the minimum critical rate of return.

(2)Historical-Simulation method

The historical simulation method uses return data from the past to simulate the probability distribution of returns in the future. The various risk factors (stock price, interest rate, exchange rate, etc.) of the investment portfolio are applied to simulate the probability distribution of price changes in the investment portfolio in the future and calculate the VaR. The VaR calculation with the historical simulation method is as follows:

$$R_{p,t} = \sum_{i=1}^{N} w_{i,t} R_{i,t} \qquad \tau = 1.2.3..t, \tag{7}$$

In that, w_t is the current weight value. The rate of return calculated is based on the hypothetical investment portfolio established according to the current condition. Initially, the historical returns during the sample period are sequenced in ascending order. Then, the number α percentile (the positive critical value adopted) is the risk estimate obtained with the historical simulation method.

The historical simulation method can clearly reflect the probability distribution of each risk factor; it is not easy to be affected by the model settings. However, if the period chosen is too short, the reliability of the risk estimates will not be high. On the other hand, if the period chosen is too long, the risk estimates obtained cannot reflect the current market condition.

(3) Monte Carlo simulation method

The Monte Carlo simulation method uses a random process to simulate a large number of future price paths of the asset. During calculation, it is hypothesized that the random process complies with a specific probability distribution. A target asset is selected to estimate its average rate of return and standard deviation. Then random sampling is conducted under standard normal distribution (such as the number of times of simulation n=2,000) to obtain 2,000 standard normal variances Zi. The 2,000 Zi are substituted in Ri =μ+Zi*σ to obtain 2,000 simulated normally distributed returns Ri. Next, the 2,000 normally distributed returns are arranged in ascending order and the number α percentile (the positive critical value adopted) is the risk estimate obtained with the Monte Carlo simulation method.

EMPIRICAL RESULT

This study focuses on Bitcoin(BTC), Litecoin(LTC), and Ripple(XRP), using data from 2014.1.1 to 2018.3.31 to assess remunerations per day, month, and year of the three virtual currencies above, then using Historical Simulation Method, Correlation Method, Monte Carlo Method to calculate the value at risk.

1. Return Rate

Selecting a total of 1550 data from 2014.1.1 to 2018.3.31, we calculated the average rate of return, standard deviation, maximum, and minimum as shown in Table 1, 2, and 3.

In terms of daily rate of return, BTC's average daily return rate is 0.22%, standard deviation is 4.03%, maximum is 25.25%, and minimum is -21.15%. LTC's average daily return rate is 29%, standard deviation is 6.31%, maximum is 66.59%, and minimum is 40.19%. XRP's average daily return rate is 0.48%, standard deviation is 8.51%, maximum is 179.37% and minimum is -46%。

Table 1 Statistical Analysis of BTC/LTC/XRP daily rate of return

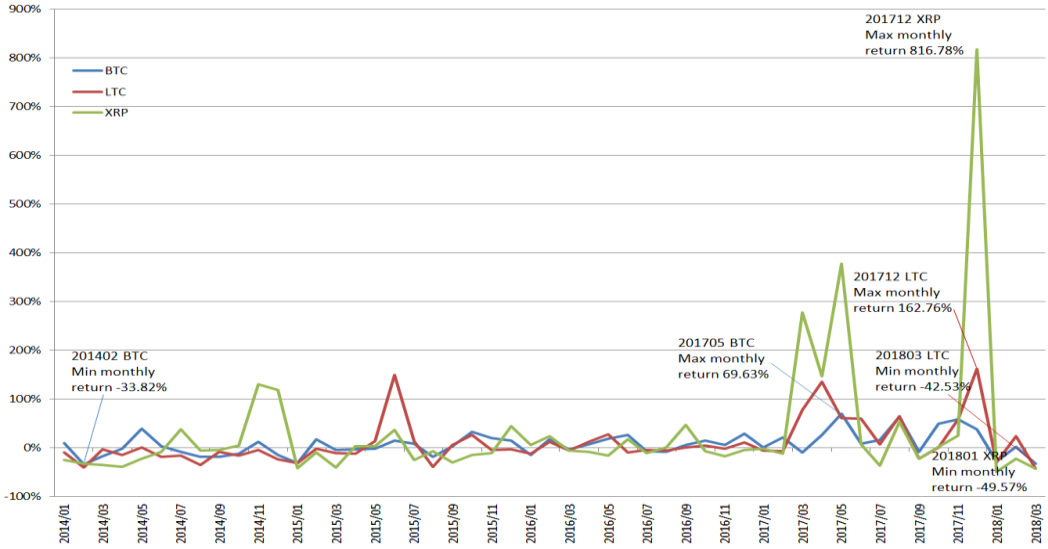
	BTC	LTC	XRP
Average Rate of Return(daily)	0.22%	0.29%	0.48%
Standard Deviation	4.03%	6.31%	8.51%
Min	-21.15%	-40.19%	-46.00%
Max	25.25%	66.59%	179.37%
Number	1550	1550	1550

In terms of monthly rate of return, selecting 51 data from 2014.01 to 2018.03, as shown in Table 2 and Figure 1. BTC's average monthly return rate is 6.95%, standard deviation is 23.73%, maximum is 69.63%, and minimum is -33.82%. LTC's average monthly return rate is 9.58%, standard deviation is 44.12%, maximum is 162.76%, and minimum is -42.53%. XRP's average monthly return rate is 30.66%, standard deviation is 135.7%, maximum is 816.78% and minimum is -49.57%.

Table 2 Statistical Analysis of BTC/LTC/XRP monthly rate of return

	BTC	LTC	XRP
Average Rate of Return(monthly)	6.95%	9.58%	30.66%
Standard Deviation	23.73%	44.12%	135.70%
Min	-33.82%	-42.53%	-49.57%
Max	69.63%	162.76%	816.78%
Number	51	51	51

Figure 1 BTC/LTC/XRP monthly rate of return (2014/01~2018/03)



In terms of yearly rate of return, from 2014.01 to 2018.03, a total of 4 data, as shown in Table 3. BTC, LTC, and XRP all shown a negative growth in 2014, which are -57.54%, -88.83%, -10.58% respectively. BTC, LTC, and XRP all shown a positive growth during 2015 to 2017, with XRP reaching up to 35564.44% and BTC and LTC resulting in 1368.9%, 5260.28% respectively.

Table 3 Statistical Analysis of BTC/LTC/XRP yearly rate of return

Average Rate of Return(yearly)	BTC	LTC	XRP
2014	-57.54%	-88.83%	-10.58%
2015	34.47%	27.94%	-75.28%
2016	123.83%	24.43%	6.77%
2017	1368.90%	5260.28%	35564.44%

2. Value at risk analysis

This study follows Basel Accords' 99% Confidence Level (Z(1%) = -2.33), thus calculating the VaR under 99% confidence level and showing the value positively.

Results show that BTC's average VaR is 10.12%, between 7.91% and 11.92%. LTC's average VaR is 15.55%, between 14.32% and 18.76%. XRP's average VaR is 19.51%, between 15.97% and 22.88%.

Under 99% confidence level, BTC's Absolute 99%VaR is 9.16%, Relative 99%VaR is 7.91%, Historical Simulation Method is 11.49%, Monte Carlo Method is 11.92%. LTC's Absolute 99%VaR is 14.42%, Relative 99%VaR is 14.71%, Historical Simulation Method is 14.32%, Monte Carlo Method is 18.75%. XRP's Absolute 99%VaR is 19.35%, Relative 99%VaR is 19.82%, Historical Simulation

Method is 15.97%, Monte Carlo Method is 22.88%.

We can tell from data above that LTC and XRP both have higher VaRs than BTC. Therefore, investors are suggested to choose BTC for investment, which has a lower risk.

Table 4 VaR of BTC/LTC/XRP

	BTC	LTC	XRP
Absolute 99%VaR(%)	9.16%	14.42%	19.35%
Relative 99%VaR(%)	7.91%	14.71%	19.82%
Historical Simulation	11.49%	14.32%	15.97%
Monte Carlo Simulation	11.92%	18.75%	22.88%
VaR of Average	10.12%	15.55%	19.51%

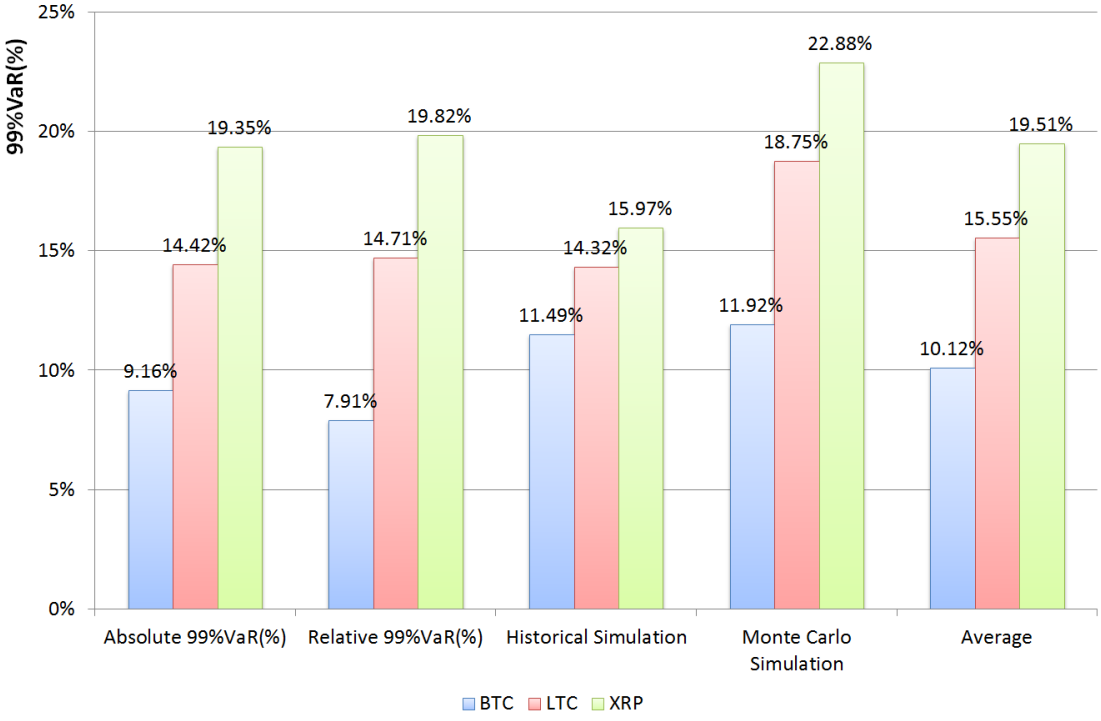


Figure 2 VaR of BTC/LTC/XRP

CONCLUSION OF STUDY

This study assessed the daily, monthly, and yearly return rate and VaR of BTC, LTC, and RXP based on closing price data from 2014.1.1 to 2018.3.31. Conclusions according to return rates and VaRs are listed below respectively.

In terms of return rate, all three virtual currencies show positive values in average daily and monthly return rates, which are 0.22%, 6.95% respectively for BTC, 0.29%, 9.58% for LTC, and 0.48%, 30.66% for XRP. Yearly return rates show unsteady results, with BTC resulting in a negative growth -57.54% for 2014 then a

positive growth 1368.9% for 2015-2017, while results for LTC and XRP show a same trend, ending up being -88.83%, -10.58% during 2014 and 5260%, 35564.44% during 2015-2017 respectively. In conclusion, XRP show better results in daily, monthly, and yearly return rates than the other two.

In terms of value at risk, BTC's average VaR is 10.12%, between 7.91% and 11.92%. LTC's average VaR is 15.55%, between 14.32% and 18.76%. XRP's average VaR is 19.51%, between 15.97% and 22.88%. As a result, BTC has a lower VaR than LTC and XRP. Therefore, it is a more conservative investment object.

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DOES FAMILY OWNERSHIP AFFECT EARNINGS QUALITY? THE CASE OF SOUTH KOREA

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Keywords: Chaebol , Earnings Quality, Family Ownership, Panel Data ,Wedge

ABSTRACT

This paper investigates how family ownership affects earnings quality of firms listed on the Korean Stock Exchange (KSE), one of the highest family ownership capital markets in the world during the period 2000 to 2012 using panel data. In addition, this study decompose family ownership into two categories: pure family ownership and ownership-control disparity. This paper tests earnings quality using four proxies, proposed by Jonas and Blanchet (2000): 1) persistence, 2) value relevance, 3) conservatism, and 4) accruals quality. This research finds family ownership is positively associated with earnings quality; value-relevance and accruals quality. However, this study does not find that ownership-control disparity reduces earnings quality. Inconsistent with prior research, the ownership-control disparity positively affects earnings quality. Controlling family shareholders of Chaebol firms have a dominant influence on firms they invest in using affiliated ownership. Significant ownership-control disparity is prevalent in Chaebol firms, resulting in low earnings quality.

INTRODUCTION

Family firm is common business form around the world even in the countries with well-developed corporate governance. Most public firms are generally owned, controlled and managed by the family shareholders who are the founders and their heirs, and families (Schleifer and Vishny 1986; La Porta, Lopez-de-Silanes, and Shleifer 1999). For example, publicly traded firms in more than half of East Asian corporations are family controlled (La Porta et al. 1999) and 30 per cent of the S&P 500 in the U.S. is a family firm (Anderson and Reeb 2003; Chen et al. 2008). According to the Korean Chamber of Commerce's investigation (2006), 68.3 per cent of firms in Korea are managed by the controlling family Controlling families use cross-holdings of affiliated firms to strengthen their control. The controlling shareholder, usually the founder and his/her family members, tends to play a dominant role in the decision-making process in Korea firms through a chain of ownership relation called as pyramidal ownership (Lim and Kim 2005). La Porta et al. (1999) define a pyramid as a hierarchical chain by which a family controls a firm and cross-shareholding as a structure through which a controlled firm owns shares of its controlling firm or other firms in that chain of control, which is more pronounced in countries with poor investor protection, especially in East Asian countries (Claessens et al. 2002). This ownership structure in Korea permits controlling families to have immense influence at all levels of management, and makes it easier to expropriate minority shareholders. The IMF and the World Bank note that the dominant family ownership using affiliated firms was one of the primary causes of the financial crisis in 1997, and the biggest obstacle in improving corporate governance in Korea (Jang et. al 2002).

Specifically, the business groups (so-called *Chaebol*)[1] in Korea which are controlled by families, and the controlling families have a huge managerial power over the whole group despite their small fraction of shareholding as low as 10 per cent (Jung and Kwon 2002). This immense control power is achieved through the holdings of the controlling family and affiliated firms. Although the owners of family firms including *chaebol* possess ultimate authority in the firm's decision-making process, they are not burdened with equivalent responsibility for their managerial decisions. In addition, the controlling power of family members in excess of their cash flow rights provides them with more means and greater opportunities to expropriate firm resources for their own benefit. Thus, they have incentives to expropriate other minority investors in the firm by allocating firm's resources

[1] The Korea Fair Trade Commission defines a *chaebol* as a group of firms of which more than 30 per cent of shares are owned by the group's controlling shareholders and its affiliated firms.

to maximize their own welfare and to manipulate earnings in order to maintain their control over the firm. Given these unique feature of family ownership in Korea, it is an empirical question how family ownership influence earnings quality. This study investigates the relation between family ownership earnings quality in the post crisis period 2000 to 2012 using panel data set of publicly listed firms on Korean Stock Exchange (KSE).

This study contributes to the literature in several ways. First, in terms of family ownership, This study measures family ownership three different ways: family ownership, pure family ownership, and ownership-control disparity[2] to test different impact of family ownership on firm value and earnings quality. Prior research (Mørck et al. 1988; Lemmon and Lins 2003) find that firms with highly concentrated family ownership have higher firm value because the interest of controlling family is more aligned to the firm's market value. More recently, Wang (2006) and Ali et al. (2007) find that family ownership is associated with higher earnings quality because family members' interests are better aligned with other shareholders' welfare and they tend to monitor the firm's management more cautiously, thereby supplying higher earnings quality to financial statement users. However, in contrast to the positive effect of family ownership, Bebchuk, Kraakma, and Triantis (2000) pay attention to the downside of "a controlling-minor structure" where a shareholder with a small cash flow rights controls entire firms. According to Bebchuk et al. (2000), "a controlling minor structure" is accomplished through dual-class share structures, pyramidal structure, and cross-ownership.

In Korea, dual-class share structure and cross-share ownership are prohibited by the Fair Trade Act. Thus, the pyramidal structure using affiliated firms is the most common type of controlling family ownership among Korean firms (Jang, Kim, and Kim 2002). Previous Korean studies (Joh 2003; Kim and Yi 2006) show that a higher control-ownership disparity was prevalent in Korea, thereby exacerbating agency problems and leading to low firm performance and earnings quality. Thus, it is important to classify family ownership into pure family ownership and ownership-control disparity because pure family ownership and ownership-control disparity can differently affect earnings quality. Family ownership is predominant in a number of countries, especially in East-Asian countries. Hence, the results of this study are important not only for the Korean context, but will also contribute to understanding of family ownership and earnings quality in other East Asian countries. Finanlly, this study extends prior research by comprehensively exploring the effects of

[2] La Porta *et al*. (2002) define the difference between control rights and cash flow rights

family ownership on four measures of earnings quality: persistence, value-relevance, conservatism, and accruals quality. The remainder of this paper is organized as follows. The next section reviews the previous research and develop research question. Then, in section 3, the sample, data sources and sampling procedure are represented as well as the research method. Section 4 provides the empirical results are reported and conclusions are reported in section 5.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

Earnings Quality

Earnings quality, as a measure of financial reporting quality, is the most primary measure provided in financial statements (Lev 1989) and the most comprehensive measure for financial reporting quality (Balsam et al. 2003). In this study, earnings quality as a proxy of financial reporting quality can be assessed by two types of different approaches: user needs and shareholder/investor protection following Jonas and Blanchet (2000). In the view of user needs, the purpose of financial statements should provide useful information to users in making economic decision, thereby making a difference to their decisions. Schipper and Vincent (2003) propose that earnings persistence and value-relevance are derived from a decision usefulness perspective. Under the category of shareholder/investor protection, financial information should not mislead or confuse financial information users and should be fully and fairly disclosed because information asymmetry occurs between management and financial information users. Ball et al. (2000 and 2003) assert that conservatism captures financial statement transparency. Schipper and Vincent (2003) suggest that accruals quality is consistent with the representational faithfulness perspective. In the context of shareholder/investor protection, earnings quality can be measured by conservatism and accruals quality.

Family Ownership

The relationship between family ownership and earnings quality is explained using two conflicting hypotheses: the alignment hypothesis and the entrenchment hypothesis. Jensen and Meckling (1976) and Fama and Jensen (1983) argue that managerial ownership aligns the interests of owners and managers, and reduces the agency costs associated with separation of decision control when management has reduced ownership in the firm. Demsetz and Lehn (1985) assert that large shareholders have a stronger and superior oversights incentive to monitor managers since their wealth is closely linked to firm welfare. Families can reduce agency problems by placing one of their members in the

position of CEO (Anderson, Mansi, and Reeb 2003). Since families are long-term investors and want to pass the firm onto descendants, family ownership is stable and is able to maintain efficient investment strategy to increase firm value (James 1999). Further, Anderson and Reeb (2003) find that family firms have significantly better firm performance than non-family firms. It implies that family ownership has strong incentives to closely monitor manager and is likely to have better information on firm, thereby reducing the cost of debt. Wang (2006) examines the impact of family ownership on earnings quality. The result shows that family ownership is positively associated with higher earnings quality (proxied by abnormal accruals, earnings response coefficients, and conservatism), suggesting that family ownership has strong incentive to monitor management as long-term investors. In the view of the alignment effect of family ownership, family ownership has a strong monitoring incentive to keep their wealth as long-term investors. Thus, higher family ownership has incentive to produce higher earnings quality.

In contrast, an different argument offers positive effects of family ownership on earnings quality. Management entrenchment could occur when insider holdings are high, causing a moral hazard and informative asymmetry problem between the insiders (owner-manager) and outside investors (Morck, Shleifer, and Vishny 1988). Altruism arise agency cost since family management expose firms to moral hazards. Founding family has strong incentive to pass the firm to their heirs. Thus, founding family view their firms as an asset to bequeath to family members or their descendents (Anderson et al. 2003). In most family firms, family members serve as the firm's CEO or key member of management excluding more capable and talented outside or professional managers. Family firms may inadvertently hire lower quality management, results in lower firm performance. Altruism alters the incentive structure of family firms and many of the agency benefits are offset by moral hazards. Owner management does not minimize the agency costs of ownership within family firms (Schulze et al. 2001). Controlling shareholders are generally not willing to loss their control of the firm. Tenacity of control can more closely align the firm's actions with their own interests. Gomez-Mejia et al. (2001) find family ownership and control is associated with greater managerial entrenchment in Spanish firms. Prencipe and Bar-Yosef (2011) also evidence that impact of board independence on earnings management is weaker in family-controlled companies due to board control of family CEO.

Specifically, in East Asian emerging-market countries, a substantial number of firms are owned and managed by controlling families (Claessens et al. 2000). Fan and Wong (2002)

suggest that controlling family shareholders in East Asian countries tend to take advantage of flexibility and discretion over accounting choice and auditor selection to distort the firm's true earnings performance. Ball et al. (2003) find that earnings quality of four East Asian countries (Hong Kong, Singapore, Malaysia, and Thailand) is low despite receiving common-law accounting regimes. They interpret that controlling family ownership overrides incentives to report higher-quality earnings. Thus, higher quality of earnings is determined by the incentives of financial statement preparers (controlling family shareholders or family owner), not by legal/judicial or accounting regimes. More recently, Ki, Hung, Chen and Lieu (2015) find family firms in Taiwan are more likely to engage in earnings management than are nonfamily firms. In the view of entrenchment effect of family ownership, as family shareholdings increase, family managers become less constrained by disciplinary forces, and more entrenched, thereby higher family ownership can provide lower quality of earnings.

Hypotheses Developmet

The features of Korean firms are their concentrated share ownership within controlling family shareholders and their affiliated firms, and their highly diversified business structure. To achieve control of the firms, controlling family shareholders can control firms through a chain of ownership relation (pyramidal ownership). Korean family ownership structure shows a significant divergence between control (voting rights) and ownership (cash flow rights) of controlling. This is made possible because there exist extensive reciprocal shareholding agreements among member firms and there are few mechanisms to control the discretionary power of controlling shareholders. Due to a high disparity between cash flow rights and control rights, controlling shareholders have incentives as well as discretionary powers to expropriate minority investors by investing the firm's resources to maximize their own or the group's wealth, even when such investments do not maximize the value of the firm (Bae et al. 2002). The effect of the expropriation activities eventually should show up in the firms accounting earnings and book values, which would result in some disciplinary actions by outside investors and the regulatory body. Thus, controlling shareholders have incentives to hide the firms' true economic performance to reduce outsider interference.

However, Warfield et al. (1995) find high cash flow rights (ownership) reduce earnings management due to the decreased demand for accounting-based contracts. This suggests that high family ownership excluding control via affiliated firms positively affects earnings quality. Chu (2011) documents that the positive association is strong particularly when

family members serve as CEOs, top managers, chairpersons, or directors of the firms in Taiwan because family ownership is combined with active family management and control. Recent Korean researches prove the alignment effect of family ownership. Koh and Park (2013) find that the family firms in which the family members participate in the management tend to demonstrate lower earnings managements. An (2015) provides the evidence that pure family ownership excluding affiliated ownership mitigates agency problems, thereby improving firm value and earnings quality. Based on argument above, the following competing hypotheses will examined.

Hypothesis One: Family ownership of Korean firms is systematically associated to earnings quality
Hypothesis 1a: The pure family ownership of Korean firms is positively associated to earnings quality
Hypothesis 1b: The control-ownership disparity of Korean firms is negatively associated to earnings quality

A *chaebol* firm is defined as a gathering of formally independent firms under the single common administrative and financial control of one family. According to La Porta et al. (1999), large corporations in most wealth countries have controlling shareholders who enjoy control in excess of their equity holding through a hierarchical chain of ownership and participation in management. The importance of *chaebols*, the Korean business groups, needs no emphasis within the Korean economy. The Korea Fair Trade Commission (KTFC) defines a *chaebol* firm as "a group of firms of which more than 30 per cent of shares are owned by the gorup's controlling shareholder and its affiliated firms." Each year, the KFTC ranks c*haebol* firms according to the size of their total assets and identifies the 30 largest groups. First, the 30 largest *chaebols* account for 20 per cent above of total output of Korea. Second, c*haebol* follow the multidivisional organizational structure, under which individual affiliated firms function as operating division. Finally, despite their huge size, *chaebols* are largely family-controlled, the major decisions of the *chaebol* firms being in the hands of a controlling family rather than professional management. Cross-shareholding enables a few individuals, such as the Lee family of the Samsung Group to tightly control legally independent firms.

In Korea, the agency problem focus between controlling shareholders and minority shareholders because of the *chaebols'* inherent governance structure. While owner-managers of *chaebols* put up a small portion of the stakes in the firm, they have full control

of a vast business group. Thus, they have incentives as well as discretionary power to expropriate other investors in the firm by investing the firm's resources to maximize their welfare, even when such investments do not maximize the value of the firm. This agency problem of expropriation is particularly serious when there are few mechanisms to protect investors and to control the discretionary power of owner-managers. Baek, Kang, and Park (2004) analyzed Korean firms during the 1997 financial crisis and find that *chaebol* firms with concentrated ownership by controlling-family shareholders experienced a larger drop in the value of their equity than did firms with less concentrated ownership. This result implies that corporate governance is significantly related to firm value, and thus differences in corporate governance practice at the firm level play an important role in determining firm value. More recently, An (2015) supports negative impacts of chaebol firms on firm value and earnings quality. He finds that pure family ownership of *chaebol* firms is significant lower than non- *chaebol* firms. Thus, significant affiliated ownership of chaebol firms results in low firm value and earnings quality. Hence, the following hypothesis will be formulated.

Hypothesis Two: Family ownership of Chaebol is negatively associated to earnings quality

RESEARCH METHODOLOGY

Sample Selection

This study uses Korean firms listed on the Korean Stock Exchange (KSE) for 13 years (2000-2012). All financial institutions (e.g., commercial banks, insurance firms, security brokerage firms) are excluded because accounting methods and the format of financial statements differ to other industries and are subject to different regulatory requirements. Financial statements data and stock data are obtained from OSIRIS and KIS-VALUE database respectively. Ownership data are all manually collected from business reports of each firm on DART system (http://dart.fss.or.kr) provided by the Korean Financial Supervisory Commission (KFSC) the equivalent to the SEC in Korea. The final sample consists of panel data of 489 non-financial Korean firms and a total of 6,357 firm-year observation over the 13 year periods. The sample firms belong to 10 industry groups based on the Korean Standard Industry Classification (SIC).

Measure of Earnings Quality

Earnings quality as a proxy of financial reporting quality is classified into two categories: 1) user needs and 2) shareholder/investor protection. In the view of user needs, earnings

quality is measured as persistence and value-relevance, while earnings quality under the shareholder/investor protection is measured as conservatism and accruals quality. To address the association between earnings quality and foreign investors, earnings quality is set as a dependent variable following Francis, LaFond, Olsson, and Schipper (2004) methodology.

As earnings quality proxy of user needs, this study measures earnings persistence as the slope-coefficient (β_1) estimates of regression of current earnings on previous earnings Earnings persistence means how much of current earnings will persist into the future and continue from period to period. In order to measure the value-relevance of accounting information, this study uses Francis et al. (2004) methodology that price as a function of both earnings and book value of equity. The explanatory power of regression (R^2) is used as the metric to measure the value-relevance of earnings and book value. As earnings quality proxy of shareholder/investor protection, This study measures conservatism using Ball and Shivakumar's (2005) accruals-based test of loss recognition model. Conservatism is measured by the incremental coefficient on the association between accruals and negative cash flows. Accruals quality is measured following Dechow and Dichev (2002). Accruals quality for each firm is measured as the absolute value of firm-level residuals ($|\varepsilon_{i,t}|$)from industry level pooled cross-sectional regression of total current accruals on lagged current, and future cash flows plus the change in revenue and gross property, plant, and equipment.

Measure of Family Ownership and Wedge

Family ownership comprises voting rights in the form of both cash flow rights, percentage of equity shares directly held by the largest shareholder and his/her family as well as the share ownership they control through affiliated firms. The Korean National Tax Law states that the controlling shareholder ownership is the total number of shares held by the largest shareholder, his/her relatives[3], specially related person, and affiliated firms. The Korean Stock Exchange Law defines largest shareholder as a person who together with any specially related persons[4] holds the largest number of stocks on the basis of the total

[3] A spouse, a blood relative within eight degrees of kinship, or an in-law within four degrees of kinship

[4] "The major shareholder of the concerned company and that person's spouse and lineal

number of stocks with voting rights of a firm[5].

As a definition of family ownership, family ownership can be decomposed into two different types of family ownership variables: (1) pure family ownership (*PUREFAM*), and (2) ownership-control disparity (*WEDGE*). Pure family ownership (*PUREFAM*) is the direct ownership of cash flow rights in the hands of the largest shareholders and his/her family excluding stock held by affiliated firms. Ownership-control disparity (*WEDGE*) is measured in two ways by the Korean Fair Trade Commission (KFTC) which has for regulatory purposes monitored the ownership-control disparity of *chaebol* firms since 2003. According to the KFTC, ownership-control disparity is measured as a wedge ratio and a wedge multiplier. The wedge ratio is calculated as the simple difference between cash flow rights (pure family ownership) and voting rights (family ownership), while the wedge multiplier is measured as the ratio between voting rights and cash flow rights (family ownership/pure family rights)[6]. Following the KFSC, ownership-control disparity (*WEDGE*) is measured as the wedge ratio (*WR*) and the wedge multiplier (*WM*). The larger the *WR* and *WM* are, the larger the ownership-control disparity.

Control Variables

Seven control variables that may affect firm value and earnings quality are foreign ownership, *chaebol* group dummy, size, leverage, sales growth ratio, capital asset investment ratio, and liquidity ratio. Foreign ownership (*FOREIGN*) is percentage of equity shares held by all foreign shareholders as of the end of the year, and calculated as the total number of shares held by foreign shareholders divided by the total number of shares outstanding. In Korea, the potentially positive impact of foreign ownership as large outside blockholders can mitigate family managerial opportunism. Thus, higher proportions of foreign ownership induce firms to improve earnings quality and to decrease opportunistic managerial accounting choices and decisions (An 2015b). To control for size effects, the natural logarithm of the book value of total assets (*SIZE*) is included as a proxy for firm size. Leverage (*LEV*) is the ratio of total debts to total assets. A large business group is called a *chaebol* in Korea. Generally, the families of Korean *chaebol* hold large proportion of shares but much less than the majority holdings of the firm.

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ascendant and descendant; The spouse or lineal ascendant and descendant of an officer of the concerned company."(Article 54-5-(4), Korean Stock Exchange Law)

[5] Article 54-5, Korean Stock Exchange Law

[6] Wedge multiplier can be excessively large when cash flow rights (denominator) are small.

They are able to exercise effective control of the firm with holdings as low as 10 per cent. This is possible through the holdings of the family and their affiliated firms. Therefore, *chaebol* firms in Korea (listed firms with assets of 5 trillion KRW) are subject to many government regulations. In keeping with prior Korean studies (Joh 2003; Kim and Yi 2006, Choi *et al*. 2007), This study uses size proxy for membership of a *chaebol* firms dummy variable [*CHAEBOL*; takes the value of one if firms with asset of 5 trillion KRW (US$ 2 billion) or more; and zero otherwise] as control variable. High growth firms are expected to increase earnings quality, but they can be regarded as risky firms and inflate their earnings. To control these offset effects on earnings quality, growth and profitability options are included. Growth (*GRW*) is firm's sale growth ratio, measured by annual percentage change of sales. As a measure of profitability, the ratio of net income to total assets (*ROA*) is employed. Firm with negative earnings (*LOSS*) is a dummy variable that takes the value of one if firm's previous year's net income was negative, and zero otherwise

Empirical Model

This study uses the following two equations to test the impact of family ownership on four proxies of earnings quality.

$$(EarningsQuality)_{i,t} = \begin{cases} \alpha + \beta_1 (PUREFAM)_{i,t} + \beta_2 (FOREIGN)_{i,t} + \beta_3 (CHAEBOL)_{I,T} + \beta_4 (PUREFAM * CHAEBOL)_{I,T} \\ + \zeta_1 (SIZE)_{i,t} + \zeta_2 (LEV)_{i,t} + \zeta_3 (GRW)_{i,t} + \zeta_4 (LOSS)_{i,t} + \zeta_5 (ROA)_{i,t} + \sum_{t=1}^{2001-2012} \psi_t (YEAR)_t + \varepsilon_{i,t} \end{cases} \quad (1)$$

$$(EarningsQuality)_{i,t} = \begin{cases} \alpha + \beta_1 (WEDGE)_{i,t} + \beta_2 (FOREIGN)_{i,t} + \beta_3 (CHAEBOL)_{I,T} + \beta_4 (WEDGE * CHAEBOL)_{I,T} \\ + \zeta_1 (SIZE)_{i,t} + \zeta_2 (LEV)_{i,t} + \zeta_3 (GRW)_{i,t} + \zeta_4 (LOSS)_{i,t} + \zeta_5 (ROA)_{i,t} + \sum_{t=1}^{2001-2012} \psi_t (YEAR)_t + \varepsilon_{i,t} \end{cases} \quad (2)$$

As this study utilizes panel data, panel study methodology should be considered. According to Himmelberg et al. (1999), the choice of ownership structure depends on unobserved firm characteristics such as contractual, regulatory, or informational environment. With panel data, one common treatment of this unobserved time-constant effect is to use fixed-effect (FE) regression, known as least square dummy variable (LSDV) analysis (Wooldridge 2002; Baltagi 2005). Himmelberg et al. (1999) suggest that firm fixed effects estimators should be used in examination of the relationship between ownership and firm performance

because the cross-sectional variation in ownership explained by unobserved firm heterogeneity is a firm fixed effect. However, Zhou (2001) argues that the firm fixed effect model in panel data is not appropriate in this setting because ownership typically changes slowly from year to year within a firm. Namely, the ownership-firm value relationship is likely to be a cross-sectional phenomenon.

Extending Zhou's (2001) argument, FE estimation is not suitable for this thesis for three reasons. First of all, FE estimation requires significant within panel (firm) variations of the variable values to produce consistent and efficient estimates. The inclusion of firm fixed effects essentially removes most cross-sectional variations of the dependent variable, thus the effect of other explanatory variables (e.g., *SIZE*, *GRW* etc.) may not be observed unless ownership and board composition measures exhibit substantial time-series variations. Thus, the FE estimates would be imprecise. Second, FE estimates may aggravate the problem of multicollinearity due to using so many dummies known as LSDV (Baltagi 2005). Third, when panel data set (observations on 489 firms over 13 years in this study) consists of large '*N*' (489 firms) and fixed small '*T*' (13 years), FE estimation is inconsistent (Baltagi 2005). Moreover, for large *N*, FE estimation would lead to an enormous loss of degrees of freedom (Baltagi 2005). Fourth, when the sample was extracted from a large population (listed firms on the KSE in this study), individual specific constant terms regarded as randomly distributed across cross-sectional firms (Green 2000). Finally, the general way choosing between fixed and random effect is a Hausman (1978) test. However, a Hausman test is not to provide which approach is good but just to provide what they are different (Black et al. 2009). In addition, Green (2000) suggests that a Hausman test becomes problematic when use unbalanced panels, as the case in this study. Thus, this study employs random-effect regression (RE) as an empirical model.

EMPIRICAL RESULTS

Descriptive Statistics

Table 1 shows the descriptive statistics for variables. As for earnings quality on the user needs, the mean (median) of persistence in the sample is 0.314 (0.263), and the mean (median) of value-relevance is 0.453 (0.452). Turning to earnings quality on shareholder/investor protection, conservatism has a mean (median) value of 0.193 (0.079), and accruals quality has a mean (median) value of 0.076 (0.023), respectively.

Table 1: Description of the samples

Categories	Variables	Mean	Median	Min	Max	Standard Deviation
Earnings Quality (User Needs)	PERSISTENCE	0.314	0.263	-4.634	11.188	0.703
	VALUE RELEVANCE	0.453	0.452	0.003	0.992	0.253
Earnings Quality (Shareholder/Investor Protection)	CONSERVATISM	0.193	0.079	-77.72	54.415	6.436
	ACCRUALS QUALITY	0.076	0.023	1.48E-05	3.362	0.199
Independent Variabls (Family Ownership)	PUREFAM	0.206	0.203	0.7883	0.0003	0.168
	WR	0.145	0.069	0.887	0.0007	0.177
	WM	24.069	1.243	4776.000	1.000	204.787
Control Variables	FOREIGN	0.108	0.017	0.000	0.982	0.145
	CHAEBOL	0.084	0.0000	1.000	0.000	0.276
	SIZE	21.230	19.430	12.922	25.890	1.456
	LEV	0.546	0.495	0.017	27.478	0.729
	LOSS	0.229	0.000	0.000	1.000	0.412
	GRW	1.268	0.387	0.0002	288.00	6.912
	ROA	0.014	0.036	-4.724	3.599	0.231

The average pure family ownership is 0.206 which are relatively low compared to other East Asian countries, where the average family ownership of Hong Kong is 0.489, (Ng 2005)[7)] Singapore is 0.571 (Chau and Gray 2002), and Malaysia is 0.430 (Tam and Tan 2007) respectively. Two measures of ownership-control disparity called 'wedge ratio (*WR*)' and 'wedge multiplier (*WM*)' are 0.145 and 24.07, respectively. Foreign investor (*FOREIGN*) has the mean value of 0.108 and the median value is 0.017. The severe difference between mean and median of foreign ownership implies that foreign ownership is concentrated in specific firms. This feature of foreign ownership supports that foreign

[7] Ng (2005) use managerial ownership as proxy of family ownership in Hong Kong because the correlation between managerial ownership and family ownership is almost one (0.978)

shareholders prefer large manufacturing firms with good accounting performance, lower unsystematic risk, and lower leverage but underweight smaller and highly leveraged firms (Kang and Stulz 1997).

Test Results

Table 2 presents on the results of random-effect regression estimates of the association between earnings quality in the view of user needs (e.g., persistence and value-relevance) and in the view of shareholder/investor protection (e.g., conservatism and accruals quality) and family ownership variables, respectively. Family ownership is decomposed into pure family ownership (*PUREFAM*) and Ownership-Control disparity (*WEDGE*). Almost all controlling family shareholders in East-Asian countries including Korea typically obtain effective control through pyramidal structures and cross shareholdings, even though their cash flow rights are relatively low. This separation of control and ownership often makes controlling shareholders entrenched so that they pursue their own interests at the expense of minority shareholders (Fan and Wong 2002; Mitton 2002; Claessens et al. 2003). Therefore, pure family ownership and ownership-control disparity might differently affect earnings quality. Consistent with this prediction, *PUREFAM* is positively related to valur-relevance (0.046) and negatively linked with accruals quality (-0.086) at 0.10 and 0.01 level, respectively. Accordingly, pure family ownership increases earnings quality not only on the user needs prospects but also on the shareholder/investor protection prospects. This result strengthens the alignment effect of family ownership in Korea. However, as for persistence and conservatism measure, *PUREFAM* is statistically not significant despite consistency with expected sign. Overall, the relation between pure family ownership earnings quality supports the alignment effect of family ownership, and thus H_{1a} is accepted.

Table 2: Random Effect Estimation Results for Pure Family Ownership

$$(EarningsQuality)_{i,t} = \begin{cases} \alpha + \beta_1(PUREFAM)_{i,t} + \beta_2(PUREFAM * CHAEBOL)_{i,t} + \beta_3(FOREIGN)_{I,T} + \beta_4(CHAEBOL)_{i,t} \\ + \zeta_1(SIZE)_{i,t} + \zeta_2(LEV)_{i,t} + \zeta_3(GRW)_{i,t} + \zeta_4(LOSS)_{i,t} + \zeta_5(ROA)_{i,t} + \sum_{t=1}^{2001-2012} \psi_t(YEAR)_t + \varepsilon_{i,t} \end{cases}$$

Subscripts *i* denotes individual firms, *t* time period. The dependent variable *Earnings Quality* is four measures of earnings quality: 1) Persistence, 2) Value-Relevance, 3) Conservatism, and 4) Accruals Quality. *PUREFAM* is the percentage of equity shares owned by the largest personal shareholder and his/her families. *FOREIGN* is the percentage of equity shares held by foreign investors. *CHAEBOL* is a dummy variable which takes the value of one if firms with asset of 5 trillion KRW (US$ 5 billion) or more; and zero otherwise. Firm size (*SIZE*) is the natural log of the total assets. Leverage

(*LEV*) is total debt scaled by total assets. Growth prospects (*GRW*) is market to book ratio of equity. Firm with negative earnings (*LOSS*) is a dummy variable that takes the value of one if firm's pervious year's net income was negative, and zero otherwise. Profitability (*ROA*) is return on assets. *YEAR* is a time dummy. Superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively. (*t*-statistics)

		User Needs		Shareholde/Investor Protection	
Variables		Persistence	Value-Relevance	Conservatism	Accruals Quality
Independent Variabls	PUREFAM	0.061 (1.096)	0.046* (1.922)	0.313 (1.215)	-0.086*** (-3.151)
	PUREFAM *CHAEBOL	0.010 (0.038)	-0.104* (-1.991)	-0.857 (-0.696)	0.540*** (3.745)
Control Variables	FOREIGN	0.220*** (3.164)	0.241*** (8.050)	0.034 (1.287)	0.063 (1.505)
	CHAEBOL	-0.031 (-0.619)	-0.136*** (-3.975)	-0.045 (-0.195)	0.324*** (10.319)
	SIZE	0.004 (0.443)	-0.009** (-2.256)	0.082** (2.027)	0.034*** (6.153)
	LEV	-0.003 (-0.251)	-0.233*** (-4.138)	0.182*** (2.997)	0.004 (0.687)
	GRW	0.108*** (-0.392)	0.036*** (4.054)	-0.255*** (-2.942)	-0.026** (-1.996)
	LOSS	0.008 (0.342)	-0.023** (-2.229)	0.347*** (3.056)	0.016 (1.468)
	ROA	0.391 (-1.465)	-0.061*** (1.956)	0.326 (-0.410)	-0.028 (-1.134)
Constant		-0.001 (-0.006)	0.689*** (6.185)	-1.267 (-1.631)	-0.618*** (-5.873)
Model Fits	*Adj* R^2 *F*-Statistics	0.018*** 6.154	0.042*** 14.790	0.026*** 8.957	0.158*** 52.237

With regard to *Chaebol* firms variables, the interaction of pure family ownership and *Chaebol* firms (*PUREFAM*CHAEBOL*) and *Chaebol* dummy (*CHAEBOL*) show

significantly negative effect with both value-relevance and accruals quality, respectively. The family ownership of Korean *Chaebol* firms negatively impact earnings quality. This result can be interpreted as that pure family ownership of *Chaebol* firms is significant lower than non-Chaebol firms. According to An (2015a), average pure family ownership of *Chaebol* fimrs 8.52 per cent, while non-*Chaebol* firms' average pure family ownership is reached to 26.62 per cent. Thus, H_2 is accepted.

Foreign ownership (*FOREIGN*) is significantly positive with earnings quality on user needs. The coefficient estimates of *FOREIGN* on persistence and value-relevance are 0.220 and 0.241 at the 0.01 level, respectively. In the association with earnings quality on shareholder/investor protection, *FOREIGN* is not statistically significant both for conservatism and accruals quality. Overall, the relation between foreign ownership and earnings quality supports the active monitoring hypothesis of foreign ownership as institutional shareholder, but the positive impact of foreign ownership on earnings quality should be careful interpretation.

Table 3 and 4 indicate the results of ownership-control disparity (*WEDGE*) on earnings quality. Inconsistent with prior Korean studies (Joh 2003), the coefficients of both *WR* and *WM* are statistically insignificant with persistence and conservatism. Thus, the impact of the higher ownership-control disparity on firm value is weak and insignificant. Interestingly, ownership-control disparity positively affects value-relevance and accruals quality. The coefficients of *WR* and *WM* on value-relevance are statistically significant and positive at the 0.05 and 0.10 level, respectively. In the association with accruals quality, the coefficients of *WR* on accruals quality are statistically significant and negative (-0.036) at the 0.10 level. This result is inconsistent with prior Korean study (Joh 2002, Kim and Yi 2006). They find that high affiliated ownership increases firm's earnings management (measured as discretionary accruals) since affiliated ownership provides controlling shareholders with more incentives and opportunities to hide adverse consequences of their self-serving behavior. This result can be interpreted as that ownership-control disparity of non-*Chaebol* firms the positive effect of *WEDGE* on earnings quality as that control through affiliated ownership is more prevalent in *Chaebol* firms. In this study, mean value of *WR* of *Chaebol* firms is 24.87 per cent[8], while that of non- *Chaebol* firms is 14.05 per cent[9]. Accordingly, *WR* of *Chaebol* groups is much larger than that of non- *Chaebol* firms,

[8] As of 2007, *WR* of *Chaebol* firms had increased to 31.28 per cent (KFTC).

[9] In addition, mean value of pure family ownership (cash flow rights) of *Chaebol* firms was 7.37 per cent, while that of non-*Chaebol* firms was 20.63%

suggesting that control via affiliated ownership is less significant in non- *Chaebol* firms. Thus, H_{1b} is not accepted.

Table 3: Random Effect Estimation Results of Wedge Ratio

$$(EarningsQuality)_{i,t} = \begin{cases} \alpha + \beta_1(WR)_{i,t} + \beta_2(WR*CHAEBOL)_{i,t} + \beta_3(FOREIGN)_{I,T} + \beta_4(CHAEBOL)_{i,t} \\ + \zeta_1(SIZE)_{i,t} + \zeta_2(LEV)_{i,t} + \zeta_3(GRW)_{i,t} + \zeta_4(LOSS)_{i,t} + \zeta_5(ROA)_{i,t} + \sum_{t=1}^{2001-2012} \psi_t(YEAR)_t + \varepsilon_{i,t} \end{cases}$$

Subscripts *i* denotes individual firms, *t* time period. The dependent variable *Earnings Quality* is four measures of earnings quality: 1) Persistence, 2) Value-Relevance, 3) Conservatism, and 4) Accruals Quality. *WR* is wedge ration, the difference between family ownership and pure family ownership. *FOREIGN* is the percentage of equity shares held by foreign investors. *CHAEBOL* is a dummy variable which takes the value of one if firms with asset of 5 trillion KRW (US$ 5 billion) or more; and zero otherwise. Firm size (*SIZE*) is the natural log of the total assets. Leverage (*LEV*) is total debt scaled by total assets. Growth prospects (*GRW*) is market to book ratio of equity. Firm with negative earnings (*LOSS*) is a dummy variable that takes the value of one if firm's pervious year's net income was negative, and zero otherwise. Profitability (*ROA*) is return on assets. *YEAR* is a time dummy.

Superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively. (*t*-statistics)

		User Needs		Shareholde/Investor Protection	
Variables		Persistence	Value-Relevance	Conservatism	Accruals Quality
Independent Variabls	WR	-0.066 (-1.259)	0.047** (2.051)	0.578 (1.501)	-0.036* (-1.908)
	WR*CHAEBOL	0.052 (0.291)	-0.139* (-1.812)	-1.24** (-2.368)	0.179* (1.760)
Control Variables	FOREIGN	0.217*** (3.217)	0.231*** (7.673)	-0.294 (-1.124)	0.059 (1.386)
	CHAEBOL	-0.046 (-0.821)	-0.024 (0.991)	-1.639*** (-5.075)	0.294*** (8.552)
	SIZE	0.004 (0.514)	-0.011*** (-2.853)	0.105** (2.575)	0.037*** (6.406)
	LEV	-0.005	-0.024***	0.185***	0.004

		(-0.404)	(-4.287)	(3.068)	(0.755)
	GRW	0.108*** (5.798)	0.032*** (4.015)	-0.252*** (-2.903)	-0.027** (-2.026)
	LOSS	0.003 (0.119)	-0.025** (-2.350)	0.347*** (3.082)	0.019* (1.665)
	ROA	-0.073 (-1.486)(	-0.059*** (-2.796)	0.311 (1.359)	-0.027 (-1.089)
Constant		0.012 (0.070)	0.738*** (10.321)	-1.697** (-2.206)	-0.677 (-6.229)
Model Fits	*Adj* R^2 *F*-Statistics	0.018*** 6.197	0.042*** 14.833	0.027*** 9.456	0.142*** 46.967

As expected, the coefficients of interaction on ownership-control disparity and *Chaebol* firms and *Chaebol* dummy are negatively significant with value-relevance and conservatism and positively significant with accruals quality at both 0.01 level. Thus, Korean *Chaebol* firms negatively impact earnings quality even after the Asian financial crisis, supporting Kim and Yi (2006) and An (2015a). Overall, the ownership-control disparity results of *Chaebol* firms are quite similar with the pure family results of *Chaebol* firms in Table 2. This result indicates that controlling family ownership of *Chaebol* firms have a dominat influence on firms using affiliate ownership. Thus acceptance of H_2 is confirmed. The relation between *FOREIGN* and earnings quality is significantly positive with persistence and value-relavance but negative with conservatism, supporting that foreign shareholders do not efficiently monitor firm's management. Other control variables are not substantially different from those presented in Table 2. In general, the results are consistent with the expectation thereby confirming our interpretation.

Table 4: Random Effect Estimation Results of Wedge Multiplier

$$(EarningsQuality)_{i,t} = \begin{cases} \alpha + \beta_1(WM)_{i,t} + \beta_2(WM * CHAEBOL)_{i,t} + \beta_3(FOREIGN)_{I,T} + \beta_4(CHAEBOL)_{i,t} \\ + \zeta_1(SIZE)_{i,t} + \zeta_2(LEV)_{i,t} + \zeta_3(GRW)_{i,t} + \zeta_4(LOSS)_{i,t} + \zeta_5(ROA)_{i,t} + \sum_{t=1}^{2001-2012} \psi_t(YEAR)_t + \varepsilon_{i,t} \end{cases}$$

Subscripts *i* denotes individual firms, *t* time period. The dependent variable *Earnings Quality* is four measures of earnings quality: 1) Persistence, 2) Value-Relevance, 3) Conservatism, and 4) Accruals Quality. *WM* is wedge multiplier, calculated by family ownership divided by pure family ownership. *FOREIGN* is the percentage of equity

shares held by foreign investors. *CHAEBOL* is a dummy variable which takes the value of one if firms with asset of 5 trillion KRW (US$ 5 billion) or more; and zero otherwise. Firm size (*SIZE*) is the natural log of the total assets. Leverage (*LEV*) is total debt scaled by total assets. Growth prospects (*GRW*) is market to book ratio of equity. Firm with negative earnings (*LOSS*) is a dummy variable that takes the value of one if firm's pervious year's net income was negative, and zero otherwise. Profitability (*ROA*) is return on assets. *YEAR* is a time dummy.

Superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively. (*t*-statistics)

		User Needs		Shareholde/Investor Protection	
Variables		Persistence	Value-Relevance	Conservatism	Accruals Quality
Independent Variabls	WM	8.91E-05 (1.107)	6.23E-05* (1.796)	-0.005 (-1.367)	-1.72E-05 (-0.346)
	WM*CHAEBOL	-5.30E-05 (-0.528)	-1.81E-07 (-0.004)	6.72E-06 (0.015)	7.99E-05 (1.489)
Control Variables	FOREIGN	0.205** (2.351)	0.274*** (7.301)	-0.174 (-0.123)	0.010 (0.249)
	CHAEBOL	-0.021 (-0.414)	-0.015 (-0.713)	0.039 (0.168)	0.239*** (7.601)
	SIZE	0.029 (0.287)	-0.009* (-1.944)	0.091* (1.935)	0.046*** (6.421)
	LEV	-0.005 (-0.313)	-0.026*** (-3.257)	0.127 (1.517)	-0.001 (-0.193)
	GRW	0.095*** (4.926)	0.027*** (3.274)	-0.222** (-2.498)	-0.026** (-2.221)
	LOSS	0.011 (0.408)	-0.021* (-1.701)	0.380*** (2.933)	0.004 (0.405)
	ROA	-0.034 (-0.468)	-0.035 (-1.113)	0.113 (0.341)	-0.087*** (-3.007)
Constant		0.035 (0.179)	0.701*** (8.431)	-1.479* (-1.667)	-0.836*** (-6.1554)
Model Fits	*Adj* R^2 *F*-Statistics	0.016*** 4.452	0.042*** (11.977)	0.027*** 7.564	0.098*** 24.816

CONCLUSION

This study examines the impact of family ownership on firm value and earnings quality using panel data listed on the Korean Stock Exchange (KSE) over the 2000 to 2012 period. Specifically, This study use two different measures of family ownership: pure family and ownership-control disparity. This study finds that pure family ownership increases earnings quality. The effect of ownership-control disparity (Wedge) on earnings quality is positively affects value-relevance and accruals quality. The finding supports that family ownership in Korea supports alignment effects. Overall, family ownership reduces severe agency problems, thereby leading to less opportunistic management behavior and better management performance. Consistent with prior Korean studies (Joh 2003; Bae et al. 2002), Korean *Chaebol* firms show low earnings quality. Controlling family shareholders of *Chaebol* firms dominate their firm using affiliated ownership, and thus significant ownership-control disparity of *Chaebol* firms aggravates entrenchment effects. The control via affiliated ownership is significant in *Chaebol* firms since the ownership-control disparity of *Chaebol* firms is about 10 per cent above that of non-*Chaebol* firms. Through the tests for *Chaebol* firms, the negative impact of ownership-control disparity on earnings quality is confirmed.

This study finds that foreign ownership is only significant with user needs earnings quality (persistence and value-relevance), suggesting that foreign shareholders play a restrictive role in monitoring firms. It might support that foreign shareholders, as large outside blockholders, are transient investors without significant incentives to monitor firm management. This study provides new evidence on the impact of family ownership on firm value and earnings quality. Many East-Asian studies (Fan and Wong 2002; Claessen et al. 2002; Ball et al. 2000 and 2003) suggest that family ownership decreases firms value and earnings quality because controlling families dominate firms at all levels of firm's decision-making processes and overrides incentives to report higher-quality earnings, thereby expropriating outside shareholders' wealth. However, this study finds that family ownership is better aligned with the firm, and thus higher family ownership increases firm value and earnings quality.

In advance, there are two potential limitations related to future research. First, this study assumes a linear impact of familyownership. However, prior research (e.g. Demsetz 1983) suggests that an increase in insider shareholding (family shareholding) could increase management entrenchment. Thus, future research shold seek to identify a non-linear relationship between family ownership and earnings quality. Second, four proxies of

earnings quality in this study do not necessarily reflect all aspects of earnings quality. In this study, the results between family ownership and earnings quality are mixed, based on the four proxies used. Thus, the results based on the association between corporate governance and earnings quality could depend on how earnings quality is defined.

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Bank Performance and Board Structure

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Abstract

This paper examines the relationship between board governance and performance using a sample of 74 US banks and 53 Chinese banks for the period 2002 to 2006. I find substantial differences in board structure between the two countries; in particular the average board size and the proportion of outside directors for US banks are almost twice of those in China. Regarding the relation between performance and governance, the evidence is mixed for the US sample while insignificant for the Chinese sample. In particular, for the US sample, the board size is found to be significantly and negatively correlated with ROA, but a larger board also tends to be associated with lower costs. For Chinese banks, the evidence indicates that governance variables are not significantly correlated with performances with the exception of block ownership: there is strong evidence that the relation between block ownership and bank performance is negative. In China, block ownership primarily comes from government shares. Therefore, the overall evidence is consistent with our conjecture that the role of board governance structure is of secondary importance in Chinese banks, perhaps due to the strong role of government.

1. Background

1.1 Introduction

Much of the literature on board structure documents that the effectiveness of board affects performances, but the majority of which examine non-financial firms (Boone *et al*., 2007 and Coles *et al*., 2008). In this study, I examine the relation between board structure and performance in the Chinese and US banking industry.

One of my major objectives is to examine the role of government ownership. The Chinese banking industry is characterized by substantial government ownership. It is likely that substantial government ownership will reduce the effectiveness of bank board monitoring. Therefore, I expect the relation between board structure and performance to be weaker in China relative to that in the US.

Extant research on banks governance focuses on the relation between performance and ownership structure. In contrast, I concentrate on the interaction between performance and board structure, rather than ownership structure. It is conceivable, and recent turmoil suggests, that with the increased pace of securitization (especially since mid-80s), even large owners may not be able to adequately assess a bank's risk, but board members might with generally closer association with managers. To the extent this argument is correct, it is at least equally important to examine the relation between board structure and performance.

Because banks are heavily regulated, it is also conceivable that banking firm governance differs from that of unregulated firms. On the one hand, regulation might serve as an alternative form of monitoring, thus reducing the role of the board structure. On the other hand, if deposit insurance premium is not priced correctly or if securitization leads to improper risk transfer, some bank managers might pursue riskier customers and activities (Allen and Carletti, 2006)); as such, the board's role might be critical.

The existing literature remains mainly concerning the U.S. and Europe (Berger *et al*., 2005; Iannotta *et al*., 2007), where the governance systems are quite different from those found in China and other transition economies (Cull *et al*., 2005). Therefore, I perform an empirical comparison of US and Chinese banks. The interesting points about Chinese banks are their rapid growth, their large size, and heavy government

ownership. La Porta *et al*. (2002) find that government ownership of banks is rather prevalent around the world, so examining a representative country in that regard is potentially useful. If regulation serves as an alternative form of monitoring, corporate governance for Chinese banks is likely to be less important than that of the US banks. However, there are some potential offsetting factors: most of them are newly-listed and growing rapidly; the merger market in Chinese markets is virtually non-existing; further, they represent the dominant source of corporate financing because both the stock market and bond market are relatively small and very volatile. It is not impossible that public scrutiny on bank corporate governance might be more intense in a fast-growing industry, in an industry where outside threat is lacking, in an industry that is critical for economy growth, and in an industry where reform has recently been introduced, and competition among managers has intensified. Thus, whether the influence of board structure is stronger or weaker in the China is largely an empirical issue. Although China has increasingly emphasized the importance of corporate governance (Sun and Tobin, 2005), to my knowledge, there is no research about bank board structure in China.

In sum, bank governance is unique and changes in banking environment during the 1990s and early 2000s substantially altered the governance of the world's banking organizations. What is the effect of board structure on bank performance? In order to address this issue, this paper aims to empirically analyze the relation between bank performance and board structure, in one of the developed economics -- the US bank industry, and one in developing economies -- Chinese banks. The findings show a significant relation between the board size and bank performance in the US sample, but the evidence is mixed and varies with performance measures. For China, evidence implies that block ownership is an important determinant of Chinese bank performance. There is no other significant relationship between board governance and bank performance for either country. Therefore, the overall evidence suggests that board structure is only weakly linked to performances.

The structure of this paper is as follows. The next section presents a review of literature. Section 3 discusses the expected relation between board structure and performance. The data and methodology are given in section 4. In section 5, I examine the link between board structure and banking performance. The conclusion is in section 6.

1.2 Literature Review

In this section, I review research on the performance effects of corporate governance. I first concentrate on the broader set of studies on non-financial firms, then on financial firms. This is followed by a discussion of the Chinese banking system.

The Performance Effect of Board Structure in Non-Financial Firms

From the agency theory perspective, the objective of corporate governance is to ensure that managers resort to value maximizing strategies (Shleifer and Vishny, 1997). Most empirical studies in corporate governance focus on the linkage between corporate governance and firm performance. There are many related studies; because my main interest is in the banking industry, I only discuss a few representative papers.

Linck, *et al*. (2008) and Hermalin and Weisbach (1998) analyze the determinants of board structure. They indicate that the three important measures of board structure are board size, board independence, and board leadership. Boone *et al*. (2007) imply board structure reflects a firm's competitive environment and managerial team. Coles *et al*. (2007)[1] show that the market-to-book ratio increases with the board size for complex firm and with the percentage of insiders on the board for firms in which firm-specific knowledge is important. Weisbach (1988), Byrd and Hickman (1992) and Rosenstein and Wyatt (1990) find positive relation between abnormal returns and outside board membership. Regarding CEO/Chairman of Board (COB) duality, Brickley, *et al*. (1997) document that the duality concentrates management's power and might exacerbate potential conflicts of interest, and results in a less effective monitoring of the CEO.

The concern for corporate governance is evident from studies on markets around the world. For example, several studies show that the negative board size effects exist for publicly traded firms in other countries, for example: Conyon and Peck (1998) in a sample of publicly traded firms in the UK, France, the

Netherlands, Denmark and Italy; and de Andres, *et al*. (2005) in a sample of firms from ten OECD countries. However, Jong *et al*. (2000) report insignificant board size effects in Dutch firms. These studies nevertheless investigate primarily developed countries, and our understanding of corporate governance in emerging markets is lacking.

Regarding the relationship between board structure and firm performance in China, a few studies investigate non-financial firms and find some evidence that implies board structure might affect the firm performance (Wen *et al*., 2002).

Li and Naughton (2007) focus on the corporate governance reform in China and they suggest that board size is positively related to short-term returns, while in the long-run, a positive relationship exists between performance and the voluntary post-listing separation of the roles of CEO and COB.

Chen and Lin (2007) examine the relationship between corporate governance and corporate fraud, and their results reveal a lower proportion of independent members in board of directors for firms experiencing corporate fraud than for no-fraud firms; and they also imply that the firms with duality of CEO and COB are more likely to commit corporate fraud than the other firms. Moreover, Long (2008) indicates that, earnings management is positively influenced by the CEO duality and negatively affected by concentration ownership, board size and proportion of independent directors.

In sum, Su, *et al*. (2008) argue that ownership concentration of Chinese listed firms have a U-shaped relationship with board compensation, board size and the presence of independent directors, which provides corroborating evidence that principal–principal conflict can lead to high agency costs.

The Performance Effect of Board Structure in the Banking Industry

Banks' regulatory structure is unique; it focuses on reducing losses associated with bank failure as well as fair lending. In return for access to federal deposit insurance, banks face regulation related to such areas as safety and soundness, fair lending practices, and consumer protection. Flannery (1994) notes that because of the structure in the banking industry and the high degree of leverage with which banks operate, the impact of managerial actions on shareholder wealth is magnified. It is frequently argued that deposit insurance that is not priced to fully reflect the risk of the institution provides owners and managers with additional incentives to enhance risk-taking behavior. This suggests a greater need for the monitoring of management to insure that decisions are consistent with shareholder wealth maximization. Additionally, the lack of hostile takeovers in this market suggests that external discipline for managers is weak (Booth, *et al*., 2002). Taking these factors into considerations, it can be argued that benefit of aligning the incentives of managers and shareholders may be as important in banking firms as in less regulated industrial firms.

On the other hand, during the 1990s the U.S. commercial bank regulation focuses on the prompt corrective action. Thus, managerial decisions, and their impact on the safety and soundness of the bank, are monitored closely by regulators. To the extent that monitoring by regulators limits the amount of managerial discretion (and thus its effects on shareholder wealth), board monitoring becomes less important.

Macey and O'Hara (2003) argue that a broader view of corporate governance should be adopted in the case of banking institutions, and corporate governance mechanisms for banks should take care of the interests of depositors as well as shareholders. Depositors do not know the true value of a bank's loan portfolio, as such information is incommunicable and very costly to reveal. This information asymmetry gives bank managers an incentive to invest in riskier assets than they promised (Bhattacharya *et al*., 1998). Thus the specialty of the banking firm requires public protection of depositors from opportunistic bank management. However, this specialty also affects the relationship between shareholders and managers and the existence of deposit insurance may reduce the need for banks to raise capital from large, uninsured investors who have the incentive to exert corporate control.

The competition in the product or service market may act as a substitute for corporate governance mechanisms. However, the banking industry, due to its information-intensive nature and deposit insurance, may be less competitive than other business sectors. Therefore, this lack of competitive pressure suggests that banks may need stronger corporate governance mechanisms than other firms.

Previous empirical studies analyze the relation between corporate governance and bank performance. Most of them study the relation between the ownership and bank performance. However, few look at the role of board structure. To my knowledge, Adams and Mehran (2008) is the only one that examines the relation between board structure and performance for banks. They find a non-negative relationship between board size and performance and suggest that the advantages of larger boards may outweigh their costs. This study is similar to mine. However, there are several differences. First, their examination period ends before 2000, while the sample period here is post-2002 when Sarbanes-Oxley Act (SOX) is enacted. The SOX imposes stronger director liability. Moreover, this period is characterized by a huge expansion of the securitization. The importance of board is likely to be different from that before SOX. Second, I also examine the Chinese bank board structure, another important banking sector. In addition, I examine three important dimensions of board structure: board size, board independence, and board leadership, while they focus on the effects of board size.

What's Special about Corporate Governance in Chinese Banks?

There are four major types of banks in China: policy banks, big nationwide commercial banks with substantial state ownership, regional commercial banks, and city commercial banks. A considerable number of city commercial banks are not publicly traded. There are also numerous, non-publicly-traded credit unions and mutual banks. In this study, I focus on big nationwide banks, regional banks, and city commercial banks for which data is available. In terms of the total asset size, the Chinese banking sector is quite large, only smaller than the US and Japan. In terms of the number of banks and credit unions, the Chinese sector is probably the largest in the world.

The state-owned banks that have dominated Chinese banking sector face little competitive threat with inadequate risk control due to the legacy of years of forced policy and political lending to unprofitable state-owned enterprises. La Porta *et al*. (2002) find that government ownership of banks is rather prevalent around the world, which is often associated with subsequent lower productivity and development, consistent with "political" theories of government ownership. Between 1998 and 2000 state-owned banks experienced recapitalization and bad loan stripping-off[2], while the continually growing bad loans suggest that these seems unlikely to be enough without improving governance. These problems mainly are rooted in the politicization and socialization of the state banking system. State-owned banks are expected to support a wide range of political and social activities, are directed by multiple principals, and operate under a number of constraints. Kydland and Prescott (1977) suggest that this institutional arrangement might lead to time inconsistency problem that generate the abuse of political and social objectives, the absence of credible financial discipline and easy access to government funds. Such a set-up results in weaker corporate governance in Chinese banks.

Firstly, the degree of board independence is lower and inside control is more serious among the state-owned banks because of two important institutional constraints (1) government-controlled shares and assets are prohibited to be sold to the public, and (2) government maintains the ultimate decision right on the appointment of CEOs. The excess concentration of non-tradable shareholdings leads to the lack of both hostile takeover and proxy contests, and it is hard for minority tradable shareholders to monitor sufficiently due to the widely dispersed tradable individual investors. These facilitate management entrenchment and increase insider discretion. Because the appointment and evaluation of management are often determined by the controlling shareholders, this might give a rise to rent-seeking behavior and collusion between the larger shareholders and mangers. On the performance effect of corporate governance for Chinese banks, Wang and Kumbhakar (2007) find that joint-holding firms perform better than wholly-stated-owned banks. However, there is no corresponding research on the board structure.

Secondly, the government and politicians may have less incentive to improve the firm efficiency due to the non-transferability of the state owned shares and assets. Because total firm value is hard to measure when most of its shares are non-transferable, the wealth of the politician depends on a set of macroeconomic and political factors (i.e., the employment rate, the fiscal conditions of the region) rather than the firm performance. Shleifer and Vishny (1997) imply that achieving these objectives may increase

the politician's incomes and promotion opportunities, but it can reduce the efficiency and value of the enterprise).

The third one is that managerial ownership is extraordinarily low in Chinese banks. The average proportion of ownership in the hands of management, directors, and supervisors was 0.0005 percent in 2005 and 0.001 percent in 2006. Neither long-term, equity-based programs nor performance-based compensation programs are widely put into practice. The incentive alignment between the shareholders and management arguably is inadequate.

Overall, these problems might affect the effectiveness of board structure; I expect a generally weaker relation between board structure and performance for Chinese banks compared to the US.

1.3 Expected relation between board structure and performance

Linck, *et al*. (2008) point out three important aspects of board structure: board independence, board size, and board leadership. Consequently, these three variables are the focus of this research. The following gives a more detailed review of related studies, from which I form my expectations.

Board Independence

Fama and Jensen (1983) suggest that more outside directors increase a board's monitoring effectiveness. A number of studies on the proportion of outside directors find a positive relation between the abnormal returns associated with outside board membership (Byrd and Hickman, 1992; De Andres *et al*., 2005; Rosentein and Wyatt, 1997)[3].

For the case of Chinese banks, due to the dominance of the large shareholders in Chinese listed banks, the ratio of independent directors on a board may be of particular importance, and might help to test indirectly the level of board independence. However, because the CEO or COB has discretion to select members of the board, many of the independent directors may be actually friends of management, that is, many "independent" directors are not really independent. The press has reported on a number of cases in which independent directors did nothing to resolve a conflict between insiders and minority shareholders.

I adopt another proxy for independence: state ownership. The degree of ownership concentration affects the nature of contracting. For example, when the ownership is diffuse in the U.S., agency problems come mainly from the conflict of interest between outside shareholders and managers. However, in Asia, the ownership is concentrated, the nature of the agency problem shifts away from manager-shareholder conflicts toward conflicts between the large shareholder and minority shareholders. As mentioned above, because of the dominant control of the non-tradable state owned shares in the Chinese banks, their management is likely affected by politicization and socialization, and the government takes a large role in Chinese bank corporate governance.

Given the above discussion, if outside directors are independent, then there should be a positive relationship between the proportion of independent members on the board of directors and bank performances. Moreover, state-owned banks or banks with CEO/COB duality tend to perform poorer than other banks.

Board Size

Board size may affect the ability of bank boards to function effectively. Resource dependence theory has been one foundation for the perspective: larger boards are associated with higher levels of firm performance (Goodstein *et al*., 1994). In their view, board size may be a measure of an organization's ability to form environmental links to secure critical resources. Increased board size also gives rise to a larger pool of expertise and counsel for entity decision-making. A larger board size may be particularly beneficial for banks due to relation banking. For example, it is not uncommon for a large customer to sit on the board. Indeed, compared to other industries, banking is special for its typically larger size of board. For a typical corporation, Lipton and Lorsch (1992) propose an optimum board size of around 7 or 8 directors. Using a sample of US non-financial firms, Yermack (1996) finds that the mean of board members is about 12. In contrast for banks, Adams and Mehram (2008) document bigger boards of the US banking sample, with a mean of 17.97 during the period 1986 and 1999.

Nevertheless, researchers have far from achieving consensus on the optimal board size. Firstenberg and Malkiel (1994) argue that a board with eight or fewer members "engenders greater focus, participation, and genuine interaction and debate". Increased board size over a level, however, also carries disadvantages. Although a board's capacity for monitoring increases as more directors are added, the benefit may be outweighed by the incremental cost of poorer communication and decision-making associated with larger groups (Jensen, 1993; John and Senbet, 1998). Larger board size may also decrease the ability to control management, thereby leading to agency problems stemming from the separation of management and control (Jensen, 1993; Lipton and Lorsch, 1992).
John and Senbet (1998) survey the empirical and theoretical literature on corporate boards of directors and conclude a negative relationship between board size and firm performance. For banks, however, Adams and Mehran (2008) find no negative board size effect. Based on this study, I expect the relation to be non-negative.

Leadership
CEO/Chair duality concentrates management's power and board leadership in one person's hands (Jensen, 1993) and this concentration of power might exacerbate potential conflicts of interest, and result in less effective monitoring of the CEO (Brickley *et al*., 1997; Miyajima *et al*., 2003). I expect this also applies to the banking industry; that is, I expect a negative relationship between CEO/COB duality and bank performance.

2. Methods

2.1 Sample Selection

As a comparative study, it is desirable to have roughly equal number of comparable banks in the two countries. Since the number of traded bank stocks is smaller in China than in the US, I started with the collection of Chinese banks' data, which are available from the China Securities Regulatory Commission, China Banking Regulatory Commission and each individual Chinese bank. Due to the lack of data for small local banks, the sample includes 53 Chinese banks that represent more than 60% of the assets between 2002 and 2006 on average, and they include three types of banks: state-owned banks, corporate commercial banks, and city commercial banks. There are three reasons to choose the post-2002 era. First, Sarbanes-Oxley Act (SOX) was enacted in 2002, and I want to keep regulatory atmosphere about the same. Second, the period before 2000 has been examined by Adams and Mehran (2008). Third, many Chinese banks were not publicly traded before this period.
The comparable US sample is obtained for the same period using the sources COMPUTSTAT, CRSP, and official websites of Federal Reserve at Chicago and US Security and Exchange Commission. The sample includes 74 banks that are representative since the assets of the sample banks a large fraction of total industry assets; some of omitted due to the unavailability of governance data[4].

2.2 Empirical Model

I adopt a regression approach given below, followed by a description of the variables.

$$PerformanceMeasure_{it} = \alpha_0 + \alpha_1 InternalGovernance_{it} + \alpha_2 Control_{it} + \varepsilon$$

Where:

the subscript i represents ith bank and t denotes time.

$PerformanceMeasure_{it}$ include four types of bank performance variables:

Profit Measure: Return on Asset (ROA)
Valuation Measure: Tobin's Q;
Cost Measure: Cost/Asset;
Loan Measure: Loan Loss Reserve/Gross Loan.

$InternalGovernance_{it}$ is a vector of board governance variables:

Board Size (BS);
Board Independence (OUT = number of outside directors / total number of directors);

Bank Ownership (OWN = 0 if the percent of state ownership is < 5%, 0 otherwise; alternatively, the actual government ownership is used);
Leadership (LEA is a dummy variable that equals 1 if CEO is also COB).

$Control_{it}$ is a vector of control variables that include:
Logarithm of size of the bank (SZ);
Growth Opportunity (GROWOPP = Capital Expenditures / total sale);
Capital Ratio (CAPRATIO = Capital / Total Assets).

As reviewed earlier, some studies suggest a non-linearity of the board size effect. Therefore, I add a square term of board size to measure the effect of the board size on banking performance. At the last section, I explore the relationship between governance and subsequent performance of banks to account for the possibility of endorgeneity of corporate governance.

3. Empirical Results

3.1 Descriptive Statistics

As mentioned earlier, I compute four performance variables, board governance variables, and additional control variables available in my data for both US and China. Their descriptions and data sources are presented in Table 1.

Table 1: Data Descriptions and Sources

Data Type	Variables Descriptions	Sources
US:		
Governance Variables:		Risk Metrics & www.sec.com (Financial Reports 10-K)
Board Size (BS)	The total number directors of the board	
Outside Director (OUT)	Number of outside directors/total number of directors	
Leadership (LEA)	A dummy variable that equals to 1 if CEO is also COB	
Block ownership (OWN)	OWN=0 if the percent of bank state ownership is < 5%, Otherwise, the actual government ownership is used.	
Performance Variables:		
ROA	Return on Assets	COMPUSTAT & CRSP
Tobin's Q	Total assets minus the book value of equity plus to the market value of equity /total assets	
Cost Measure	Cost/assets	
Loan Measure	Loan loss allowance/gross loan	
Control Variables:		
lnSize	log of total assets	
Growth Opportunity (GrowOpp)	Capital expenditures/sales	
Capital Ratio (CapRatio)	Equity/total assets	
China:		Bankscope
Share Type	A dummy variable: it equals to 1 if banks issue B or H shares, 0 otherwise. Other variables are measured same with the US's.	China Banking Regulatory Commission(www.cbrc.gov.cn) and China Security Regulatory Commission (www.csrc.gov.cn)

Table 2 reports descriptive statistics on governance measures, performance measures, and control variables for US banks (panel A) and Chinese banks (panel B). This table reports all variables for the years 2002-2006 for the sample of 74 US banks and 53 Chinese ones.

Table2: Descriptive Statistics

Panel A: US	Obs	Mean	Median	Min	Max	Std. Dev
Independent Variables (Governance)						
Board Size	74	16.25	15	7	31	4.93
Independent Directors (in %)	74	53.66	82.15	50	94.77	12.21
Leadership	74	0.57	1	0	1	0.45
Block Ownership (in %)	74	9.34	7.52	2.33	83.45	14.89
Dependent Variables (Performance)						
ROA (in %)	74	1.23	1.27	-1.67	4.32	0.52
Tobin's Q	74	1.07	1.06	0.91	1.80	0.06
Cost Measure	74	0.27	0.16	0.07	2.41	0.56
Loan Measure	74	0.02	0.00	0.01	0.03	0.03
Control Variables						
lnSize	74	7.36	6.88	0.45	14.50	1.99
GrowOpp	74	0.12	0.07	0.00	0.85	0.44
CapRatio	74	0.09	0.10	0.05	0.23	0.03
Panel B: CHINA	**Obs**	**Mean**	**Median**	**Min**	**Max**	**Std. Dev**
Independent Variables(Governance)						
Board Size	53	8.78	10	5	17	3.68
Independent Directors (in %)	53	29.27	20.57	0	54.71	10.33
Leadership	53	0.68	1	0	1	0.31
Block Ownership (in %)	53	43.26	12.76	0	100	34.99
Dependent Variables (Performance)						
ROA (in %)	53	0.38	0.28	-0.19	0.79	0.15
Tobin's Q	53	0.85	0.97	0.54	1.44	0.08
Cost Measure	53	0.30	0.29	0.15	0.62	0.36
Loan Measure	53	0.03	0.03	0.03	0.04	0.02
Control Variables						
lnSize	53	5.37	4.31	0.24	10.78	1.58
GrowOpp	53	0.40	0.23	0.09	1.45	0.98
CapRatio	53	0.06	0.06	0.05	0.19	0.06

Governance Variables

I first focus on the governance variables. The board size is 16.25 on average in US and 8.78 in China during the period of 2002-2006. As Adams and Mehran (2008) document, US financial firms in the period of 1986-1999 have on average larger boards than manufacturing firms. As in with their studies, my results suggest that the board size of banking tends to be large. Although Chinese banks' average board size is about half of that in the US, the average board size of Chinese banks is still larger than that of non-financial publicly listed firms in China. Based on the data from China Security regulatory Commission[5], the average board size of all listed companies is 6.2 during the years 2002-2006. It seems safe to conclude that banks tend to have larger boards of directors than nonbanking firms both in US and in China.

Regarding the proportion of outsiders on the board, I find a 53.66% for US sample and 29.27% for China. The 53.66% of outsiders in US is close to the 54% in Yermack (1996) but substantially lower than 69% found in Adams and Mehran (2008)[6]. Based on these results, the independence of Chinese banking boards is obviously weaker than that of US, and this might be due to the higher proportion of state ownership

among Chinese banks and their relatively poorer governance. Additionally, US banks have lower leadership and block ownership than Chinese banks[7], which implies that the dual-role of CEO and COB is more popular in Chinese bank management and the ownership distribution is more diverse in US banks.

Performance Variables

The performances are much higher in the US than in China during 2002-2006: the average/median ROA is 1.23%/1.27% in US and 0.38% /0.28% in China. Similarly, Tobin's Q is higher in the US (mean = 1.07) than in China (mean = 0.85). The cost measure and loan loss measure are lower in the US; the average cost measure (ratio of cost to assets) is 0.27 in the US and that in China is 0.30, and the average loan loss is 0.02 in the US and 0.03 in China. While I do not show them in the tables, there are several trends that are noteworthy, particularly trends in performance and firm size. For Chinese banks, ROA and Tobin's Q have shown an upward trend that might be induced by the Chinese banking reformation and capitalization of Chinese banking industry in 2002, while ROA and Tobin's Q of US banks fluctuate from 2002 to 2006.

Control Variables

Bank size may be one important element of performance as banks may enjoy economics of scale in financial operations and in adoption of corporate governance norms. I measure firm size by the logarithm of total assets; on average, the US bank size is higher than that in China. I also control for growth opportunities, as banks with higher growing opportunities might achieve better performance even if their governance is not ideal. To the end, I use the ratio of capital expenditures to sales to proxy for growth opportunities. Chinese banks have higher growth opportunities although their standard deviation is much larger than US. Another control variable is the capital ratio (equals the ratio of equity to total Assets). US banks' capital ratio is higher than Chinese banks on average (0.09 in US versus 0.06 in China), and Chinese banks' capital ratio has a greater standard deviation (0.03 in US versus 0.06 in China).

In sum, banks in China operate less efficiently than those in US based on all four measures of performance - ROA, Tobin's Q, cost, and loan management, and the variations in Chinese banks' variables tend to be greater. On average, US banks have a larger board size and higher percentage of outside directors than Chinese banks. Additionally, US banks are less likely to have a dual CEO/COB and to have a concentrated ownership.

Table 3 presents the correlations between board governance and performance variables (panel A for the US and panel B for China). In the US, ROA and Tobin's Q are significantly correlated with governance variables – board size and the percentage of outsiders, while cost measure is insignificantly but positively correlated with board size. In China, the correlations between performances and governance are insignificant except for a negative relation between block ownership and ROA and between block ownership and Tobin's Q. Therefore, the correlation analysis suggests a general weaker association between performance and governance in China than that in the US.

Table 3: Correlations between board governance and bank performance in the US and in China

Significance levels: (***) – 1%, (**)-5%, (*)-10%.

Panel A. Governance and Performance in US

	BS	OUT	LEA	OWN	ROA	Tobin's Q	Cost Measure	Loan Measure
BS	1.00	0.02	-0.15	0.18*	-0.12**	0.10*	0.08*	-0.07
OUT		1.00	-0.06	-0.03	0.05*	0.01	-0.01	-0.00
LEA			1.00	0.09*	-0.02	0.00	0.06	0.03
OWN				1.00	-0.08*	-0.01	0.05	0.04
ROA					1.00	-0.01	-0.04	-0.06
Tobin's Q						1.00	-0.06	-0.02
Cost Measure							1.00	0.03
Loan Measure								1.00

Panel B. Governance and Performance in China

	BS	OUT	LEA	OWN	ROA	Tobin's Q	Cost Measure	Loan Measure
BS	1.00	0.04	-0.05	0.15*	-0.11	0.09	-0.04	-0.07
OUT		1.00	-0.04	-0.09	0.09	0.13	-0.07	-0.02
LEA			1.00	0.21*	-0.11	-0.08	0.11	0.07
OWN				1.00	-0.14*	-0.15*	0.11	0.13
ROA					1.00	0.02	-0.07	-0.05
Tobin's Q						1.00	-0.04	-0.07
Cost Measure							1.00	0.06
Loan Measure								1.00

3.2 Corporate Governance and Contemporaneous Performance

In this section, I discuss the regression analysis of the relation between governance and bank performance, as measured by ROA in Table 4, Tobin's Q in Table 5, cost measure in Table 6, and loan measure in Table 7. For each table, five different regressions are performed: each of the first four regressions includes just one board structure variable, specifically board size and its square term in column 1, board composition in column 2, leadership in column 3, and ownership in column 4; then in column 5, all four board structure variables are included in the same regression. The purpose of this is to assess the robustness of results.

ROA as the Measure of Bank Performance

Table 4 shows the regression results with ROA as the dependent variable. For both countries, board size is negatively related with ROA although the relation is significant for the US sample only. For US banks, the coefficient of the square of board size is significantly negative, again suggesting that larger boards are not beneficial in terms of ROA. For Chinese banks, the correlation between block ownership and ROA is negative. This result is not surprising, since the block ownership in China often is government ownership and government ownership has been shown to be associated with poor performances by some previous studies. The leadership variable is insignificant when it is the only governance variable (regression III). However, it is significantly positive when it is included with other governance variables (regression V). Note that Table 3 also indicates a positive relation between leadership and block ownership. The positive relation is contrary to our expectation: if duality of CEO/COB suggests entrenched managers, then performance is expected to be poor. Thus I cannot offer a satisfactory explanation for the result on the leadership variable. As for the control variables, both size and capital are positively related to performance, especially for the US sample.

Table 4: Regression Analysis - ROA as the Dependent Variable

Significance levels: (***) – 1%, (**) -5%, (*) -10%.

Panel A: US			ROA		
Governance Variables	I	II	III	IV	V
Board Size	-0.001*				-0.001**
Board Size^2	-0.003**				-0.000**
Independent Directors		-0.000			-0.000
Leadership			0.007		0.006
Block Ownership				0.005	0.003
Control Variables					
lnSize	0.004*	0.007*	0.006*	0.004*	0.004*
GrowOpp	-0.031	-0.025	-0.047	-0.035	-0.033
CapRatio	0.003**	0.005**	0.004**	0.006	0.004***
Panel B: CHINA			ROA		
Governance Variables	I	II	III	IV	V
Board Size	-0.001				-0.001
Board Size^2	0.000				0.000

Independent Directors		0.000			0.001
Leadership			0.001		0.001**
Block Ownership				-0.053*	-0.046*
Control Variables					
lnSize	0.001	0.001*	0.002	0.001	0.001
GrowOpp	-0.008	-0.003	-0.003	-0.052	-0.002
CapRatio	0.000	0.002*	0.000	0.000	0.001

Tobin's Q as the Measure of Bank Performance

The regression results using Tobin's Q as the dependent variable are displayed in Table 5. For the US sample, Tobin's Q is significantly positively related with board size, which is strikingly different from that in Table 4. Here the results imply a larger board size enhances performances while the result in the previous table suggests that a larger board lowers ROA. It is hard to reconcile the differences. However, it should be noted that our result regarding Tobin's Q is consistent with that in Adams and Mehran (2008). Also noteworthy is that the board size is significant only when it is the only governance variable, not when it is included along with other governance variables. The evidence for the square of board size is clearer, significantly positive in both cases. The relation between block ownership and performance in either the US or China is negative. As in Table 4, the coefficients of size and capital ratio are positive.

Table 5: Regression Analysis - Tobin's Q as the Dependent Variable

Significance levels: (***) – 1%, (**) -5%, (*) -10%.

Panel A: US			Tobin's Q		
Governance Variables	I	II	III	IV	V
Board Size	0.000*				0.003
Board Size^2	0.001**				0.001*
Independent Directors		0.000			0.000
Leadership			0.004		0.004*
Block Ownership				-0.001**	-0.001**
Control Variables					
lnSize	0.003*	0.004*	0.002	0.003	0.004***
GrowOpp	-0.079	-0.092	-0.104	-0.092	-0.067
CapRatio	0.003**	0.003***	0.002*	0.003*	0.003***
Panel B: CHINA			Tobin's Q		
Governance Variables	I	II	III	IV	V
Board Size	-0.001				-0.001
Board Size^2	0.001				0.001
Independent Directors		0.000			0.000
Leadership			0.001		0.001
Block Ownership				-0.015	-0.013*
Control Variables					
lnSize	0.001	0.001*	0.002	0.001	0.001*
GrowOpp	-0.021	-0.014	-0.055	-0.084	-0.037
CapRatio	0.003*	0.004*	0.001	0.002*	0.003

Cost as the Measure of Bank Performance

I then turn to cost control and use cost as a proxy for bank performance. Table 6 presents the results. For the US sample, both the coefficients of board size and square of board size are significant negative. This is in agreement with the results with Tobin's Q: larger boards tend to be associated with better performances. As for the Chinese sample, there is no significant relation between performance and bank governance.

Table 6: Regression Analysis - Cost Measure as the Dependent Variable

Significance levels: (***) – 1%, (**) -5%, (*) -10%.

Panel A: US	Cost Measure				
Governance Variables	I	II	III	IV	V
Board Size	-0.001*				-0.001**
Board Size^2	-0.001***				-0.002*
Independent Directors		0.000			0.000
Leadership			0.033		0.028
Block Ownership				-0.001	-0.002*
Control Variables					
lnSize	0.016*	0.153	0.019	0.017	0.023
GrowOpp	-0.048	-0.063	-0.079	-0.036	-0.049
CapRatio	0.004***	0.004***	0.003***	0.004*	0.004***
Panel B: CHINA	Cost Measure				
Governance Variables	I	II	III	IV	V
Board Size	-0.002				-0.003
Board Size^2	-0.011				-0.009
Independent Directors		-0.001			-0.003
Leadership			0.003		0.002
Block Ownership				-0.005	-0.008
Control Variables					
lnSize	0.002	0.002	0.003	0.004	0.002
GrowOpp	-0.006	-0.005	-0.007	-0.006	-0.005
CapRatio	0.001	0.001*	0.001	0.002	0.001

Loan Loss as the Measure of Bank Performance

Table 7 reports the regression coefficients when the dependent variable is the loan loss measure. Since loan loss represents a major cost, the US results here are consistent with those in Table 6: larger boards tend to be associated with lower loan losses. For the Chinese sample, the results again indicate no significant relation between performance and governance variables.

Table 7: Regression Analysis - Loan Measure as the Dependent Variable

Significance levels: (***) – 1%, (**) -5%, (*) -10%.

Panel A: US	Loan Measure				
Governance Variables	I	II	III	IV	V
Board Size	-0.001*				-0.026
Board Size^2	-0.001**				-0.021
Independent Directors		0.000			0.000
Leadership			0.029		0.018
Block Ownership				-0.000	-0.001
Control Variables					
lnSize	0.033*	0.000	0.023	0.045	0.069
GrowOpp	-0.011	-0.032	-0.062	-0.009	-0.009
CapRatio	0.002***	0.003***	0.003***	0.002**	0.002 ***
Panel B: CHINA	Loan Measure				
Governance Variables	I	II	III	IV	V
Board Size	-0.001				-0.001
Board Size^2	-0.031				-0.053
Independent Directors		0.000			0.000
Leadership			0.001		0.002
Block Ownership				-0.001	-0.000
Control Variables					
lnSize	0.007	0.009	0.005	0.006	0.007
GrowOpp	-0.018	-0.006	-0.031	-0.019	-0.023
CapRatio	0.000	0.002*	0.000	0.002	0.002

4. Conclusions

This paper presents evidence on the relationship between board governance and performance using a sample of 74 banks in US and 53 banks in China. It finds substantial differences in board structure between the two countries; in particular the average board size and the proportion of outside directors for US banks are almost twice of those in China. US banks also perform much better than Chinese banks since SOX was enacted. As for the relation between performance and governance, the evidence is fairly mixed for the US sample while insignificant for the Chinese sample. In particular, in the US sample, board size is found to be significantly and negatively associated with ROA, but a larger board also tends to reduce costs. I cannot identify a satisfactory explanation to reconcile the results for ROA and costs. Regarding Chinese banks, the evidence indicates that governance variables are not significantly correlated with performances with the exception of block ownership; there is strong evidence that block ownership is negatively related to performance. In China, block ownership is often government ownership. Therefore, the overall evidence is consistent with my conjecture that the role of board governance structure is of secondary importance in Chinese banks, perhaps due to the strong role of government.

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Financial Constraints and Private Equity Placements

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Abstract

This study examines whether private equity placements reduce issuing firms' financial constraints in the Taiwan Stock Exchange. We find that private equity placements mitigate financial constraints and potentially provide a source of value by enabling issuing firms to improve their investment policy. We further show that the post-placement performance of issuers is significantly improved due to the reduction of financial constraints. Finally, we show that offerings subject to higher financial constraints are more heavily discounted and there is a negative relationship between the offering price discounts and financial constraints.

JEL Classifications: G32

Key words: private equity placements; financial constraints

Director busyness and company performance: evidence from Russian public companies

The literature disagrees on the link between having "busy" directors on the board and firm performance. Directors are considered to be busy in case they are serving at the same time on boards of directors of three and more companies. Busyness, on the one hand, implies good reputation of a director, certifies his knowledge, experience and access to broad networks; on the other hand, busy director might not have enough time for productive work. This paper investigates the relationship between director busyness and firm performance in Russian companies which were ranked as the best companies in terms of corporate governance by S&P during the period 2002-2010. The obtained results show that there is negative linear relationship between return on assets and director busyness, while there is also non-linear U-shaped relationship between Tobin's Q and director busyness. These results suggest that the market appreciates when directors focus only on 1 or 2 companies, or when they are members of significant number of boards. In the latter case we assume that lack of time can be compensated by the experience, knowledge from different industries, and, in particular, by being involved into networks. The findings support both busyness hypothesis and reputation hypothesis. The results of the study can be a basis for making recommendations regarding director busyness in corporate governance codes.

Keywords*: corporate governance, board of directors, busy directors, multiple directorships, firm performance.*

1. Introduction

The attention of regulators, researchers and practitioners to the role of the Board of Directors as a body and mechanism of corporate governance has increased since the start of the legislative reforms in the area of the corporate governance. The release of the Cadbury report in the UK in 1992 and the Sarbanes – Oxley Act in the United States in 2002 were the substantial milestones in this reform. They were followed by significant changes in the corporate legislation of other countries. After 20 years researchers and business experts did not come to consensus on how the reformed Boards of Directors cope with the new monitoring functions, which are conferred on them by the regulators.

Numerous studies of the Boards of Directors structure, the role of non-executive and independent directors, gender composition and other characteristics, and their relationship with financial performance of companies have the inconsistent results. One of the main directions of modern research on corporate governance, allowing us to analyze the role of the boards of directors from the point of view of fulfilling the key functions with the emphasis on experience, connections and other resources they bring to the company, is the issue of multiple director's positions. In fact, it is the combination of the position of the director in the company with the director positions and (or) position of the senior executive manager in other companies.

To take examples of the Russian companies, - on the board of "OGK-6" there were directors who held board member positions at the same time in 41 or even 44 companies in 2006, and the company showed good performance results during the year. On the other hand, board members of "Yakutskenergo" held director positions in 26, 29 companies, but their performance was rather poor. Based on this, the following question arises: is there any relationship between director busyness and company performance of Russian companies?

One of the facets of the problem of multiple directorships positions, studied in relation to the appointment to the boards of external (non-executive and independent) directors, is the question of how the company, nominating such directors into its board, gains or losses because of the fact that these directors could hold positions in the boards and executive bodies of other companies. We are investigating the issue of how multiple directorships are related to the performance of the company.

2. Literature Review

Director busyness is considered as the combination of the director's position in the boards of directors of different companies. Which directors and how many positions should they hold in order to be referred to as busy directors? Most of the studies in developed markets consider director to be busy if he holds directorship in the board of three or more companies [Cashman et al., 2012; Fich, Shivdasani, 2006; Benson et al., 2014]; some authors focus on busy outside directors or busy independent directors. However, the threshold for the number of positions of busy directors might differ due to institutional features, cross-cultural differences, varied business practices and specifics of corporate law in different countries.

Director busyness can be explained through different motives and reasons. Directors who demonstrate their ability as monitors and serve well usually get additional board appointments, which is known as "reputation hypothesis" [Fama and Jensen, 1983]. Additional appointments make signal to the market that director can be effective, and other companies start seeing value in busy directors. In other words, the fact that the competences of the director are demanded by several firms, give the positive signal on the talents and experience of this director [Masulis, Mobbs, 2014]. One of the functions of board of directors is consulting; being a good consultant requires experience and profound knowledge in different fields, which will allow to make good decisions. Knowledge, experience, networks and access to the resources enable busy directors to perform better [Kor, Sundaramurthy, 2009].

While serving for several boards, director has an opportunity to compare different activities, decisions and approaches and enlarge his or her experience which is good both for the company and for the director. Consistent with this view, there is "resource dependency hypothesis" which states that multiple directors might be better networked, helping the company to get access to valuable resources and establish more linkages with the external environment [Pfeffer, 1972; Booth and Deli, 1995]. Another evidence on the positive association between busy directors and firm performance is "quality hypothesis": being a member of board of directors in several companies certifies director's quality.

In addition, the business community could perceive the busy directors of large corporations as more experienced because of their work in companies with diversified activities. The authors of the study [Field et al., 2013] found that companies that conducted an initial public offering, invite busy directors to their boards usually after making such placement due to the necessity of the experience which busy directors can provide.

At the same time, it is obvious that multiple directorships can have negative influence on company performance simply because of the lack of time; "busyness hypothesis" implies that overbusyness of board members can do harm to the companies. Problems with the time availability can be demonstrated through meetings attendance. In the study of [Jiraporn et al., 2009] the authors have discovered that busy directors as a result of the addition of excessive liabilities tend to miss meetings of the board of directors.

Though there are some studies that find positive relationship between busyness and performance of the US companies [Core et al., 1999; Shivdasani, Yermack, 1999], majority of the studies in developed markets prove the busyness hypothesis and find negative relationship between director busyness and company performance [Fich, Shivdasani, 2006; Andres et al., 2013; Cashman et al., 2012]. This results into requirements in the company governance codes about the limitations for the number of additional directorships for the board members. However, if we have a look at the results obtained in the developing markets, first, we will notice, that average number of directorships per director will be much higher in, for example, India, Brazil or Colombia, and, secondly, there is positive relationship between director busyness and company performance [Sarkar, Sarkar, 2009; Li et al., 2013; Gutierrez, Pombo, 2011; Santos da Silveira, Barros, 2012]. The results of the study which included 4225 companies from all over the world and covered the period 2004-2010 also showed positive relationship between director busyness and company performance [Omer et al., 2014]. Some studies find no evidence of the relationship between busyness and performance [Arioglu, Kaya, 2014]. Differences between the results for different markets can be explained by cultural, historical and institutional specifics.

3. Research Hypotheses and Methodology

As far as there are theoretical assumptions and empirical proof for both positive and negative relationship between director busyness and company performance, the following hypothesis is formulated:

Research hypothesis: there is non-linear relationship between director busyness and performance of Russian companies.

We expect that busyness of the directors can be valuable for companies due to knowledge, reputation, experience and networks, but when directors become too busy and they combine huge number of directorships, this could affect company performance negatively.

In the empirical analysis that follows, we use the following econometric model which can be written as follows:

$$Performance_{it} = \beta_0 + \beta_1 BUSY^2{}_{it} + \beta_2 BUSY_{it} + \beta_3 BD_{it} + \beta_4 FIN_{it} + u_{it}, i = 1, 2, \dots, N; t = 2002, \dots, 2010,$$

where subscripts *i* and *t* index firms and time, respectively, the dependent variable $Performance_{it}$ is a measure of financial performance (Tobin's Q or ROA), $BUSY_{it}$ describes director busyness, variable BD_{it} is the size of board of directors, vector FIN_{it} includes control variables, such as firm size, leverage and firm age, and u_{it} is a random variable.

As it was mentioned, variable $BUSY_{it}$ denotes director busyness, and in this particular study busyness is measured in four different ways:

- average number of directorships held by the board member in other companies [Fich, Shivdasani, 2006];
- average number of directorships held by *outside* directors in other companies [Pombo, Gutierrez, 2011];
- maximum number of directorships held by the board members in other companies [Ferris et al., 2003];
- maximum number of directorships held by an *executive* of the firm in other companies.

The first two measures are widely used in different studies [Cashman et al., 2012; Andres et al., 2013; Arioglu, Kaya, 2014], while maximum number of directorships of an executive director was chosen because of the specifics of their position, role, goals in the company: their poor performance can be extremely harmful for the company.

4. Data and Sample

The sample on which the study was conducted first consisted of 128 Russian publicly traded companies and covered the period 2002-2010.

Chosen companies were ranked as the best Russian companies in terms of corporate governance in S&P ranking. In the period of 2001-2007 S&P company first published CGS (Corporate Governance Score) ranking, and then since 2007 it started publishing GAMMA (Governance, Management, Accountability, Metrics and Analysis) ranking. Both rankings were based on different characteristics of board of directors and approaches to procedures. For example, ownership structure, board composition, protection of shareholders' rights, transparency of the company were taken into consideration for the ranking.

Banks and other companies from financial sector were excluded from the sample due to the specifics of their activities. Thus, final sample consists of 116 companies and 519 company-year observations. Number of observations does not equal to the product of number of companies and number of years for the following reason: each year the ranking could include new companies and exclude other companies depending on the changes in their corporate governance. Because of this some companies could be in the ranking during the whole period covered by the study and some companies could appear only during one or two years. On average, each year 58 Russian companies were ranked. Table 1 below presents descriptive statistics.

Table 1. Descriptive statistics

Variable	Mean	Std. dev.	Min	Max
BUSYD	2.48	2.46	0	13.67
BUSYOUT	2.18	2.34	0	13.67
MAXD	7.83	8.03	0	47
MAXEX	2.24	3.81	0	30
Q	1.213	0.898	0.144	10.405
ROA	0.075	0.091	-0.194	0.410
BD	10.293	2.116	5	17
SIZE	17.899	1.423	13.237	22.781
LEV	0.367	0.218	0.000	0.978
AGE	28.894	35.196	1	165

BUSYD – directorships per director
BUSYOUT – directorships per outside director
MAXD – maximum directorships held by director
MAXEX – maximum directorships held by executive
BD – size of board of directors

As is shown, on average, a member of Russian board of directors is not busy if to follow the definition which implies holding 3 directorships in order to be considered as busy director. However, at the same time, we can see that there are extreme situations when a director holds 47 or 30 directorships. If to compare, in the USA or Germany average maximum number of directorships equals three [Ferris et al., 2003; Andres et al., 2013].

5. Estimation Results

First, the hypothesis was tested for such a performance measure as return on assets. Table 1 shows the results obtained for the model with non-linear relationship between director busyness and return on assets.

Table 2. Estimation results: non-linear model with ROA

Variable	ROAt				
	Baseline model	1	2	3	4
$BUSYD_t$	-	0.001	-	-	-
$BUSYD2_t$	-	-0.001	-	-	-
$BUSYOUT_t$	-	-	0.001	-	-
$BUSYOUT2_t$	-	-	-0.001	-	-
$MAXD_t$	-	-	-	0.001	-
$MAXD2_t$	-	-	-	-0.000	-
$MAXEX_t$	-	-	-	-	0.001
$MAXEX2_t$	-	-	-	-	-0.000
BD_t	-	-0.002	-0.002	-0.002	-0.002
$SIZE_t$	0.012***	0.012***	0.012***	0.012***	0.012***
LEV_t	-0.033*	-0.039**	-0.039**	-0.037**	-0.037**
AGE_t	0.000*	0.000*	0.000*	0.000	0.000*
Cons	-0.129**	-0.105**	-0.104**	-0.102**	-0.116**
R^2 adj.	0.0449	0.0616	0.0607	0.0625	0.0508
p-value	0.0000	0.0000	0.0000	0.0000	0.0002

Statistical significance at the 10, 5, and 1 percent levels is indicated by *, **, and *** respectively.

All the models are statistically significant; however, non-linear relationship is statistically insignificant.

Thus, we focused on linear relationship between director busyness and return on assets (Table 3).

Table 3. Estimation results: linear model with ROA

Variable	ROA_t				
	Baseline model	1	2	3	4
$BUSYD_t$	-	-0.004**	-	-	-
$BUSYOUT_t$	-	-	-0.004**	-	-
$MAXD_t$	-	-	-	-0.001***	-
$MAXEX_t$	-	-	-	-	-0.001
BD_t	-	-0.002	-0.002	-0.002	-0.002
$SIZE_t$	0.012***	0.012***	0.012***	0.012***	0.012***
LEVt	-0.033*	-0.035*	-0.035*	-0.035*	-0.036*
AGE_t	0.000*	0.000*	0.000*	0.000	0.000*
Cons	-0.129**	-0.109**	-0.109**	-0.106**	-0.115**
R^2 adj.	0.0449	0.0576	0.0572	0.0616	0.0493
p-value	0.0000	0.0000	0.0000	0.0000	0.0001

Statistical significance at the 10, 5, and 1 percent levels is indicated by *, **, and *** respectively.

As is shown in Table 3, all models are statistically significant. Besides, we obtained significant negative relationship between director busyness measures and ROA which implies that high number of directorships is associated with poor operational performance. This result is consistent with the results obtained in developed markets indicating busyness hypothesis, based on assumption that when directors start serving on several boards, they cannot fulfill their duties properly for every company, and company efficiency could suffer [Cashman et al., 2012; Fich, Shivdasani, 2006].

However, more interesting results were obtained in the model where Tobin's Q was used as a performance measure. According to [Lei, Deng, 2014], on the sample of the companies from Hong Kong there was obtained non-linear relationship between busyness and firm performance which derives from consequences of the busyness, potentially both positive and negative for the company. It is also important to remember, that Tobin's Q reflects market's perception of the company performance, and the results should be treated in this context.

Table 4. Estimation results: non-linear model with Tobin's Q

Variable	Qt				
	Baseline model	**1**	**2**	**3**	**4**
$BUSYD_t$	-	-0.121***	-	-	-
$BUSYD2_t$	-	0.016***	-	-	-
$BUSYOUT_t$	-	-	-0.137***	-	-
$BUSYOUT2_t$	-	-	0.018***	-	-
$MAXD_t$	-	-	-	-0.026**	-
$MAXD2_t$	-	-	-	0.001***	-
$MAXEX_t$	-	-	-	-	-0.008
$MAXEX2_t$	-	-	-	-	0.000
BD_t	-	-0.027	-0.030	-0.026	-0.029
ROA_t	1.849***	1.976***	1.970***	1.956***	1.866***
$SIZE_t$	-0.612***	-0.522***	-0.521***	-0.455***	-0.616***
LEV_t	0.623***	0.613*	0.607***	0.594***	0.624***
AGE_t	0.100***	0.097***	0.097***	0.085***	0.100***
Cons	8.930***	7.784***	7.790***	6.838***	9.311***
R^2 adj	0.1060	0.1407	0.1486	0.1652	0.1084
p-value	0.0000	0.0000	0.0000	0.0000	0.0000

Statistical significance at the 10, 5, and 1 percent levels is indicated by *, **, and *** respectively.

As is shown in Table 4, all models are statistically significant and we have significant non-linear quadratic relationship between director busyness and company performance for all director busyness measures except the maximum number of directorships held by an *executive* director of the firm in other companies. The results are obtained using the fixed-effects estimator.

Obtained results suggest that market reacts positively in two cases. First, market finds appropriate if director serves only on the board of one or two companies and is able to devote significant amount of time for the work in these particular companies. Then, when director accepts more and more appointments, the market finds this busyness as a problem and as a negative signal. But, quadratic relationship suggests that big amount of directorships is also perceived in the positive way. It is possible to assume that when a director serves on really great amount of boards of directors, lack of time can be compensated by experience, knowledge, reputation and networks.

Given Russian institutional background we suppose that networks are playing the most important role in this relationship. Often knowing "the right person in the right place" can bring enormous value to the company, and hiring such a director as a board of directors member really can be a positive signal for the market.

6. Conclusions

The research has given the grounds to investigate the relationship between director busyness and company performance in Russia. Multiple directorships can be treated in two different ways: on the one hand, lots of appointments indicate high reputation of the director, let him enlarge his knowledge and enrich experience, give access to important people and important networks. On the other hand, multiple directorships inevitably result in lack of time and can be associated with bad performance of the companies. Prior literature has shown different results, including positive relationship, negative relationship and no significant relationship.

The conducted study is the first to investigate the relationship between director busyness and performance of Russian firms. Our results are that there is negative relationship between director busyness and company performance measured by ROA. Operational performance in companies with not busy directors is on average higher than operational performance of the companies with busy directors. Furthermore, there is non-linear relationship between busyness and company performance measured using Tobin's Q, which can be treated as market-based performance measurement. Non-linear U-shaped relationship suggest market's positive reaction if directors are not busy or if they serve on boards of many companies. On average market reacts positively when there are members with more than 7 directorships per director.

Practical implications of the obtained results can be the following: while choosing board members, it should be kept in mind that busy directors give a positive signal to the market. The networks of busy directors can bring real value to the company and provide the company with easier access to the necessary resources. With regard to policy implications, it might be reasonable to introduce the minimum number of non-busy directors in the corporate governance codes. This will help to guarantee a presence on the board of those directors who will fully devote their time and competences to the particular company.

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The information effect of environmental, social and governance indexes

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Abstract

With the issues of environmental, social and corporate governance are more emphasized during the operations of enterprises, the related indexes are created rapidly. The Taiwan Sustainability Index, TWSE RAFI Taiwan High Compensation 100 Index (TWSE HC 100 Index), and TWSE Corporate Governance 100 Index (TWSE CG 100 Index) compiled by Taiwan Index company can be regarded as proxies for environmental, social and corporate governance. The companies listed in the previous three indexes are represented those that much more focus on environmental, social and corporate governance in Taiwan capital market. Among them, companies included in the index represented better environmental performance, higher pay levels or better-performing corporate governance, which had a positive impact on the business and higher expected share price. Excluding stocks are the opposite. The event study is explored to determine whether the price of the newly added stocks to the index would increase and the price of excluded stocks from the index would decline on the announcement data and effective data respectively. The findings showed that there existed positive abnormal returns of the companies newly listed in the Taiwan

Sustainability Index, TWSE HC 100 Index and TWSE CG 100 Index whereas there existed negative abnormal returns of the companies excluded from the previous three Indexes both on announcement data and effective data. The results represent that the added or excluded information exist information effect.

Keyword: environmental, social and corporate governance; Abnormal return; Taiwan Sustainability Index, TWSE HC 100 Index and TWSE CG 100 Index

The effect of overinvestment on long-term analyst forecast

ABSTRACT: This study examines whether the companies' investment decisions affect the publication of analysts' long-term growth forecasts. Using public U.S. firms for the period from 2000 to 2014, we document a positive relation between overinvestment and the long-term growth forecast issuance. This positive relation is more pronounced for firms covered by more competent analysts and for firms with more earnings management. In addition, analysts provide more negative forecasts as the magnitude of overinvestment increases. Overall, the findings are consistent with the notion that investment decision is an important determinant of analysts' long-term forecasts in analyzing the firms' long-term prospects.

Keywords: Overinvestment; Long-term Analyst forecasts; Earnings management

Market reaction to the change in Taiwan Mid Cap 100 Index

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Abstract

The stocks listed on the Taiwan Mid Cap 100 index are those market capitalization ranked from 51st to 150th on Weighted Stock Price Index of Taiwan Stock Exchange, which represent the mid-size stocks. According to Shankar and Miller (2006), there are mostly positive abnormal return of added firms that are listed on S&P 600 index .Conversely, deleted firms existed negative abnormal returns mostly. And the market reaction of the changed companies listed on the index is the short-term effect. The result is based on the price pressure hypothesis. However, most literature on this topic focus on American or European index. The companies of Taiwan Mid Cap 100 index is chosen to test the market reactions of the stocks which are changed from the index based on event study. The observation period is from November 29, 2004 to September 2017. The companies which are added or deleted from the index is adjusted quarterly. The number of addition and deletion shares were 252 over the past fourteen years, while the number of addition shares on the effective date was 352. This study finds that companies that added (deleted) to the index had significant negative (positive) abnormal returns on the announcement day. Trading volume at the announcement date or the effective date have reduced both for added and deleted firms. This phenomenon is not consistent with the previous literature. The

reason is worth further investigating.

Key word: Taiwan Mid Cap 100 index, index changes, price effect, trading volume, event study

Dual-class stock companies: how the ownership and dividend payments are related?

This paper investigates the relationship of dividend policy and ownership structure of Russian dual-class stock companies. The results allow to conclude on the link of a wide range of factors of ownership structure and concentration in Russian companies with their dividend policy, as well as to trace the differences in dividend policy for common and preferred shares. The findings point to a growing level of ownership concentration on the Russian market, indicate the severity of agency problem and abuse of minority shareholders' rights, and may be helpful for improving dividend policy of Russian companies and increasing their investment attractiveness.

Keywords: *dividend policy, dual-class stock companies, ownership structure, ownership concentration, agency problem, private benefits of control, Russia*

1. Introduction

Dividend policy of companies for several decades has been a topic of current interest, since it reflects interests of various groups of owners. Dividend policy is sensitive to the degree of ownership concentration and different shareholders' power level, associated with the quality of corporate governance and the degree of minority shareholders' rights protection. For this reason, the study of the factors related to the dividend policy is important from perspective of increasing the level of corporate governance, protection of shareholders' rights and prevention of conflicts between different types of owners.

2. Dividend policy and ownership structure

Empirical studies show that the size of dividend payments is interrelated with the proportion of votes held by largest shareholders, who can extract private benefits of control (Maury, Pajuste, 2002). In addition, researchers notice the relation between size of dividends and proportion of shares held by different types of owners on the basis of conflict of interests (Wei, Zhang, Xiao, 2004; Kumar, 2006; Wang, Manry, Wandler, 2011). Conflict of interests in Russia can be especially acute due to the peculiarities of the country's legal system, which is characterized by a low level of minority shareholders' protection. In other countries, the relation of dividend payments and the level of shareholders' protection has been studied, in particular, by (La Porta et al., 2000), and (Goyal, Muckley, 2013).

Dual-class stock companies are of particular interest for the study of dividend policy, as issue of non-voting shares leads to a breach of a proportional distribution of control and cash flow rights, thus clashing interests of the owners of different types of shares and influencing corporate governance and dividend policy.

3. Data and sample

The sample includes data for all dual-class stock companies, which paid cash dividends and were traded on the Moscow Stock Exchange in the period from 2010 to 2013 (65 companies). The total payout ratio and payout ratios for two types of shares separately are considered as indicators of dividend policy. As measures of ownership concentration are taken proportions of votes held by three largest shareholders, the difference between the proportions of common shares held by two largest shareholders, as well as the ratio of proportions of preferred and common in the largest shareholder's portfolio. In addition, shares of different types of owners in authorized capital and ordinary stocks of company are taken into consideration.

4. Empirical results and conclusions

Statistical analysis showed high ownership concentration and redistribution of voting shares to the first largest shareholder through the decrease of proportion of votes held by other shareholders in Russian dual-class stock companies. Such situation may indicate the severity of agency problem and the use by the largest shareholder his influence for the distribution of available funds in his own interests.

To identify the relation between dividend policy and factors of ownership concentration and structure, regression models on panel data with random effects were constructed. The

results show that the size of dividends on common shares is inversely related with the proportion of votes held by the largest shareholder, the total proportion of votes held by three largest shareholders and the distance in proportions of common shares held by the first and the second largest owners. This could be a signal of extraction of private benefits of control by the largest shareholder and infringement of minority shareholders' rights. The structure of the largest shareholder's portfolio is directly related to the size of dividend payments on both types of shares, indicating that in companies where the largest shareholder holds a relatively small proportion of preferred shares, the agency conflict is especially acute, because major shareholder retains control over decisions without carrying all the costs and may not be interested in dividends on preferred shares. Moreover, it was found that dividend payments on preferred shares are not related with the share of any type of owners in authorized capital and ordinary stocks. Dividends on common shares are inversely related with the proportion of shares held by foreign investors, who, due to their lower awareness of the state of affairs in a company, may prefer capital gains to dividend income. A similar interrelation, observed with the proportion of shares held by offshores, may be caused by withdrawal of funds through transactions involving these companies. Finally, the share of Russian corporate investors is inversely related to the size of dividends on common shares, which again may be associated with extraction of private benefits of control.

In general, dividend policy on preferred shares is more conservative than dividend policy on common shares, and infringement of rights occurs in respect of minority holders of common stocks.

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Integration of Artificial Neural Network and Technical Analysis for Stock Price Prediction

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Abstract

Along with the rapid development of artificial intelligence (AI), the industry has adopted AI to process complicated big data. This research applied neural networks in the category of AI and combined the data of a technological analysis indicator as the predictive variable of neural networks. First, the predictive performances in different hidden layers and different neuronal ensembles were compared, and then the performance after GARCH volatility was used as the predictive variable of neural networks. The historical data of the stock price of Taiwan Semiconductor Manufacturing Co. Ltd from 2007 to 2016 were used to discuss predictive performance. The neural network demonstrated excellent fault-tolerant capability and could generate more precise prediction results even if there are noise data. Many research studies have adopted neural networks as research tools to further enhance the predictive ability. This study found that neural networks exhibit the best prediction in 5-day hidden layer and neuronal ensemble 2×2, 10-day hidden layer and neuronal ensemble 3×2, and 20-day hidden layer and neuronal ensemble 5×2 before GARCH volatility is added. After GARCH fluctuation is added and used as the predictive variable, most neural network

models did not improve their predictive performance, but 20-day predictive performance did improve. The findings can serve as reference on using the neural network to predict price and volatility, especially when a technological analysis indicator is used as the variable to predict the price.

Keywords: Artificial Intelligence, Neuron Networks, Technical Analysis, Forecasting

An Investor's Perspective on the Effect of Internet Sentiment Tracking of Mobile Payment Services on Stock Returns and Volatilities

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ABSTRACT

With the rapid quantity of information inflow and informational response in online communities, investors' decisions are usually influenced by public sentiment, especially under the promotion of social media (Tsapeli, Musolesi, & Tino, 2017). Recent studies into financial theory provides evidence to prove that stock market prices are affected by the viewpoints and sentiment of social media reports (Rao, & Srivastava, 2012 ; Li, Wang, Li, Liu, Gong, & Chen ,2014). However, under the vigorous development of mobile payment markets, understanding the relationship among information response of mobile payment trend, stock returns and volatilities that market investors worthy of further discussion. Therefore, this study applied the asymmetric EGARCH model with sentiment tracking variables to explore the effect of mobile payment's internet sentiment tracking activities on Taiwan's listed and OTC stock returns and volatilities during 2013-2017. The empirical results found that total sentiment tracking has a positive effect on stock returns and mostly has a positive effect on volatility in stock returns; while negative sentiment tracking has a positive or negative effect on stock returns and has a negative effect on volatility in stock returns. This study included the internet sentiment tracking of mobile payment, and the results

herein can be used by investors as a basis to form investment decisions under different dimensions.

Key Words: Mobile Payment, Internet Sentiment Tracking, Emotions, Stock Volatility.

Cryptocurrency of Information Released by Central Banks and Market Reaction: Empirical Analysis of Bitcoin

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ABSTRACT

With the fast-changing development of network and science and technology, cryptocurrencies have gradually risen in popularity in just a few short years since 2008. They are characterized by “decentralization”, with no need to rely on particular institutions. Bitcoin is one virtual currency that appeared nearly from the beginning and currently has the largest scale, with many Bitcoin investors all over the world. The regions researched by this paper include the U.S., Japan, China, and South Korea and countries in Europe. Since October 2013, the price of Bitcoin has gone through some drastic fluctuations. Therefore, this research used the event study method to discuss the relationship between messages issued by central banks in various countries and Bitcoin’s price fluctuation during the period from November 2013 to January 2018. From the event samples, the results showed that the effect of messages issued by central banks on the abnormal return (AR) produced by Bitcoin transformed from exhibiting a

significantly positive effect to a significantly negative effect after the disclosure of messages. This finding can serve as reference to investors and owners using blockchain technology and virtual currencies.

Keywords: Cryptocurrencies, Bitcoin, Abnormal Return, Central Bank

ANALYS OF VALUE-AT-RISK OF REVERSE MORTGAGE LOAN IN TAIWAN

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Abstract

The Reverse Mortgage (RM) mechanism of real estate has gradually evolved from a mode of public benefit to that of commerce in Taiwan. In the RM, the successor is accepted to pay off the loan so as to take the property back when the borrower is deceased. However, it is apt to incur an unbalanced distribution of profit and loss for the RM lender (the probability and amount of loss in credit are higher than those of the profit), thus placing a great challenge for financial risk control and management by the undertaking bank. For this purpose, a random process of house prices and interest rates is simulated in this paper so as to observe the distribution of profit and loss and Value at Risk (VaR) in RM at different loan terms (LTV, interest rate, etc.). We find that the amount of annuity paid will be reduced when the LTV or interest rate is reduced. However, the former helps reduce the lender's lending risk, while the benefit of the latter is not evident.

Keywords: Reverse mortgage; Value at Risk

1. Introduction

The reverse mortgage (RM) system in real estate helps seniors receive annuities converted from self-owned properties in a way that deals with economic life in their twilight years and reduces risks brought by long lifespans. The United States, Britain, Australia, and some Asian countries such as Japan, South Korea, Singapore, and the Chinese mainland, etc. attach great importance to and have consecutively pushed ahead with the RM system. In Taiwan, while the central government officially implemented an RM trial (TAIWAN-RM for short) in March 2013, no results have been achieved since its establishment. The main reason is that only those who do not have legal successors can apply, thereby making most seniors unable to participate. The Taipei City Government introduced an RM trial (TAIPEI-RM) in December 2014, allowing people who have successors to apply and thus attracting more people to take advantage of the program. The said two RM trails belong to public benefit-oriented loans, of which the objective is to expand public welfare. Returns from public welfare lotteries and relevant government budgets are used to deal with any financial insufficiency that occurs in the operation. However, in terms of the long-term development of this system, commercialized RM will expand the opportunities for public loans and reduce the government's financial burden. Commercial RM operations were consecutively injected into the Taiwan banking system (BANKING-RM) in December 2015. A common point of RM for both public benefit and commerce is to provide seniors with a chance to apply for a loan using their own real estate as a guarantee. They can receive a lifelong annuity on a regular basis and continue to live in the mortgaged house property after their application succeeds. During this period, the accumulative principal and interest balance are calculated as per the floating lending rate and on the basis of the received annuity. When the contract is terminated as a result of the borrower’s death, the lender will offset any debts by the gains from the property disposal. However, with a no-recourse warranty clause, when gains from property disposal are not enough to offset the balance of a debt, the lender will not have recourse for insufficient guarantee. The most dominant difference between RM for public benefit and commerce is the source of the funds to be lent. When no government funds are injected into a commercial RM, the performance of the operation and financial management and control will be inevitably emphasized to a larger extent. Product design, actuarial pricing and risk management of RM are key to the success of the operation.

In terms of RM handling, as far as the lender is concerned, the applicant is generally concerned about two aspects: one is amount of annuity able to be received after the RM is put into place; the other is regulations on distribution of the balance after repayment of debt (BARD), that is, how such balance is distributed if the gains

from the disposal of the property are higher than the balance of the debt when the contract is terminated. As provided by the preceding TAIWAN-RM, ownership of the property for guarantee is vested in the lender after the borrower dies (since the borrower in this case has no legal successor). Thus, the benefits from the disposal all belong to the lender. In TAIPEI-RM, gains from property disposal are used to offset debts and the balance, if any, is shared by the successor and the lender. In BANKING-RM, the successor is allowed to pay off any loans so as to take the property back, which also means the BARD (in case of a positive value) is paid to the successor in full. Codes for the third type (BANKING-RM) are common in the market. Notwithstanding, the lending bank is unable to gain benefits from the disposal other than debts in the case of a sufficient guarantee (when BARD is a positive value) but will face a loss as a result of non-recourse in the case of an insufficient guarantee (when BARD is a negative value). Thus, any claim for creditor's rights will be unbalanced for the RM lender. For this purpose, the RM undertaker generally seeks loan insurance to cover its losses due to insufficient guarantees.

There are many different evaluation methods in the literature for the annuity calculations of RM, and they each have merits and demerits. An RM is different from an ordinary loan. When an RM contract is priced, the contract duration and amount of subsequent debt recovery cannot be determined, causing difficulties for the evaluation. That is, such pricing makes it difficult to ensure that receipts and payments can be balanced when the contract is terminated. The crossover risk, faced by debt recovery, involves three risk factors: interest rate, house price, and lifespan. Szymanoski (1994) proposed an RM pricing model in accordance with the principle of loan insurance. Change in property value was simulated by means of Geometric Brownian Motion (GBM) in the model. On the premise that the Present Value of the Mortgage Insurance Premium (PVMIP) is not less than the Present Value of the Expected Loss (PVEL), the Principal Limit Factor (PLF) was solved. Such factors reflect the ratio of the amount able to be lent to the value of the property, which determines the amount the borrower can receive. The result of the model showed that the lower the interest rate is or the higher the age of the borrower is, the higher the PLF and the amount able to be lent to the borrower will be. Boehm and Ehrhardt (1994) believed that uncertainties about changing property values could be eliminated if the RM operation is aimed at house price fluctuation insurance. They assumed that changes in death probability are non-random (an empirical value was used to calculate death probability) and evaluated the RM in accordance with the interest rate model proposed by Cox, Ingersoll and Ross (1985) (CIR model for short). Tse (1995) assumed the rate of change in house prices and interest rates is constant and known. On the principle that receipts and payments

are balanced in a loan, the expected Mean Breakeven Annuity was calculated for two common years by the calculated value of the subsequent house price, under the assumption that the expected amount able to be lent to the borrower is the same as the value of the gains from the lender's disposal of the mortgaged property. Ma and Deng (2006) assumed a fixed change in house prices and interest rates and evaluated the annuity of an RM in accordance with the principle of the PVMIP of the loan insurance being equivalent to the PVEL. However, when house prices and interest rates deviate from a previously set level in the model, the ratio of PVEL to PVMIP will not be one. The lower the age of the borrower, the larger the extent of the deviation will be. Thus, it is recommended that a young borrower's premium should be relatively conservative. Ma *et al.* (2007) held that insurers also face high risks in underwriting RM insurance under the fluctuation of house prices and interest rates. They assumed that house price and interest rate are subordinate to GBM and the Vasicek process respectively. It was found through Monte-Carlo simulation that changes in house prices and interest rates have great impacts on the profit and loss of the loan insurer. In addition to consideration for random changes in house prices and interest rates, Huang *et al.* (2011) estimated another risk factor by Lee and Carter's (1992) model to evaluate RM. They explored how the RM insurer transfers risk to the capital market investors in the form of securitization. During the RM evaluation, Lee *et al.* (2012) aimed at the said three risk factors and gave special consideration to house price characteristics so as to simulate the random process of house prices in the form of the Jump Diffusion model and a closed-form solution through derivation. Based on the above-mentioned literatures, we notice most principles for RM annuity evaluation focus on two perspectives. One is the idea of the balance between the profit and loss of RM issuers, and the other is the principle of the balance of the payments and receipts of the loan underwriters.

A review of the above documents shows that the evaluation of RM annuities has received considerable attention and discussion. This is not a research focus of this paper, which is centered on the evaluation of profit and loss for banks to undertake RM. As previously mentioned, an unbalanced claim for the creditor's rights of the lender occurs in most RM operations in the market. We will simulate the random process of house prices and interest rates so as to evaluate the possible profit & loss and the Value at Risk (VaR) when the bank handles an RM at different Loan-to-Value and interest rates. The financial risk of the bank is quantized thereby as an indicator for further risk management.

2. Contracted annuity evaluation and profit & loss evaluation for RM

2-1. RM annuity evaluation

Assuming the borrower handles an RM with a real estate of initial market value H_0, the lender will pay an annuity due on a regular basis until the borrower dies. Assuming the borrower is dead at the end of the τth year, if the Loan-to-Value (LTV) is k ($0<k<1$) and the initial interest rate of the loan is $\tilde{\imath}_0$ as verified by the bank, amount (a_τ) of the breakeven annuity for two common years can be calculated during different living periods:

$$a_\tau = \frac{H_0 \times k}{\sum_{\tau=0}^{\omega-x-1} exp(-\tilde{\imath}_0 \cdot \tau)} \quad , \quad 0 < \tau < \omega - x \tag{1}$$

where:

x: the age of the borrower during the period of the initial loan

ω: the ultimate age of the borrower (ultimate age of the life table is generally 110 years)

According to Eq. (1), using Tse's (1995) model for reference, the expected amount (A) of the breakeven annuity for two common years is estimated on the basis of the estimated death probability of the borrower. Such amount reflects an appropriate price for the annuity of the RM:

$$A = \sum_{t=1}^{\omega-x} \left[{}_{\tau-1|1}q_x \cdot a_\tau \right] \tag{2}$$

where, ${}_{t-1|1}q_x$ refers to the death probability of the borrower aged x from t-1 and t year(s).

2-2. Profit & loss evaluation for RM

According to the evaluated amount of the annuity found in Eq. (2), we can calculate the balance ($\tilde{B}_\tau$) of debts, total costs ($\tilde{B}'_\tau$) paid for the life annuity, and the amount ($\widetilde{D}_\tau$) of BARD allocated to the successor during different RM periods. The lender's profit and loss in RM is evaluated thereby.

First, the balance ($\tilde{B}_\tau$) of debts in the RM is the sum of the principal and interest of the received annuity calculated as per the lending rate:

$$\tilde{B}_\tau = A \times \sum_{t=0}^{\tau-1} u_{t,\tau} \quad ;$$

$$u_{t_1,t_2} = S_{t_2}(S_{t_1})^{-1} \ , \ t_1 < t_2 \ , \ S_t = \exp(\int_0^t \tilde{\imath}_s \, ds) \tag{3}$$

In the equation above, $\tilde{\imath}_s$ refers to the lending rate in the sth period (year). Such rate is calculated from the floating risk-free interest rate ($\tilde{r}_s$) plus the interest-rate spread (π) ($\tilde{\imath}_s = \tilde{r}_s + \pi$) . If the balance of debts in Eq. (3) is calculated as per the risk-free interest rate ($\tilde{r}_s$) and the interest rate of a fixed term deposit of the bank serves as a proxy variable of the risk-free interest rate, the sum of its principal and interest ($\tilde{B}'_\tau$) will reflect the cost of the funds paid for the annuity of the bank:

$$\tilde{B}'_\tau = A \times \sum_{t=0}^{\tau-1} u'_{t,\tau} \quad ;$$

$$u'_{t_1,t_2} = S'_{t_2}(S'_{t_1})^{-1} \ , \ t_1 < t_2 \quad , \ S'_t = \exp(\int_0^t \tilde{r}_s \, ds) \tag{4}$$

When the said contract is terminated, if the market value ($\widetilde{H}_\tau$) of the property for guarantee is less than the balance of debts ($\tilde{B}_\tau$), the lender will have gains ($\widetilde{H}_\tau$) from disposal of the house but will have non-recourse for insufficient guarantee. On the contrary, its BARD ($\tilde{R}_\tau = \left(\widetilde{H}_\tau - \tilde{B}_\tau\right)^+$) will be allocated to the borrower's successor in accordance with the stipulated proportion (w_τ) (allocated amount: $\widetilde{D}_\tau = \tilde{R}_\tau \times w_\tau$) , and the other amount ($\tilde{R}_\tau \times (1 - w_\tau)$) will belong to the lender. The profit and loss ($\widetilde{N}_\tau$) in the compensation settlement for the lender's creditor's rights will then be equivalent to the gains ($\widetilde{H}_\tau$) from the disposal of the property, and the amount of BARD allocated to the successor is deducted, following the cost ($\tilde{B}'_\tau$) paid for annuity:

$$\begin{aligned}\widetilde{N}_\tau &= \widetilde{H}_\tau - \tilde{B}'_\tau - \widetilde{D}_\tau \\ &= \begin{matrix} \widetilde{H}_\tau - \widetilde{B}'_\tau \le 0 \ , & if \quad \tilde{B}_\tau \ge \widetilde{H}_\tau \ \ (\widetilde{D}_\tau = 0) \\ \widetilde{H}_\tau - \tilde{B}'_\tau - \left(\widetilde{H}_\tau - \tilde{B}_\tau\right) \times w_\tau > 0, & if \quad \tilde{B}_\tau < \widetilde{H}_\tau \ \ (\widetilde{D}_\tau = (\widetilde{H}_\tau - \tilde{B}_\tau) \times w_\tau) \end{matrix}\end{aligned} \tag{5}$$

In an overview of RM contracts in the market, ownership of BARD is specified differently. BARD will be vested in the lender (w_τ=0, for example, TAIWAN-RM) , shared by the borrower and the lender (0<w_τ<1, similar to TAIPEI-RM), or all vested in the borrower's successor (w_τ=1, e.g. BANKING-RM). The third type of RM is used in most cases. Accordingly, the profit and loss ($\widetilde{N}_\tau$) in the compensation settlement for the lender's creditor's rights will be simplified from Eq. (5) to Eq. (6):

$$\widetilde{N}_\tau = \widetilde{H}_\tau - \tilde{B}'_\tau - \widetilde{D}_\tau = \begin{matrix} \tilde{B}_\tau - \tilde{B}'_\tau > 0 \ , & if \quad \widetilde{H}_\tau \ge \tilde{B}_\tau \left(\widetilde{D}_\tau = \widetilde{H}_\tau - \tilde{B}_\tau\right) \\ \widetilde{H}_\tau - \tilde{B}'_\tau > 0, & if \quad \widetilde{H}_\tau < \tilde{B}_\tau \left(\widetilde{D}_\tau = 0\right) \end{matrix} \tag{6}$$

where, the lending rate ($\tilde{\imath}_s$) and LTV (k) influence the amount of the annuity and become key factors for the profit and loss of the bank. Through simulative calculations of the interest rate, house price and other risk factors, we can evaluate the possible profit and loss of the bank at different lending rates ($\tilde{\imath}_s$) and LTV (k):

$$E\left[\widetilde{N}_\tau(k) \middle| \tilde{r}_t, \widetilde{H}_t\right] = \sum_{t=1}^{\omega-x} \left[\widetilde{N}_t(k) \cdot {}_{t-1|1}q_x \cdot v_{0,t}\right] | \tilde{r}_t, \widetilde{H}_t \tag{7}$$

By analyzing the probability distribution of the profit and loss, we can further master (VaR_k, VaR_k meets Prob.($E\left[E[\widetilde{N}_\tau(k)|\tilde{r}_t, \widetilde{H}_t]\right] \geq -VaR_k$,) = (1-$\alpha$)%) of the profit and loss from such lending. Its financial risk can be quantized through such value simulation so as to provide a basis for risk management and control and loan pricing (lending rate and LTV verification) by the bank.

The said profit & loss evaluation for an RM must be performed by a simulative trial of risk factors. The random processes of interest rates house prices, and survival rate calculations are sketched out below.

3. Risk factor model of RM

3-1. House prices

For the simulation of the stochastic change process of house prices and the adaptation model of the common continuous time and discrete time in literatures, it is assumed that house prices are subject to GBM in the former (such as Kau *et al.*, 1992, 1995; Kau *et al.*, 1993; Szymanosky, 1994; Chinloy and Megbolugbe, 1994; Kau and Keenan, 1995, 1999; Hilliard and Reis, 1998; Yang *et al.*, 1998; Bardhan *et al.* 2006; Ma *et al.*, 2007; Wang *et al.*, 2007; Huang *et al.*, 2011, etc.) or that its changing characteristics are considered to adapt to a dynamic model of price-skipping (for example, the stochastic change process of house prices simulated by Chen *et al.* (2010b) and Lee *et al.* (2012) through combining GBM with the Compound Poisson Process). In the later, via the substantiation it is found that there is a sequence-related state (such as Case and Shiller, 1989; Hosios and Pesando, 1991; Ito and Hirono, 1993; Institute of Actuaries, 2005) in house price change and the phenomenon of volatility clustering (such as Nothaft *et al.*, 1995; Chinloy *et al.*, 1997; Chen *et al.*, 2010a; Li *et al.*, 2010 etc.); thus, the measurement method is used to adapt the house price dynamic (for example, the ARMA-GARCH model is used by Chen *et al.* (2010a) and Lee *et al.* (2012), and the ARMA-EGARCH model is used by Li *et al.* (2010)). This paper refers to the method of Chen *et al.* (2010a) and Lee *et al.* (2012) to adapt the dynamic behavior of house prices with ARMA(m,n)-GARCH(p,q)[1]. We assume that under the filter probability space of[2] $(\Omega, F, P, (F_t)_{t=0}^T)$, the conditional mean value model of the logarithmic house price difference (the rate of the house logarithm return) will be as follows:

$$\delta_t = \ln\left(\frac{\widetilde{H}_t}{\widetilde{H}_{t-\Delta t}}\right) = \mu_{\widetilde{H},t} + \varepsilon_{\widetilde{H},t} \quad (8)$$

[1] Therein, m is the order of the autocorrelation item and n is the order of the moving average term. P is the order of the GARCH item and q is the order of the ARCH item.

[2] $(F_t)_{t=0}^T$ is the right continuous natural filter mesh, which makes $F_t \subset F_s, t \leq s$.

where, $\mu_{\tilde{H},t} = a + \sum_{i=1}^{m} b_i \cdot \delta_{t-i\Delta t} + \sum_{j=1}^{n} c_j . \varepsilon_{\tilde{H},□-j\Delta t}$ is a conditional mean value function in the given information of $F_{t-\Delta t}$, and $\varepsilon_{\tilde{H},t}$ is the innovation process with the conditional variation pattern $h_t = d + \sum_{i=1}^{p} e_i \cdot h_{t-i\Delta t} + \sum_{j=1}^{q} f_j \cdot \varepsilon^2_{\tilde{H},t-j\Delta t}$ in the given information of $F_{t-\Delta t}$. Therewith, the above equation can be converted to a dynamic process under risk indifference measure Q according to the conversion method of the equivalent martingale measurement, the conditional Esscher transform, proposed by Bühlmann *et al.* (1996):

$$\delta_t = \ln\left(\frac{\tilde{H}_t}{\tilde{H}_{t-\Delta t}}\right) = \tilde{\imath}_t \cdot \Delta t - \frac{1}{2} h_t + \varepsilon^Q_{\tilde{H},t} \tag{9}$$

where, $\tilde{\imath}_t$ is the risk-free interest rate.

3-2. Interest rates

Interest rates are variable over time. We use a simple model that captures variability in the short-term interest rate. We assume thatl interest rate follows an AR(1) process. That is,

$$\tilde{\imath}_t = \mu_{\tilde{\imath}}(1 - \phi_{\tilde{\imath}})dt + \phi_{\tilde{\imath}} \cdot \tilde{\imath}_{t-1} + \varepsilon_t \tag{10}$$

where ε_t is a normally distributed white noise shock with mean zero and variance σ^2_{ε}.

3-3. Mortality rate model

The estimation method of mortality has been developed multifariously and maturely. The mortality prediction model of Lee and Carter (1992) is more widely used in academic and practical applications, and this study also quotes this model to calculate the mortality of RM borrowers. Lee and Carter (1992) proposed a linear equation for describing central mortality rates:

$$\ln\ m_{x,t} = a_x + b_x k_t + \varepsilon_{x,t} \tag{11}$$

where, $m_{x,t}$ refers to the central mortality rate of people at age *x* in year *t*, and a_x refers to the common form of mortality rate at age group *x*. In addition, it stands for the substantiation mean value of the cross−year mortality rate, which is calculated by using the logarithm of the geometric average. k_t refers to the time trend (mortality intensity) in year *t*. In practice, ARIMA(0,1,0) is usually used for adaptation (Lee *et al.*, 2012). b_x is the rate of change (reaction extend of the trend) of the relative mortality

rate at age group x, and $\varepsilon_{x,t}$ is a stochastic error term at age group x in year t and is adapted with the white noise model. In this model, it is assumed that the mortality rate is constant within a given age and time bandwidth and varies between different bandwidths. Thus, the mortality rate of individuals at the age of $x_0 + s$ $(x_0 \in \mathbb{Z}^+,\ s \in [0,1))$ in year $t_0 + v$ $(\ t_0 \in \mathbb{Z}^+,\ v \in [0,1))$ is equal to m_{x_0,t_0}. The survival probability $({}_np_{x_0,t_0})$ of individuals at age of x_0 after n years will be:

$${}_np_{x_0,t_0} = \exp\left(-\sum_{j=0}^{n-1} m_{x_0+j,t_0+j}\right) = \exp\left(-\sum_{j=0}^{n-1} \exp(a_{x_0+j} + b_{x_0+j}k_{t_0+j})\right) \quad (12)$$

Thus we can know that the distribution function of ${}_np_{x_0,t_0}$ under the *P*-measure (real-world) should be $F_n\ (x) = \Pr({}_np_{x_0,t_0} \le x$. Through the measurement conversion technique, we can convert the distribution function of ${}_np_{x_0,t_0}$ to the distribution function under the *Q*-measure:

$$F_n^{\tau}(x) = \Phi\left(\Phi^{-1}\left(F_n\ (x)\right) + \tau\right) \quad (13)$$

where, τ is the market price of risk; $\Phi(\cdot)$ is the standard normal distribution function; and $F_n^{\tau}(\cdot)$ is the distribution function under the Q-measure (risk indifference). More specifically, according to the method of Denuit *et al.* (2007), we can transform the survival distribution ${}_np_{x_0,t_0}$ in the real world into the following probability under a risk neutral world:

$${}_np_{x_0,t_0}^{Q} = \int_0^1 \left(1 - F_n^{\tau}(x)\right) dx = \int_0^1 \left(1 - \Phi\left(\Phi^{-1}\left(F_n\ (x)\right) + \tau\right)\right) dx \quad (14)$$

4. Numerical calculation result

This study assumes that each period corresponds to one year. We follow Campbell and Cocco (2015) in setting the value for the baseline parameterization and the market information using Taiwan's statistical data from the financial market. In addition, in the estimation of the mortality rate, we use the model of Lee and Carter (1992) for calculations (data from the Human Mortality Database http://www.mortality.org/).

Table 1. Baseline parameter summarizes

description	value
Initial housing price (H_0)	100

Mean log real house price growth (δ_t)	3%
Standard deviation of house price return	16.2%
Correl. real int. rate and house price shocks ($\rho_{\tilde{H}\tilde{\imath}}$)	0.3
Mean log real rate ($\theta_{\tilde{\imath}}$)	1.2%
Standard deviation of the real rate ($\sigma_{\tilde{\imath}}$)	1.8%
Initial interest rate ($\tilde{\imath}_0$)	1.095%
Log real rate AR(1) coefficient	0.825
Interest-rate spread (π)	0.5%

We substitute the above numerical settings and calculations into Eq. (2) to obtain the RM annuity amount (Table 2) under different LTV.

Table 2. Annuity Amount Pricing

Unit: NTD

Loan-to-Value (LTV)	90%	80%	70%	60%
Reasonable annuity	5.85	5.20	4.55	3.90

According to the Table 2 annuity amount, the profit and loss (Figure 1 and Table 2) of the bank undertaking the RM is simulated to be analyzed by the Monte Carlo method. The results show that, no matter the size of the LTV, the expected profit and loss may be either a positive value or a negative value. However, there is a negative skew phenomenon in its probability distribution, and the mean value is negative. The phenomenon is mainly due to the attribution and identification of BARD. In the above simulation, the BARD of the RM is owned by the Heir (w_τ =1) when the borrower dies. With such contractual specifications, when the borrower dies early and the balance of the debt (the sum of the investment and profit of the annuity drawn) is lower than the value of the insured property at that time, the property heirs must choose to repay the loan to recover the property. Therefore, the bank will be unable to obtain the residual proceeds of the property disposal and can only earn the loan spread (the spread between the interest and the fund cost); by contrast, if the borrower lives longer or the house

price falls, the debt balance at the end of the RM will be higher than the value of the property and the bank will be unable to avoid losses without non-recourse. It is also the case that most times, the RM will make a claim to the insurer for the shortfall in the amount of its loss when the claim is insufficient. In addition, it can be seen from the simulation results that when the loan is more conservative (the lower the LTV), a lower annuity amount will be paid and the probability, amount, and VaR of the insufficient obligation compensation will be reduced.

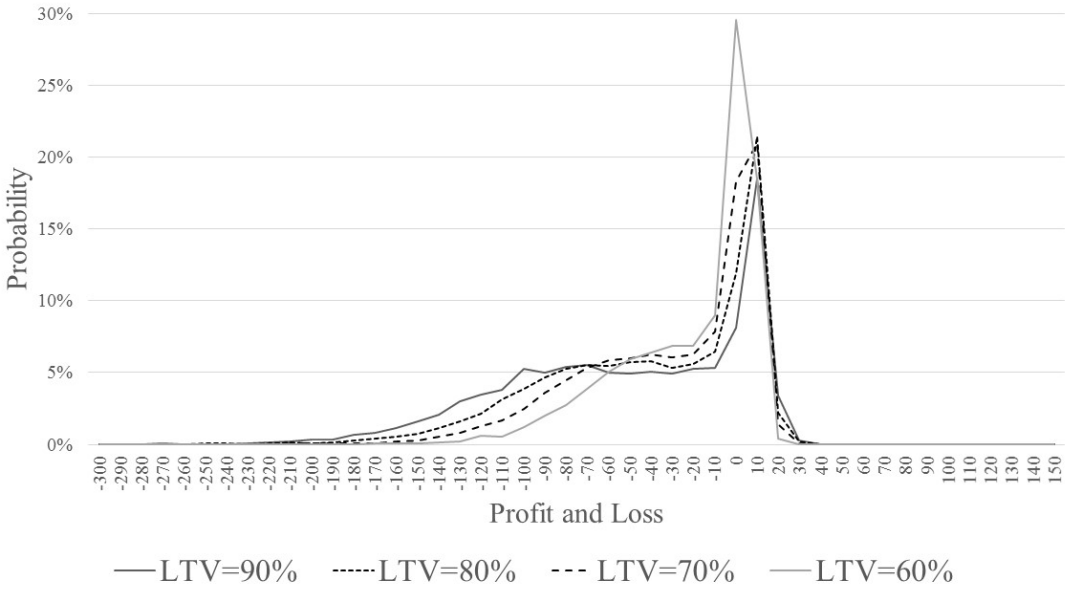

Figure 1 Distribution Diagram for Probability of Profit and Loss of the Bank Undertaking the RM

However, there is an asymmetrical situation of obligation claims in such RM contracts, thus forming the characteristic of loss risk from limited profit with a heavy burden for the lending bank. The simulation results show that even if the LTV is as low as 60%, there is still the possibility of a serious loss in insufficient debt compensation due to the borrower exceeding the expected longevity or the collapse of house prices. Hence, banks should review the mortgage applications prudently. The maximum loss of the loan in the bank is measured with the indicator of the VaR loss, particularly under the trust level of 95% and 90%. By our simulated calculation, under a trust level of 95%, the values at risk for an LTV of 90%, 80%, 70% and 60% are respectively NTD 143, 122, 100 , and 80, while under a trust level of 90%, they are respectively NTD 122, 102, 82, and 64. We can carry out loan risk management on the basis of this assessment or develop a credit condition or claim for inadequate insurance of the compensation, and so on.

Table 3 Statistical Analysis Table for Profit and Loss of the Bank Undertaking the RM (Interest-rate spread =0.5%)

Unit: NTD

LTV	90%	80%	70%	60%
Mean value	-46	-34	-25	-16
Standard deviation	55	48	40	32
VaR (90%)	122	102	82	64
VaR (95%)	143	122	100	80

Based on the above simulation analysis, this paper further discusses the effects of an increase in the interest rate on an RM annuity and the profit and loss of the loan. In accordance with the foregoing parameter setting, we increase the interest rate of the loan by two quarters (0.5%), which will increase the amount of the annuity in each period and increase the annuity amount of the RM by NTD 0.16 to 0.24 (Figure 2). Under this annuity payment level, the mean value of the expected profit and loss of the bank is slightly better than the original loan rate, but its VaR will be higher than the original value (Table 3). Why is the expected loss amount reduced when the bank annuity is paid much more? It is an interesting phenomenon, and the main reason is that when the RM contract terminates, in the case of the balance of the creditor's debt being lower than the guaranteed property's value (the level of the house price is high), the higher creditor's rights ($\tilde{B}_\tau$) can be recovered from the guaranteed property by the bank with a higher interest rate, and more interest margin income ($\tilde{B}_\tau - \tilde{B}'_\tau$) can be earned. But why is the VaR raised by increasing the interest rate of the loan? This is because in the case when house prices collapse when the contract is terminated, the value of the guaranteed property will be lower than the debt balance, and the bank can only get back the guaranteed property at this time. An excessive annuity payment will increase the annuity payment cost of the bank, which will lead to a larger loss. The emergence of this phenomenon can also be understood by Eq. (6).

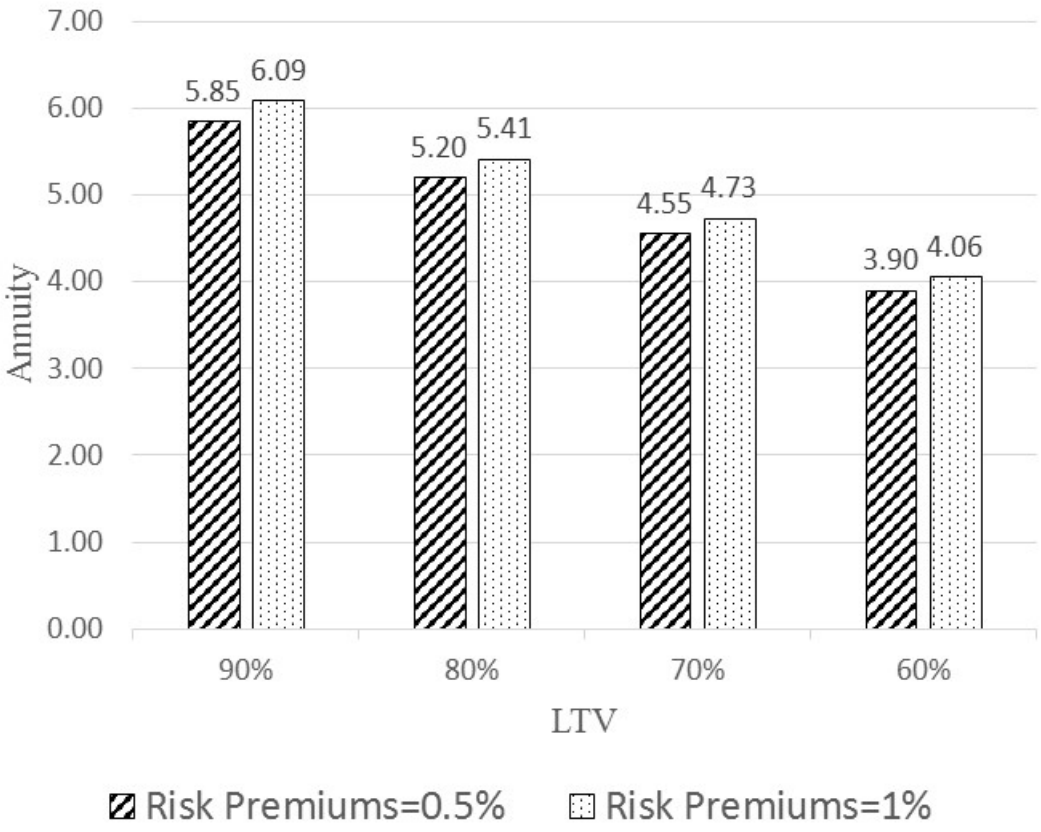

Figure 2 Comparison of RM Annuities under Different Interest Rates on Loans and LTV

Table 4 Statistical Analysis Table for the Profit and Loss of the Bank Undertaking the RM (Interest-rate spread =1%)

Unit: NTD

LTV	90%	80%	70%	60%
Mean value	-44	-33	-21	-12
Standard deviation	64	57	47	39
VaR(90%)	129	110	88	68
VaR(95%)	152	131	106	85

5. Conclusion

In recent years, the issue of RM has been hotly debated, and there have been numerous discussions about RM systems and the evaluation of annuities in the literature. Different from the previous research issues, this paper is aimed at the profit and loss analysis of the bank transacting the RM. The loan risk of the bank is discussed and the decision reference for making loan conditions and risk management is provided for the bank.

In this RM risk analysis, we believe that the affiliation of BARD is an important key. As for common RM contracts in the current market, BARD is attributed to the successor of the borrower in the most cases. The simulation results in this paper show that such specifications will cause an asymmetrical obligation claim on the credit side of the RM, thus causing a negative skew phenomenon of the profit and loss distribution and a significant warning for RM loan risk. Revising the distribution right of BARD, tightening the LTV, claims for insufficient insurance of the debt, and so on, are all response directions that can be taken into account. The model in this paper can be used to calculate the VaR of an RM under various response adjustments, in order to find a more applicable response adjustment direction and amplitude.

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COULD ISLAMIC WORK ETHICS STRENGTHENING THE ROLE OF AUDITOR'S EXPERTISE IN THE EFFORT ON CORRUPTION DISCLOSURES IN INDONESIA?

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ABSTRACT

The purpose of this research is to investigate the role of Islamic work ethics in moderating the effect of auditor's expertise on corruption disclosures in Indonesia. This research used primary data through questionnaires from November until December 2017. Questionnaires are distributed to state auditors conducting the audit in institution / government agencies and companies of State-Owned Enterprise. The sampling method used purposive sampling technique in which selected 202 auditors as the sample. The analytical method used to test the hypothesis is Moderated Regression Analysis (MRA). The results of this research showed that: Firstly, auditor's expertise has no effect on corruption disclosures in Indonesia; Secondly, Islamic work ethics could strengthen the role of auditor's expertise in the process corruption disclosures in Indonesia. Thus, this research has an important contribution on corruption disclosures effort in Indonesia.

Keywords : Islamic Work Ethics, Auditor's Expertise, Corruption Disclosures

INTRODUCTION

Background Study

The following data are presented concerning the Corruption Perceptions Index, published in 2017 by Transparency International.

Table 1. Corruption Perceptions Index 2017

2017 Rank	COUNTRY	2017 Score	2016 Score	2015 Score	2014 Score	2013 Score	2012 Score
1	New Zealand	89	90	91	91	91	90
2	Denmark	88	90	91	92	91	90
3	Finland	85	89	90	89	89	90
...	.....	...	...	...	...	...	...
96	Indonesia	37	37	36	34	32	32
...	.....	...	...	...	...	...	...
179	South Sudan	12	11	15	15	14	N/A
180	Somalia	9	10	8	8	8	8

Source: Transparency International (2017). Corruption Perceptions Index 2017. Accessed through: https://www.transparency.org/news/feature/corruption_perceptions_index_2017

Based on table 1, showed that the level of corruption in Indonesia classified high by Corruption Perceptions Index in 2017 amounted to 37. This case an interesting to test about the factors that cause to high levels of corruption in Indonesia.

Research about corruption ever done by previous researchers, among others: Saha and Ben Ali (2017); Kuris (2015); Lehman and Thorne (2015); Beekman, Bulte, and Nillesen (2014); Othman, Shafie,and Hamid (2014), and Arnold, Neubauer, and Schoenherr (2012). The focused of those researches is generally emphasized on individual and organizational, political and economic aspects, a country's development process, law enforcement, and even in the practice of a management value chain in a company. However, no one has focused aspects on corruption disclosures.

This research has focused on corruption disclosures. Corruption disclosures is expected to be explored of auditor's expertise aspects. However, those researches are not attributed with corruption disclosures aspects. In addition to auditor’s expertise aspects attributed to corruption disclosures aspects, this research also attributed with Islamic work ethics aspects. Previous researches that examined about Islamic work ethics, performed by Amilin (2018); Amilin (2016a and 2016b); K han, Abbas, Gul, and King (2015); and Rokhman and Hassan (2012). However, it has not been found in previous researches that examine about Islamic work ethics which directly attributed with auditor's expertise in exposing corruption events. So that, this research is a new research theme that different with previous researches that connected directly between the issue of corruption disclosures with auditor's expertise and Islamic work ethics.

The issue of corruption disclosures an important to test because : Firstly, many corruption cases that happened in Indonesia but in the process of disclosures is slow; Secondly, although many corruptors have been sentenced to prison terms, new corruption cases still emerge;

Thirdly, corruption seems to be a common phenome non is that many people who do not feel the deterrent penalties accepted due to corruption.
This research aims to obtain empirical evidence about: Firstly, the role of state auditor's expertise in exposing the occurrence of corruption in Indonesia; Secondly, how far Islamic work ethics are able to strengthen the role of auditor's expertise in exposing the occurrence of corruption in Indonesia. This research is expected to be useful: Firstly, for the government in formulating policies in an effort on corruption disclosures in Indonesia; Secondly, for auditor in establishing the audit guidelines, especially in an effort on corruption disclosures in Indonesia; Thirdly, for law enforcer in considering the legal process that prosecute corruption cases.

This paper is organized as follows: Section 1, discusses the background of research, include: state of the art, the focus of research, the reason for the importance of this research is conducted, the purpose and benefits of research. Section 2, discusses the literature review and hypothesis development. Section 3, reports the research methods. Section 4, discusses the results of analysis and some of the findings. Section 5 concludes and recomendations of the paper.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Gone Theory

Gone Theory is a theory that explains factors of corruption disclosures. This theory was popularized by Jack Bologna et al. in 1994 (Bologna, Lindquist, and Wells, 1994). According to this theory, there are four factors of corruption disclosures: Greed, Opportunity, Need, and Exposes (abbreviated "Gone"). Greed is a greedy behavior that potentially exists within everyone. Opportunity relates with the state of the organization or society in such a way that there is an opportunity for a person to commit fraud. Need relates with factors needed by individuals to support their normal life. Exposes relates with actions or consequences that will be faced by the perpetrators of fraud. Greed and need Factors relates with individuals of fraud. Meanwhile, opportunity and exposes relates with victims of fraud. Gone theory has relevant to this research issue that is to test an effect of auditor’s expertise on corruption disclosures, as well as the role of Islamic work ethics in moderating the causality relationship between auditor's expertise with corruption disclosures.

Islamic Work Ethics

According to Ali and Owaihan (2008), Islamic work ethics is an orientation of shaping and influencing the involvement and participation of adherents in the workplace. The concept originally i.e., derived from the Qur'an and Sunnah or word of the Prophet Muhammad. The initial concept derived from the Qur'an and the Hadith. From some of those definitions, Rowold (2008) concluded that Islamic values applied on behavior ethics and career orientation in the workplace are guide of values in human life. Furthermore, Yousef (2001) stated that the Islamic work ethics emphasizes the aspect of cooperation in the work and solves problems in the work through communication to avoid errors in the completion ofwork.

Auditor's Expe rtise

The definition of expertise according to the Merriam-Webster Dictionary (2016) is a skill that owned by an expert. Experts defined as a person who has a certain level of skill or knowledge in a particular subject is adequate gained from experience or training. Thus, the auditor's expertise is expertise possessed by an auditor in the audit field, particularly expertise in the general audit.

Corruption Disclosures

According to Indonesia's Language Dictionary (2007), corruption is the action to showing, proving, revealing that something was initially still be secret. Meanwhile, Transparency International (2017) stated that corruption is the abuse of entrusted power for private gain. It can be classified as grand, petty and political, depending on amounts of money lost and the sector where it occurs. Furthermore, the definition of corruption according to Act of The Republic of Indonesia N umber 31 Year 1999, every person categorized against the law, doing deeds enrich yourself, profitable yourself or others or a corporation, misusing authority or opportunity or facilities available to (her/him) because of the position or position that could be detrimental to the state's finances or the economy of country. Thus, corruption disclosures may be defined as an act to show, prove, and reveal about the events/corruption case.

The Causal relationship Between Auditor's Expertise and Corruption Disclosures

Research on auditor's expertise ever done by Schelker (2012) and Gul, Fung, and Jaggi (2009). The results of this research conducted by Schelker (2012) on state auditors in the US Federal showed that auditors with adequate expertise are able to produce qualified audit report so as to improve government performance. Meanwhile, the research conducted by Gul, Fung and Jaggi (2009) on companies whose data financial statements are taken from Compustat Annual Industrial and Research Files and have been audited by Big 6/5/4 auditors. The results indicated that specialty expertise of industry clients has an effect on the relationship between the audit tenure and earning quality. From the results of those researches indicated that the auditor's expertise is able to produce qualified audit report and able to an effect the relationship between the audit tenure and earning quality, so it can be analogized that any auditor's expertise thought has positively an effect on corruption disclosures. Based on the description, the proposed hypothesis is as follows:

Ha1: Auditor's expertise has a positive and significant effect on corruption disclosures

Inte raction Between Islamic Work Ethics and Auditor's Expertise, Its Impact on Corruption Disclosures

Previous research showed that Islamic work ethics can contribute to distributive justice, procedural justice, and interactive justice (Rokhman and Hassan 2012). Meanwhile, Abbas Khan, Gul, and K ing (2015) found that Islamic work ethics has significantly and positively related to job satisfaction and job involvement. According to research conducted by Amilin (2018) empirical results showed Islamic work ethics has a positive effect on procedural

justice, interactive justice, and job satisfaction. Two other studies conducted by Amilin (2016a & 2016b) point out that Firstly, Islamic work ethics can moderate the effect of job satisfaction on performance of accountants; Second ly, Islamic work ethics can reduce the level of job stress and were able to minimize the desire of auditors to switch jobs. Further, the findings show that Islamic work ethics can be analogous to moderate the effect of auditor's expertise on corruption disclosures Based on the description, the proposed hypothesis is as follows:

Ha2: Islamic work ethics can moderate the effect of auditor's expertise on corruption disclosures

The Research Model

Figure 1 below illustrates the research model. The research model describes the relationship between the independent variable, the moderating variable and the dependent variable.

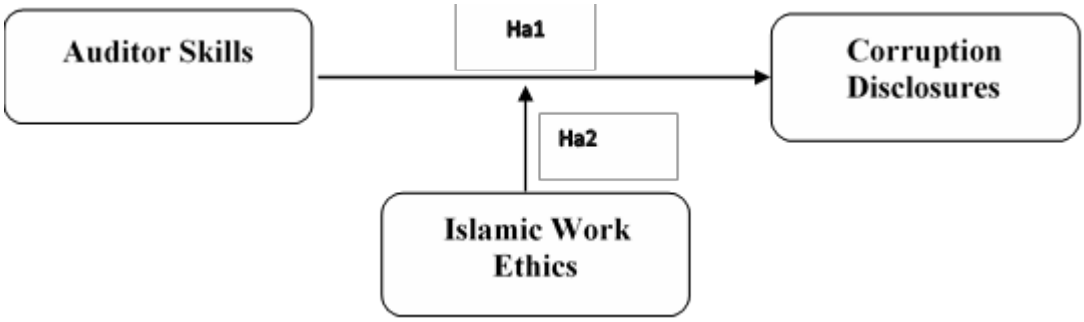

Figure 1. The Research Model

RESEARCH METHODS

Population, Data Collection, and Sampling Method

The population is the state auditor. Respondents who participated in this research were state auditors who worked at the State Audit Agency of The Republic of Indonesia. This research used primary data through questionnaires from November until December 2017. The sampling method used purposive sampling technique.

Measure ment of Variable

The variables measurement as follows: auditor's expertise variable was measured with nine statements developed by Digabriele (2008). Corruption disclosures variable was measured by eight statements using instruments developed by State Development Audit Agency of The Republic of Indonesia (2013). Islamic work ethics variable was measured with seventeen

statements developed by Ali (2005). All statement items in the questionnaire of these three variables were measured using interval scale (Likert) from one to five. The range of scores: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree.

The Technique of Data Analysis

Data was tested using descriptive statistical test and data quality test. The descriptive statistical test consists of: average (mean), standard deviation, variance, maximum, minimum, sum, range, kurtosis and skewness. Meanwhile, testing quality data test consists of validity and reliability of data. Validity test well done by calculating the correlation between the score of each item with the total score. If the correlation between the score of each question item with the total score has a significance level below 0.05, then the item declared valid, and vice versa (Hair, et al., 2013).

Reliability test used Cronbach's Alpha. A statement is reliable if the value of alpha is greater than 0.7 (Hair, et al., 2013). This research will use SPSS software for conducting Moderated Regression Analysis. To test alternative hypothesis proposed at the beginning of the research, the regression model is formulated as follows:

$$CD = a + \beta_1 * AS + e$$
$$CD = a + \beta_1 * AS + \beta_2 * IWE + \beta_3 (AS * IWE) + e$$

Description:

CD	=	Corruption Disclosures
AE	=	Auditor's Expertise
IWE	=	Islamic Work Ethics
a	=	Constanta
β1-β3	=	Regression Coefficients
e	=	Random Error

RESULTS AND DISCUSSION

Response Rate and the Profile of Respondents

The number of questionnaires which were distributed is 250 copies and returned is 212 copies (84.80%). The data can be processed as many as 202 copies (80.80%).

Table 2. Profile of Respondents Based on Gender

	Gende r	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	132	65,3	65,3	65,3

	Female	70	34,7	34,7	100,0
	Total	202	100,0	100,0	

Based on table 2, presented by profile of respondents based on gender such male respondents are 132 people (65.30%) and female respondents are 70 people (34.70%).

Table 3. Profile of Respondents Based on the Position of Respondents

	Position	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Junior Auditor	70	34,7	34,7	34,7
	Senior Auditor	96	47,5	47,5	82,2
	Supervisor Auditor	21	10,4	10,4	92,6
	Manager Auditor	15	7,4	7,4	100,0
	Total	202	100,0	100,0	

Based on table 3, presented by profile of respondents based on the position of respondents. From these data, respondents who occupies the position as junior auditors are 70 people (34.70%), senior auditors are 96 people (47.50%), supervisor auditors are 21 people (10.40%), manager auditors are 15 people (7.40%).

Table 4. Profile of Respondents Based on Education Level

	Graduate Education	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Associate's Degree	6	3,0	3,0	3,0
	Bachelor's Degree	144	71,3	71,3	74,3
	Master's Degree	52	25,7	25,7	100,0
	Total	202	100,0	100,0	

Based on table 4, presented by profile of respondents based on education level. From those presented above, respondents of Associate's Degree are 6 people (3.00%), Bachelor's Degree are 144 people (71.30%), and Master's Degree are 52 people (25.70%).

Table 5. Profile of Respondents Based on Expe rience

	Experience	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 3 years	12	5,9	5,9	5,9
	3-6 years	17	8,4	8,4	14,4

7-10 years	76	37,6	37,6	52,0
> 10 year	97	48,0	48,0	100,0
Total	202	100,0	100,0	

Based on table 5, presented by profile of respondents based on experience show that respondents who have less than 3 years of audit experience are 12 people (5.90%), 3 to 6 years are 17 people (8.40%), 7 to 10 are 76 people (37.60%), and more than 10 are 97 people (48.00%). Furthermore, the following test results validity and reliability data on three variables used in this research, namely Auditor's Expertise (Expert), Corruption Disclosures (Disc), and Islamic Working Ethics (IWE).

Table 6. Validity Test Results of Auditor's Expertise Variable

Statement	Pearson Correlation	Sig (2-Tailed)	Description
Expert 1	,503**	0,000	Valid
Expert 2	,653**	0,000	Valid
Expert 3	,738**	0,000	Valid
Expert 4	,670**	0,000	Valid
Expert 5	,730**	0,000	Valid
Expert 6	,589**	0,000	Valid
Expert 7	,659**	0,000	Valid
Expert 8	,734**	0,000	Valid
Expert 9	,577**	0,000	Valid

**. Correlation is significant at the 0.01 level (2-tailed).

Based on table 6, presented by validity test results of auditor's expertise variable show that all indicators (9 indicators) of statement on auditor's expertise variable are declared valid because all the statement indicators had a significant correlation of value at a rate of 0.01 (2-tailed).

Table 7. Validity Test Results of Corruption Disclosure Variable

Statement	Pearson Correlation	Sig (2-Tailed)	Description
Disc1	,754**	0,000	Valid
Disc2	,766**	0,000	Valid
Disc3	,798**	0,000	Valid

Disc4	,811**	0,000	Valid
Disc5	,860**	0,000	Valid
Disc 6	,712**	0,000	Valid
Disc7	,575**	0,000	Valid
Disc8	,755**	0,000	Valid

**. Correlation is significant at the 0.01 level (2-tailed).

Based on table, presented by validity test results of corruption disclosures variable show that all indicators (8 indicators) of statement on the corruption disclosures variable are declared valid because all the statement indicators had significant correlation value at rate 0.01 (2-tailed).

Table 8. Validity Test Results of Islamic Work Ethics Variable

Statement	Pearson Correlation	Sig (2-Tailed)	Description
IWE1	,375**	0,000	Valid
IWE2	,609**	0,000	Valid
IWE3	,627**	0,000	Valid
IWE4	,442**	0,000	Valid
IWE5	,635**	0,000	Valid
IWE6	,544**	0,000	Valid
IWE7	,464**	0,000	Valid
IWE8	,635**	0,000	Valid
IWE9	,453**	0,000	Valid
IWE10	,612**	0,000	Valid
IWE11	,481**	0,000	Valid
IWE12	,631**	0,000	Valid
IWE13	,598**	0,000	Valid
IWE14	,552**	0,000	Valid
IWE15	,631**	0,000	Valid
IWE16	,665**	0,000	Valid
IWE17	,479**	0,000	Valid

**. Correlation is significant at the 0.01 level (2-tailed).

Based on table 8, presented by validity test results of Islamic work ethics variable. It can be seen that all indicators (17 indicators) of statement on the Islamic work ethics variable are declared valid because all the statement indicators had significant correlation value at a rate 0.01 (2-tailed).

Table 9. Data Reliability Test Results

Variable	Cronbach's Alpha	Description

Auditor's Expertise (Expert)	0,731	Reliable
Corruption Disclosures (Disc)	0,780	Reliable
Islamic Work Ethics (IWE)	0,742	Reliable

Based on table 9, presented by data reliability test results. It can be known that all variables tested in this research revealed reliable because the value of Cronbach's is greater than 0.7 Alpha.

Table 10. Results of Moderated Regression Analysis (MRA) Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	26,305	2,483		10,593	,000
	EXPERT	,131	,067	,229	1,956	,052
	IWE	-,120	,049	-,271	-2,424	,016
	EXPERT@IWE	,000	,000	,531	3,690	,000

a. Dependent Variable: DISCLOSURES

Based on table 10, presented by results of Moderated Regression Analysis (MRA) test concluded that results of the first hypothesis (Ha1) tested the effect auditor's expertise on corruption disclosures variable obtained a significance value of 0.52. Regarding the significance of value greater than 0.05, the first hypothes is (Ha1) stated that "auditor's expertise has a positive and significant effect on corruption disclosures" could not be supported. Thus, auditor's expertise has not a significant effect on corruption disclosures. This finding is not in line with the analogy of previous research results conducted by Schelker (2012) and Gul, Fung, and Jaggi (2009). The unsupported first hypothesis because the context of the auditor's expertise in this research is the expertise in general audit, whereas the expertise required on corruption disclosures is auditor's expertise in the field of forensic audit. The study of Salleh & Ab Aziz (2014) examines the effect of auditor's expertise in the field of forensic accounting on fraud disclosures. The results show that auditor's expertise in the field of forensic accounting effects the disclosure of fraud.

Subsequent findings showed that the second hypothes is (Ha2) tested that the role of Islamic work ethics variable in moderating the effect auditor's expertise variable on corruption disclosures variable obtained a significance value of 0.00. Then, the second hypothesis (Ha2) stated that "Islamic work ethics can moderate the effect of auditor's expertise on corruption disclosures" is supported. Thus, Islamic work ethics is capable of strengthening the role of auditor's expertise in influencing on corruption disclosures. This finding is in tune with the analogy of the results of research previously conducted by Amilin (2016a and 2016b) shows

the empirical evidence that Islamic work ethics can moderate the effect of job satisfaction on performance of accountants. The findings of the results of this second hypothes is indicated that Islamic work ethics (which contains the Islamic values in work in various fields), where Islamic work ethics teaches about honesty and how to do justice, obey the norms and regulations, about the importance of law enforcement and rules, and the avoidance of negative things (e.g. corruption), so that Islamic work ethics is capable of strengthening the role of auditor's expertise in influencing on corruption disclosures. This finding is important for decision makers, especially in public sector areas where Islamic values need to be considered as solutions in an effort to minimize the occurrence of corruption cases in Indonesia.

CONCLUSION

This research resulted in two conclusions as follows: Firstly, the partial auditor's expertise has no effect on corruption disclosures; Secondly, Islamic work ethics can encourage the auditor's expertise in an effort to uncover the indication of corruption. The results of this research are important for the leadership of the Government of Indonesia in an effort to reveal the existence of indication of corruption, especially corruption that occurred in government agencies and State-Owned Enterprises.

From these findings, some things can be recommended for further research. Firstly, in the context of corruption disclosures, the next researcher needs to test the forensic auditor's expertise factor; Secondly, research on corruption disclosures can be done on respondents who were working as police investigators, prosecutors, and investigators of the Corruption Eradication Commission (KPK). Thirdly, can add another variable in testing, such as variables of advanced technology use, investigator/forensic independence variables, commitment variables to law enforcement, as well as other variables relevant to the purpose of the research.

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THE ROLE OF PERFORMANCE IN MEDIATING THE IMPACT OF ADVERSITY INTELLIGENCE ON ACCOUNTANT'S CAREER DEVELOPMENT

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ABSTRACT

The purpose of this study is to examine the effect of adversity intelligence on career development with the accountant's performance as intervening variable. This study use primary data by distributing questionnaires to accountants who working in Indonesia. Sampling was done using convenience sampling method. The number of sample are 272 accountants, was collected from December 2017 up to January 2018. Hypothesis testing use a Structural Equation Model with software of Lisrel 8.8. The results of study showed that *first*, adversity intelligence significantly influence to career development; *second*, adversity intelligence significantly influence to accountants career development; *third*, accountant performance has a significant effect on accountant's career development; *last,* accountant performance be able to intervene the impact of adversity intelligence on accountant's career development. This study has an important contribution on accountant's career development in Indonesia.

Keywords**:** *Adversity Intelligence, Career Development, Accountant Performance, Structural Equation Model*

THE IMPACT OF ADVERSITY INTELLIGENCE ON ACCOUNTANT PERFORMANCE WITH ISLAMIC WORK ETHICS AS INTERVENING VARIABLE

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ABSTRACT

This study to explore the impact of adversity intelligence on accountant's performance with Islamic work ethic as intervening variable. Questionnaires used to collect the data. Respondents of the study are accountants profession who worked in Indonesia. Data selection used convenience sampling method. Sum of samples are 272 accountants. Time of data collection was taken from December 2017 up to January 2018. The hypothesis testing use the Structural Equation Modeling with Lisrel 8.8. The results of a study showed empirical evidences that *first*, adversity intelligence significantly affect on Islamic work ethics; *second*, adversity intelligence significantly affect on accountant's performance; *third*, Islamic work ethics had not affect on accountant's performance; *last*, Islamic work ethics has intervene in the relationship between adversity intelligence with accountant's performance. This study has an important contribution in an effort to improve the accountant's performance.

Keyword: *Adversity Intelligence, Islamic Work Ethics, Accountant Performance.*

CORPORATE GOVERNANCE INDEX, CAPITAL STRUCTURE AND FIRM VALUE

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ABSTRACT

This study examines the effect of corporate governance index on firm value which is moderated by capital structure. I want to examine if companies that use corporate governance have concerns about corporate interests and reduce conflicts within company. This study uses a corporate governance index developed by the Forum for Corporate Governance in Indonesia (FCGI) and Price Waterhouse Coopers (PwC) where the measurement was first applied as a research proxy. Capital structure becomes moderating variable in this research. The results show that the corporate governance index has a positive effect on firm value and proves that the capital structure becomes moderated in the relationship between corporate governance index and firm value. It means that company have concern to its shareholders, they want to reduce the conflict (agency and asymmetry information) in the company. In the other hand, when company disclose their corporate governance accompanied by capital structure (debt), it makes shareholders feel insecure to invest in the company.

Keyword: Corporate Governance Index, Firm Value, Capital Structure

CORPORATE GOVERNANCE MECHANISMS, INTELLECTUAL CAPITAL DISCLOSURES, AND FIRM VALUE: EMPIRICAL EVIDENCE OF NON-FINANCIAL COMPANIES WITH HIGH-IC INTENSIVE IN INDONESIA STOCK EXCHANGES

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ABSTRACT

This study examines the relationship of corporate governance mechanisms, the level of intellectual capital disclosures (ICD) and firm value in Indonesia. This research is interesting because considering the role of family ownership in corporate governance mechanisms and only focus on listed modern companies. The sampling selection method is using proportionate stratified sampling with the classification based on the Global Industry Classification Standard (GICS). The level of ICD is calculated by content analysis with the developed index from Bozzolan et al. (2003). The corporate governance mechanisms such as family ownership, the board of committee size, and frequency of audit committee's meeting cannot influence the extent of intellectual capital disclosure of company. However, managerial ownership has negative effect and the size of external auditor has positive effect to the extent of intellectual capital disclosure. It prove that disclosure can decrease information asymmetry and become a signal to attract the investors. The impact of intellectual capital could be different in developing country because the influence of ICD is not proven toward firm value. It against resource-based view, this disclosure seems to have no influence on short-term changes in market value.

Keywords: intellectual capital disclosure, corporate governance mechanisms, firm value, family ownership.

THE ROLE OF ORGANIZATIONAL SUPPORT, ROLE CLARITY, PROCEDURAL FAIRNESS AND NONFINANCIAL MEASURES ON MANAGERIAL PERFORMANCE

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ABSTRACT

The purpose of this study is to analyze the direct effects of nonfinancial performance measures and organizational support on managerial performance. The study also examined the direct effect of organizational support on nonfinancial performance measures. Indirect effect of nonfinancial performance measures through role clarity and procedural fairness on managerial performance were also tested. This study used a survey through questionnaires. The research data were obtained from 97 managers working in Microfinance Institutions in Central Java, Indonesia. We used descriptive statistics and structural equation model to analyze the data. The results revealed that nonfinancial performance measures and organizational support have a direct positive impact on managerial performance. Organizational support has a positive impact on nonfinancial performance measures. The results also show that clarity roles mediate the relationship between non-financial performance measures and managerial performance, but procedural fairness is not significant as a mediating variable. Another finding is that nonfinancial measures mediate organizational support and managerial performance relationships. The results of the study provide information to management about the important role of nonfinancial performance measures and organizational support to improve managerial performance.

Keyword: Financial performance measures, Organizational support, Role clarity, Procedural fairness, Managerial Performance

THE INFLUENCE OF MORAL REASONING, RETALIATION, ORGANIZATIONAL COMMITMENT AND LOCUS OF CONTROL AGAINST WHISTLEBLOWING INTENTIONS

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ABSTRACT

This research was intended to examine the influence of moral reasoning, retaliation, organizational comitmend and locus of control on whistleblowing intention. The sample used in this research is lower level employees who manage finance at Muhammadiyah education institution in Yogyakarta (Indonesia). Data were collected by using survey method. The impact of moral reasoning and organizational commitment to whistleblowing intention are unacceptable. The results of this study are expected to enrich the knowledge of management about the importance of decreasing negative impact of retaliation on whistleblowing intention. In addition, improving the internal locus of control can have a positive impact on whistleblowing intention. Preparation of management systems also can increase whistleblowing intention. It could be minimize irregularities and fraud in the organization.

Keywords: Moral Reasoning, Retaliation, Organizational Commitment, Locus of Control, Whistleblowing Intention.

Measuring the Potential Effect of Taxes and Weight Constraints on the Home Bias in New Zealand PIEs

Abstract

This paper measures the effect of taxes and weight constraints on equity home bias for New Zealand investors who invest in equities held through a portfolio investment entity (PIE). Historical monthly index data for 34 markets denominated in New Zealand dollars from 1993 to 2014 is used with an in-sample data-based mean-variance optimization approach to measure the benefits of international diversification. Diversification into global market portfolios assuming no taxes is shown to provide return-to-risk (RR) gains versus the New Zealand market portfolio during the 1993-2014 investment period. However, the imposition of taxes and weight constraints on overseas market allocations are shown to reduce the RR benefits from international diversification to statistically insignificant levels compared to the domestic market portfolio. Overall our results suggest the theoretical return-to-risk benefits to New Zealand investors of a fully diversified global portfolio under the framework of the international capital asset pricing model are reduced when taxes and weight constraints are considered.

Keywords: International Financial Markets, Portfolio Choice, Home Bias

The Association between Board Size, CEO Duality, Audit Committee, Board Gender Diversity and Intellectual Capital Disclosures: Evidence from Emerging Markets

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Abstract

This paper reports the findings of a study on the association between Corporate Governance mechanisms (board size, CEO duality, audit committee size, board gender diversity) and the Intellectual Capital (IC) Disclosures level on IC-Intensive companies listed on the Indonesia Stock Exchange and Malaysia Stock Exchange during the period of 2015 and 2016. This study uses sample of 169 Indonesian IC-Intensive companies and 194 Malaysian IC-Intensive companies. This research uses disclosure index checklist of 40 items developed by Haji and Ghazali (2013), this checklist index has been adjusted for emerging economies. The study results show that the board size has a positive association with intellectual capital disclosure level in Indonesia. However the board size has no effect towards intellectual capital disclosure level in Malaysia. CEO Duality has no association with the level of intellectual capital disclosure in Indonesia and Malaysia. The number of audit committee has a positive effect towards intellectual capital disclosure in Indonesia. However, the number of audit committee has no association with the level of intellectual capital disclosure in Malaysia. Finally, the existence of women on board (board gender diversity) has no association with the intellectual capital disclosures level in Indonesia and Malaysia

***Key words*: Intellectual Capital Disclosures, Corporate Governance, Emerging Markets, Board Size, Board Gender**

TRADING PRICE RATIOS AND INVESTMENT PERFORMANCE: EVIDENCE FROM THE TAIWAN STOCK EXCHANGE

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Abstract

We examine stock traders' relative traded prices and investment performance in the Taiwan Stock Exchange over the period from July 2009 to May 2015. We first investigate the trading price ratios of foreign investors, mutual funds, other institutions, and individuals. We then discuss whether different firm characteristics affect stock traders' trading price ratios. Finally, we examine the relationship among trading price ratios, trader types and investment performance. Our analysis yields the following findings. Institutional investors are more aggressive than individuals on both buy and sell sides, particular for mutual funds. Institutional investors use aggressive trading prices to get better investment performance. Buy and sell trades demonstrate asymmetric effects.

Key words: investor types, order aggressiveness, order submission, trading performance

1. Background, Motivation, and Objectives

Since Taiwan Stock Exchange (TWSE) adopts electronic call auction mechanism, investors trade timely by the automated trading system. The stock prices are able to reflect new information quickly. An aggressive investors prefer to set the order which close to market price; on the contrary, if investors hold cautious and conservative attitudes, they tend to trade in limit orders. Therefore, trading price is one of the most important factors to determine investor's trading advantage and order aggressiveness.

Although many existing studies have discussed investors' investment performance on stock market, only a few literatures explore trading price ratios across investor types on investment performance of Taiwan. The extant literatures indict that trading price ratio is a method of measuring investor's trading advantage (e.g., Choe, Kho, and Stulz, 2005; Kalev, Nguyen, and Oh, 2008; Chiao, Yu, and Lin 2009). It needs to calculate the volume-weighted average price and the volume-weighted average price of each investor. For buyer, they would like to trade at lower price than the average of market; for seller, they would like to trade at higher price than the average of market.

In the stock market, investors receive asymmetric market information and make a subjective responses to these information, which is the investment behavior of making decisions. Thus, affecting investor's gains and losses in the stock market. In this way, the main purpose of our study is to explore the differences investment performance between each investor type in the stock market. Generally speaking, most studies believe that foreign investors, mutual funds and other institutions perform better than individual investors, while this paper will provide evidences to understand the performance of these four investor types in Taiwan stock market by using trading price ratio and the return of stock from every holding period.

Since July 2009, TWSE stop exposing dealers' trading information and fuse their trading data into other institutional trading information, therefore, our subjects do not include dealers. Although foreign investors, mutual funds and other institutions accounted for only 40% of our market, they play an important role in trading. The capital of them is more than individuals and Taiwan's investors often observe the amount of shares that bought by these three investor types to predict the trend of stock market. Therefore, we expect that institution investors will use aggressive prices to get better investment performance.

To answer above questions, this article focuses all the listed stocks on TWSE and test the investment performance of foreign investors, mutual funds, other institutions and individuals respectively. The purposes of this study are as follows: (1) Analyzing the trading price ratios of foreign investors, mutual funds, other institutions, and individuals. (2) Discussing whether different firm characteristics (firm size, book-to-market ratio, turnover rate, market return, exchange traded funds (ETF50), depositary receipt (DR)) effect the trading price ratios of investors. (3) Finally, this paper examines the effects of trading price ratios and various investors on investment performance.

2. Data and Methodology

2.1. Data

There are two data sources of our study. First, we gain the order-level data, transaction-level data, and market display information of investors in each stock from the Taiwan Stock Exchange Corporation. Second, we obtain firm Characteristic data from the Taiwan Economic Journal (TEJ), which includes daily Taiwan Stock Exchange Capitalization Weighted Stock Index (TAIEX), daily market trading information, and yearly financial data of individual stocks. Our investor types include foreign investors, mutual funds, other institutions, and individuals. The sample period ranges from July 2009 to May 2015, for a total of five years and eleven months. Since July 2009, the Taiwan Stock Exchange Corporation stop exposing dealers' trading information and fuse their trading data into other institutional trading information, therefore, we begin our sample period from then. On the other hand, we end our sample period in May 2015 to avoid the adjustment of price limit.[1] To observe investors' performance under the large company with more transparent information, exchange traded funds (ETF50) and depositary receipt (DR) are included. In this paper, we first deal with the intraday transaction-level data to calculate trading price ratios, then we combine the order-level data and market display information. Finally, the daily trading price ratios and investment performance for each stock, trader type, and trading day are constructed. In addition, we set the percentile of stock return and some firm characteristics to adjust the extreme values at the 1st and 99th Percentiles. After filtering the available data, our full sample consist of 843 stocks, 1,468 trading days, and 1,120,276 firm-day observations.

2.2. Related Variables

2.2.1. Trading Price Ratios

To examine different investors' trading advantages, we follow the approach of Choe, Kho, and Stulz (2005) to analyze daily trading prices of four investor types. Firstly, the volume-weighted average price is computed on a daily basis for each stock. Subscripts *i* denote stocks; subscript *n* indicates trades; subscript *t* means trading day.

[1] Taiwan Stock Exchange Corporation announced that the price limit has been relaxing from 7% to 10% since June 1st, 2015.

$$A_{it} = \frac{\sum_{n=1}^{N} P_{itn} \quad V_{itn}}{\sum_{n=1}^{N} V_{itn}} \tag{1}$$

Where, A_{it} presents the volume-weighted average price. P_{itn} is the price of stock i on day t for trade n. The number of shares, V_{itn} indicates the number of shares traded of stock i on day t for trade n. Secondly, we measure the volume-weighted average price on a daily basis sorted by buying and selling directions for each investor in each stock.

$$B_{ijt}^{d} = \frac{\sum_{n=1}^{N} P_{ijtn}^{d} \quad V_{ijtn}^{d}}{\sum_{n=1}^{N} V_{ijtn}^{d}} \tag{2}$$

Here, B_{ijt}^{d} presents the volume-weighted average price. d represents the order direction (buy or sell). j denotes four investors types of foreign investor, mutual fund, other institution and individual, respectively.

$$PriceRatio_{ijt}^{d} = {B_{ijt}^{d}}\Big/{A_{it}^{d}} \times 100 \tag{3}$$

Thirdly, we let model (2) be divided by model (1) then multiplied by 100 to get the trading price ratio. The buy ratio of less than 100 indicates the investor types pay less than average price and vice versa. Conversely, the sell ratio of more than 100 indicates the investor types receive more than average price and vice versa. Therefore, from the cost perspective, we think that buyer (seller) with lower (higher) trading price ratios will get better return. The result of descriptive statistics will show us whether each type of investor transact at different prices for the stock.

2.2.2. Dummy Variable across Investor Types

In order to understand the effect of investor categories, we set foreign investors, mutual funds, and other institutions as dummy variables. These variables are described as follow.

1. Foreign Investor ($Foreign_{ijt}$): the dummy variable of foreign investor that equal one when the trade is invested by a foreign investor, and zero otherwise.

2. Mutual Fund ($Fund_{ijt}$): the dummy variable of mutual fund that equal one when the trade is invested by a mutual fund, and zero otherwise.

3. Other Institution ($OtherInst_{ijt}$): the dummy variable of other institution that equal one when the trade is invested by a other institution, and zero otherwise.

2.2.3. Investment Performance

Investment performance is another important dependent variable of our paper. According to the approach of Hung, Chen, and Wu (2015), we denote investors' holding periods return of stocks as their investment performance by computing the natural logarithm of the stock's ending value in the holding period to the volume-weighted price for each trade direction, investor type, trading day, and stock, then expressed as a percentage. Our holding period lengths include one week, one month, three month, six month, and one year.

$$Perform_{ijt}^{d} = Ln\left(\frac{End\ Value_{ijt}}{VWPrice_{ijt}}\right) \times I \times 100\% \quad (4)$$

Where, $Perform_{ijt}^{d}$ presents the investment performance over the holding period t. $End\ Value_{ijt}$ is the ending value of each investor type j for stock i in the holding period t (t = 1 week, 1 month, 3 month, 6 month, 1 year). $VWPrice_{ijt}$ is the volume-weighted price of each investor type j for stock i in the holding period t (t = 1 week, 1 month, 3 month, 6 month, 1 year). I is an indicator of the trade direction. If the investor do a buy trade, then I equal one; if the investor do a sell trade, then I equal negative one. This paper consider that the investor of buyer (seller) expect the ending value is higher (lower) than the original value.

2.2.4. Firm Characteristics

As emerging market as Taiwan in Asia, stock prices and the variations of stock return are known to affect by some firm fundamentals (Rahman and Hassan, 2013). To understand whether firm characteristics is related to price ratio and investment performance, we include the firm size, book-to-market ratio, turnover rate, exchange traded funds (ETF50), depositary receipt (DR) and market return in the model. These control variables are described as follow.

1. Firm size ($Size_{it-1}$): it is defined as the natural logarithm of the closing price multiplied by shares outstanding of individual stocks (in TWD million) for each stock at the previous trading day.

2. Book-to-market ratio (BM_{it-1}): it is calculated as the ratio of the book value at the end of the prior year divided by the market value of individual stocks at the previous trading day.

3. Turnover rate ($Turnover_{it-1}$): it is calculated as the number of shares traded, divided by

the number of shares outstanding for each stock at the previous trading day.

4. Exchange Traded Funds ($ETF50_{it}$): it is the dummy variables that equal one when the firm have the stock of ETF50 across our sample period, and zero otherwise. The underlying stock is revised for a period of time to include the 50 largest stocks of market value.

5. Depositary Receipt (DR_{it}): it is the dummy variables that equal one when the firm have cross-listed stocks across our sample period, and zero otherwise. The underlying stock is revised for a period of time to include the depositary receipt stock.

6. Market Return ($MktReturn_t$): it is the return of Taiwan Stock Exchange Capitalization Weighted Stock Index for each trading period, expressed as a percentage. In addition, we have to control synchronous market return when estimate the investment performance.

2.3. Analytical Models

To examine the relationship between trading price ratios and various investors, we use the least ordinary squares (OLS) regression model (5). In addition, we think investors' price ratios are affected by some firm characteristics and fixed effects, so the control variables include firm characteristics, time fixed effects and industrial fixed effects. The regression model is as follow:

$$PriceRatio_{ijt}^{d} = \beta_0 + \beta_1 Foreign_{ijt} + \beta_2 Fund_{ijt} + \beta_3 OtherInst_{ijt} + \beta_4 Size_{it-1} + \beta_5 BM_{it-1} + \beta_6 Turnover_{it-1} + \beta_7 DR_{it} + \beta_8 ETF50_{it} + \sum_{w=1}^{4} \beta_{9w} Weekday_{iwt} + \sum_{m=1}^{11} \beta_{10m} Month_{imt} + \sum_{y=1}^{6} \beta_{11y} Year_{iyt} + \sum_{k=1}^{20} \beta_{12k} Industry_{ikt} + \varepsilon_{ijt}, \quad (5)$$

where the dependent variable, $PriceRatio_{ijt}^{d}$, is the trading price ratio sorted by trade direction on a daily basis for each investor in each stock. $Foreign_{ijt}$, $Fund_{ijt}$, and $OtherInst_{ijt}$ are the dummy variables that equal one when the trade is invested by a foreign investor, a mutual fund, and other Institution, respectively, and zero otherwise. $Size_{it-1}$ presents the firm size of stock i on day $t-1$. BM_{it-1} measures the firm's growth potential of stock i on day $t-1$. $Turnover_{it-1}$ is the turnover rate of stock i on day $t-1$. DR_{it} is a dummy variable that equal one when the firm have cross-listed stocks

across our sample period, and zero otherwise. $ETF50_{it}$ is the dummy variables that equal one when the firm have the stock of ETF50 across our sample period, and zero otherwise. $Weekday_{iwt}$ is a weekly dummy variable. $Month_{imt}$ is a monthly dummy variable. $Year_{iyt}$ is a yearly dummy variable. $Industry_{ikt}$ is a industrial dummy variable. We let the eight industries with the least trading data during the whole sample period merged into one category, which serves as a control group for the dummy variables. Then, the industrial dummy variables include electrical and cable industry, iron and steel industry, building material and construction industry, shipping and transportation industry, financial and insurance industry, trading and consumers' goods industry, chemical industry, biotechnology and medical care industry, semiconductor industry, computer and peripheral equipment industry, optoelectronic industry, communications and internet industry, electronic parts and components industry, electronic products distribution industry, other electronic industry, and other industry.

Next, we discuss the relation between investment performance, trading price ratios, and various investors to clarify the performance of different investors in stock market. Considering the possible interaction between trading price ratios and various investors, the interaction terms of these two variables are included in the regression model (6). The model is designed as follows:

$$\begin{aligned} Perform_{ijt}^{d} = {} & \beta_0 + \beta_1 PriceRatio_{ijt}^{d} + \beta_2 Foreign_{ijt} + \beta_3 Fund_{ijt} + \\ & \beta_4 OtherInst_{ijt} + \beta_5 PriceRatio_{ijt}^{d} \times Foreign_{ijt} + \beta_6 PriceRatio_{ijt}^{d} \times \\ & Fund_{ijt} + \beta_7 PriceRatio_{ijt}^{d} \times OtherInst_{ijt} + Controls + \\ & Fixed\ \ Industry\ \ Effects + Fixed\ \ Time\ \ Effects + \ \varepsilon_{ijt}. \end{aligned} \quad (6)$$

Here, $Perform_{ijt}^{d}$ represents investor's investment performance over the holding period t. Control variables contain synchronous market returns, firm characteristics that mentioned above. $Fixed\ Industry\ Effects$ control twenty industrial groups. $Fixed\ Time\ Effects$ include weekly, monthly, and yearly dummy variables.

3. Empirical Results

Table 1 presents the descriptive statistics of firm characteristics over the sample period from July 2009 to May 2015. It contains the number of observations, mean, median, standard deviation, first quartile, and third quartile. There are 843 stocks, 1,468 trading days, and

1,120,276 firm-day observations runs through our sample period. The statistics present full sample and subsamples by years.

The mean and standard deviation of market value is about 30,928 NT$ million and 76,424 NT$ million. Although the market value of the first quartile is only 3,491 NT$ million, the third quartile of market value is 19,472 NT$ million. It can be seen that the size of market value exist great diversity. The average turnover rate is 0.68% and it ranges from 0.49 to 1.10. When the stocks have higher turnover rate, the liquidity will become better. In 2009 and 2010, turnover rate is higher than 1, but it is lowest in 2015. The mean book-to market ratio is 0.51 and it ranges from 0.47 to 0.57. When the market is overly optimistic, the market price will be overestimated, then book-to-market ratio will be lower, generally known as value stocks. On the contrary, when the market is too pessimistic, the market price will be underestimated, then book-to-market ratio will be higher, commonly known as growth stocks. In brief, our sample covers small (large) firms, high (low) turnover rates, high (low) book-to-market ratio, and the long enough sample period.

3.1. Trading Price Ratios among Various Investors

To understand the trading advantages among various different types of investors in Taiwan stock market, we show the result of descriptive statistics in Table 2. Panel A and B present various investors' buy and sell trades, respectively. The unique data include four categories of traders: foreign investors, mutual funds other institutions and individuals. Following the approach of Choe, Kho, and Stulz (2005), we calculate the trading price ratio for buyer and seller on a daily basis for each investor in each stock. The buy ratio of less than 100 indicates the investor groups pay less than average price and vice versa. Conversely, the sell ratio of more than 100 indicates the investor groups receive more than average price and vice versa.

Panel A of Table 2 shows that mutual funds, for buy side, have the highest value of trading price ratios (100.06) across investor types, followed by foreign investors (100.00). Other institutions and individuals have the same low values of trading price ratios (99.98). Moreover, mutual funds also have the highest standard deviation of trading price ratios (0.67). Individuals have the lowest standard deviation of trading price ratios (0.15). In Panel B of Table 2, mutual funds have the lowest value of trading price ratios (99.87) across investor types for the sell side, followed by foreign investors (99.89). Furthermore, mutual funds and individuals also have the highest and lowest standard deviation respectively in sell trades. It seems that professional institutions tend to be more aggressive than other institutions and

individuals in trading stocks. In other words, foreign investment and mutual funds use higher prices to buy, lower prices to sell.

3.2. The Relationship between Trading Price Ratios, various Investors, and firm characteristics

Table 3 analyzes the relationship between trading price ratios, various Investors, and firm characteristics. We use the regression of model (5). Panel A and B present the buy and sell trades, respectively. Some of the regressions are controlled by time fixed effects and industrial fixed effects. Following the approach of Choe, Kho, and Stulz (2005), we calculate the trading price ratio for buyer and seller on a daily basis for each investor in each stock, respectively. For buy trades, we find that the coefficients of investor dummy variables are almost positively significant at the 1% level, especially professional institutional investors. It means that they submit more aggressive orders and buy in higher prices. In addition, the larger size of the firms, the higher trading price ratios they have. The coefficients of *BM* and *Turnover* are negatively significant, so institutional investors will buy in lower price when the stocks have higher growth potential and liquidity. *DR* and *ETF50* illustrate that institutional investors are passive in the firms of more disclosed information.

For sell trades, we find that the coefficients of investor dummy variables are almost significantly negative at the 1% level. It indicates that they sell in lower prices. Furthermore, mutual funds is also the most aggressive investors, followed by foreign investors. In addition, firms of larger size sell in lower prices. The coefficient of book-to-market ratio is significantly positive only when we control fixed effects. *Turnover* also present negative relation to trading price ratios. In summary, regardless of which trade direction, institutional investors perform more aggressive in trading, especially mutual funds. The buy ratios of them is higher and lower in sell ratio. This also implies that individuals have trading advantage.

3.3. The Relationship between Investment Performance, Trading Price Ratios, and various Investors

To examine the relationship between investment performance, trading price ratios and investor types, we use the regression of model (6). Panel A and B present buy and sell trades, respectively. The investment performance of buyer is calculated as the natural logarithm of the stock's ending value in the holding period to the volume-weighted price, expressed as a percentage; the investment performance of seller is calculated as the natural logarithm of

traders' volume-weighted price to the stock's value at the end of the holding period, expressed as a percentage. Trading price ratio is defined as the volume-weighted average price on a daily basis sorted by trade direction for each investor in each stock to volume-weighted average price on a daily basis for each stock, multiplied by 100. Holding period include one week, one month, three month, six month, and one year.

For buy trades, we can see that the lower the trading price ratios, the better the investment performance. Investors' performance get worse with the longer time period. In term of the interaction terms of the investor types and trading price ratios, institutional investors' trading price ratios are positively related to their investment performance, except during one month period. It means that institutional investors pay more than average price to get the return. On the other hand, most of the control variables are negatively correlated with performance, except ETF50 and synchronous market returns.

For sell trades, after controlling firm characteristics, institutional investors basically have positive investment performance and the effects of trading price ratios show a little bit week. In term of the interaction terms of the investor types and trading price ratios with control variables, institutional investors' trading price ratios is negatively related to their investment performance. That is, investors who use lower trading price ratios perform better. In addition, most control variables of firm characteristics being unchanged. In sum, buy and sell sides exhibit asymmetric effects. Institutional investors use aggressive trading price to get better investment performance during every holding periods, professional institutional investors.

Table 5 shows the regression results of investment performance on fixed effects. We join the time fixed effects and industrial fixed effects in model (6). Panel A and B present buy and sell trades, respectively. In Panel A of Table 5, the dummy variables of institutional investors are negatively related to the investment performance in one week, six months, and one year periods. Trading price ratios also present the lower the better investment performance. Regarding to interaction terms of investor types and trading price ratios, institutional investors' trading price ratios are positively related to their investment performance, except one month and three months periods. Panel B of Table 5 presents significant effects on investors' dummy variables and interaction terms. The investment performance of institutional investors is positive, while their trading price ratios are negatively associated to investment performance. In addition, market return and turnover rate have the strongest effects among firm characteristics' control variables both in buy and sell sides. Rouwenhorst (1999) and Dey (2005) both indicate stock return and share turnover

exist strong correlation. Chordia, Subrahmanyam, and Anshuman (2001) further show that stock returns and the variability of share turnover have negative and strong cross-sectional relationship, after controlling for size, book-to-market ratio, momentum, and the level of dollar volume or share turnover. Taken as a whole, after controlling the fixed effects, results of Table 5 shows a little bit weak effects on the level of trade aggressiveness for buy side, but consistent findings with those in Table 4. Institutional investors' higher trading price ratios of buy trades and lower trading price ratios of sell trades perform better. In short, after institutional investors buy (sell) the stock at a higher (lower) price, the stock price goes up (down).

4. Conclusions

As we know, many articles discuss about transaction performance, but rarely use the trading price ratio to measure the investment performance on TWSE. Therefore, using the data from July 2009 to May 2015, our study focuses the analysis on trading price ratios and investment performance among different investors of Taiwan Stock Exchange. All investors are divided into foreign investors, mutual funds, other institutions and individuals. According to Choe, Kho, and Stulz (2005) approach, we deal with the intraday transaction-level data to calculate trading price ratios. The answered of the first question is presented by the descriptive statistics of trading price ratios across investor types. Then, we investigate various investors' trading price ratio with some control variables of firm characteristics. Finally, we join the interaction terms in our model to understand the relation between investors' trading price ratios and investment performance.

The empirical results of trading price ratios among investor types present that institutions are more aggressive than individuals in both buy and sell trades. Mutual funds prefer using the highest prices to buy stocks and lowest prices to sell stocks, followed by foreign investors. Other institutions and individuals are less aggressive. After including the control variables of firm characteristics, the effect is the same. It implies that individuals are able to transact at more favorable prices compared to institutional investors. Our results are consistent with Kalev, Nguyen, and Oh (2008). In addition, when we examine the relationship between investment performance, trading price ratios, and investor types, institutional investors also use aggressive trading prices to get better investment performance. It indicts institutional investors who use higher prices to buy and lower prices to sell get better returns. On the other hand, we also notice the investment performance of institutional investors in sell side is better than buy side. Taken as a whole, there exist asymmetric effects between buy and sell sides. Moreover, we can see the most obvious effects on professional

institutional investors.

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Table 1 Descriptive Statistics of Firm Characteristics

This table shows the descriptive statistics of firm characteristics over the sample period from July 2009 to May 2015. There are 1468 trading days with 843 firm stocks. The statistics present the full sample and subsamples by years. Market value is computed as the closing price multiplied by shares outstanding of individual stocks (in TWD million) for each stock at the previous trading day. Turnover rate is calculated as the number of shares traded, divided by the number of shares outstanding for each stock at the previous trading day. Book-to-market ratio is calculated as the ratio of the book value at the end of the prior year divided by the market value of individual stocks at the previous trading day. N denotes the number of observations. Mean and Std. Dev. indicate the average number and standard deviation, respectively. Q1, Median, and Q3 present the number that divides the data into first, second, and third quartile. # of Firms is the number of firms over our sample period. # of Days is the number of trading days. # of Obs. is the number of firm-day observations.

Variables	All	2009	2010	2011	2012	2013	2014	2015
# of Firms	843	741	763	763	779	799	816	815
# of Days	1,468	131	251	247	250	246	248	95
# of Obs.	1,120,276	94,700	184,831	183,109	191,021	191,193	198,468	76,954
Market Value(NT$ billion)								
N	6,466,656	583,997	1,140,990	1,099,245	1,104,932	1,092,357	1,042,731	402,404
Mean	30.93	28.44	30.33	31.01	28.89	31.00	33.38	35.06
Std. Dev.	76.42	71.56	74.74	76.64	72.48	76.33	81.08	84.93
Q1	0.35	0.31	0.38	0.36	0.31	0.33	0.38	0.37
Median	0.78	0.73	0.87	0.81	0.70	0.73	0.81	0.80
Q3	19.47	19.19	19.70	19.43	17.42	20.11	20.65	20.40
Turnover (%)								
N	6,466,656	583,997	1,140,990	1,099,245	1,104,932	1,092,357	1,042,731	402,404
Mean	0.68	1.10	0.91	0.63	0.51	0.54	0.61	0.49
Std. Dev.	0.98	1.27	1.15	0.89	0.80	0.85	0.96	0.77
Q1	0.13	0.27	0.22	0.14	0.10	0.11	0.11	0.10
Median	0.31	0.63	0.48	0.32	0.22	0.24	0.26	0.22
Q3	0.77	1.40	1.08	0.73	0.56	0.58	0.66	0.53
Book-to-market ratio								
N	6,453,891	582,417	1,132,147	1,097,540	1,104,932	1,091,849	1,042,602	402,404
Mean	0.51	0.57	0.47	0.50	0.57	0.53	0.48	0.48
Std. Dev.	0.42	0.48	0.39	0.41	0.47	0.43	0.39	0.39
Q1	0.22	0.24	0.21	0.22	0.24	0.23	0.20	0.20
Median	0.40	0.43	0.37	0.39	0.44	0.41	0.37	0.38
Q3	0.68	0.75	0.61	0.65	0.78	0.71	0.65	0.65

Table 2 Descriptive Statistics of Trading Price Ratios across Investor Types

This table shows the trading price ratios across different type of investors. Panel A and B present buy and sell trades, respectively. Following the approach of Choe, Kho, and Stulz (2005), we calculate the trading price ratio for buyer and seller on a daily basis for each investor in each stock. The buy ratio of less than 100 indicates the investor groups pay less than average price and vice versa. Conversely, the sell ratio of more than 100 indicates the investor groups receive more than average price and vice versa. Our data include four categories of traders: foreign investors, mutual funds other institutions and individuals. N denotes the number of observations. Mean and Std. Dev. separately represent the average and standard deviation of price ratios over the sample period. Q1, Median, and Q3 indicate the number of price ratios at the first, second, and third quartile, respectively.

Investor Types	N	Mean	Std. Dev.	Q1	Median	Q3
Panel A: Buy Trades						
All Investors	2,949,981	99.99	0.49	99.92	100.00	100.09
Foreign Investors	893,705	100.00	0.57	99.85	100.03	100.20
Mutual Funds	196,251	100.06	0.67	99.81	100.06	100.31
Other Institutions	741,029	99.98	0.63	99.80	100.01	100.21
Individuals	1,118,996	99.98	0.15	99.97	100.00	100.01
Panel B: Sell Trades						
All Investors	2,964,587	100.00	0.50	99.90	100.00	100.08
Foreign Investors	885,206	99.98	0.57	99.79	99.97	100.15
Mutual Funds	234,925	99.87	0.60	99.65	99.90	100.09
Other Institutions	724,850	100.02	0.68	99.78	99.99	100.23
Individuals	1,119,606	100.02	0.14	99.99	100.00	100.02

Table 3 Regression Results for Trading Price Ratios

This table presents the regression results for trading price ratios. Panel A and B present buy and sell trades, respectively. Following the approach of Choe, Kho, and Stulz (2005), we calculate the trading price ratio for buyer and seller on a daily basis for each investor in each stock. The buy (sell) ratio of less than 100 indicates the investor groups pay (receive) less than average price and vice versa. *Foreign, Fund, OtherInst* are the dummy variables that equal one when the trade is invested by a foreign investor, a mutual fund, and other Institution, respectively, and zero otherwise. *Size* is computed as the logarithm of market value for each stock at the previous trading day. Turnover rate, *Turnover*, is calculated as the number of shares traded, divided by the number of shares outstanding for each stock at the previous trading day. Book-to-market ratio, *BM*, is calculated as the book value at the end of the prior year divided by the market value of individual stocks at the previous trading day. Depositary receipts, *DR*, is the dummy variables that equal one when the firm have cross-listed stocks across our sample period, and zero otherwise. Exchange traded funds, *ETF50*, is the dummy variables that equal one when the firm have the stock of ETF50 across our sample period, and zero otherwise. We also control the time fixed effects and industrial fixed effects in some regressions. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Independent Variables	Trading Price Ratios				
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Panel A：Buy Trades					
Intercept	99.98 ***	99.92 ***	99.93 ***	99.93 ***	99.94 ***
Foreign	0.03 ***	0.02 ***	0.02 ***	0.02 ***	0.02 ***
Fund	0.08 ***	0.07 ***	0.07 ***	0.07 ***	0.07 ***
OtherInst	0.00	0.00 ***	0.00 ***	0.00 ***	0.00 ***
Size		0.01 ***	0.01 ***	0.01 ***	0.01 ***
BM		-0.01 ***	-0.01 ***	-0.01 ***	-0.01 ***
Turnover		-0.01 ***	-0.01 ***	-0.01 ***	-0.01 ***
DR		-0.01 ***	-0.01 ***	0.00 ***	0.00 ***
ETF50		-0.02 ***	-0.02 ***	-0.02 ***	-0.02 ***
Control	No	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	Yes	No	Yes
Industry Fixed Effects	No	No	No	Yes	Yes
Adjusted R^2	0.0019	0.0030	0.0036	0.0031	0.0037
Number of Obs.	3,226,513	3,226,513	3,226,513	3,226,513	3,226,513
Panel B：Sell Trades					
Intercept	100.02 ***	100.12 ***	100.13 ***	100.12 ***	100.13 ***
Foreign	-0.05 ***	-0.04 ***	-0.04 ***	-0.04 ***	-0.04 ***
Fund	-0.15 ***	-0.14 ***	-0.14 ***	-0.14 ***	-0.14 ***
OtherInst	0.00	0.01 ***	0.01 ***	0.01 ***	0.01 ***
Size		-0.01 ***	-0.01 ***	-0.01 ***	-0.01 ***
BM		0.00	0.00 ***	0.00	0.00 ***
Turnover		-0.01 ***	-0.01 ***	-0.01 ***	-0.01 ***
DR		0.01 ***	0.01 ***	0.01 ***	0.01 ***
ETF50		0.03 ***	0.04 ***	0.03 ***	0.04 ***
Control	No	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	Yes	No	Yes
Industry Fixed Effects	No	No	No	Yes	Yes
Adjusted R^2	0.0073	0.0084	0.0091	0.0085	0.0092
Number of Obs.	3,240,659	3,240,659	3,240,659	3,240,659	3,240,659

Table 4 Regression Results for Investment Performance

This table presents the regression results for investment performance. Panel A and B present buy and sell trades, respectively. The investment performance of buyer and seller is calculated as the natural logarithm of the stock's ending value in the holding period to the volume-weighted price sorted by trade direction for each investor in each stock, expressed as a percentage. Our holding period lengths include one week, one month, three month, six month, and one year. Following, the approach of Choe, Kho, and Stulz (2005), we calculate the trading price ratio for buyer and seller on a daily basis for each investor in each stock. The buy (sell) ratio of less than 100 indicates the investor groups pay (receive) less than average price and vice versa. *Foreign, Fund,* and *OtherInst* are the dummy variables that equal one when the trade is invested by a foreign investor, a mutual fund, and other Institution, respectively, and zero otherwise. Market return, *MktReturn*, is defined as the rate of return of TAIEX for each trading period. *Size* is computed as the logarithm of market value for each stock at the previous trading day. Turnover rate, *Turnover*, is calculated as the number of shares traded, divided by the number of shares outstanding for each stock at the previous trading day. Book-to-market ratio, *BM*, is calculated as the book value at the end of the prior year divided by the market value of individual stocks at the previous trading day. Depositary receipts, *DR*, is the dummy variables that equal one when the firm have cross-listed stocks across our sample period, and zero otherwise. Exchange traded funds, *ETF50*, is the dummy variables that equal one when the firm have the stock of ETF50 across our sample period, and zero otherwise. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Independent Variables	Investment Performance									
	1 Week		1 Month		3 Months		6 Months		1 Year	
Panel A：Buy Trades										
Intercept	89.63 ***	85.10 ***	69.20 ***	60.06 ***	119.71 ***	97.87 ***	230.31 ***	181.57 ***	413.01 ***	290.29 ***
PriceRatio	-0.90 ***	-0.85 ***	-0.69 ***	-0.59 ***	-1.20 ***	-0.97 ***	-2.31 ***	-1.81 ***	-4.15 ***	-2.89 ***
Foreign	-22.96 ***	-16.26 ***	-13.99 **	1.12	-101.33 ***	-66.89 ***	-250.29 ***	-178.66 ***	-495.79 ***	-323.13 ***
Fund	-19.98 ***	-15.47 ***	2.99	12.42 *	-50.70 ***	-27.85 **	-172.43 ***	-123.20 ***	-356.34 ***	-233.55 ***
OtherInst	-5.18 *	0.48	18.84 ***	30.25 ***	-20.48 **	5.95	-132.38 ***	-75.05 ***	-348.64 ***	-205.26 ***
PriceRatio×*Foreign*	0.23 ***	0.16 ***	0.14 **	-0.01	1.01 ***	0.67 ***	2.50 ***	1.79 ***	4.95 ***	3.23 ***
PriceRatio×*Fund*	0.20 ***	0.16 ***	-0.02	-0.12 *	0.52 ***	0.29 ***	1.74 ***	1.25 ***	3.58 ***	2.36 ***
PriceRatio×*OtherInst*	0.05 *	0.00	-0.19 ***	-0.30 ***	0.21 **	-0.05	1.33 ***	0.76 ***	3.49 ***	2.06 ***
MktReturn	0.92 ***	0.92 ***	1.07 ***	1.06 ***	1.09 ***	1.09 ***	1.05 ***	1.05 ***	1.18 ***	1.19 ***
Size		-0.02 ***		-0.07 ***		-0.08 ***		-0.06 ***		-0.01
BM		-0.05 ***		-0.10 ***		-0.07 **		0.06		-0.36 ***
Turnover		-0.17 ***		-0.44 ***		-0.97 ***		-1.78 ***		-3.90 ***
DR		-0.03 ***		-0.19 ***		-0.73 ***		-1.46 ***		-2.74 ***
ETF50		0.08 ***		0.36 ***		0.71 ***		1.47 ***		2.47 ***
P-value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Adjusted R^2	0.22	0.23	0.25	0.25	0.23	0.23	0.20	0.21	0.19	0.21
Number of Obs.	3,226,513	3,226,513	3,226,513	3,226,513	3,226,513	3,226,513	3,226,513	3,226,513	3,226,513	3,226,513

Independent Variables	Investment Performance									
	1 Week		1 Month		3 Months		6 Months		1 Year	
Panel B：Sell Trades										
Intercept	24.62 ***	22.51 *	24.19 ***	5.81	72.84 ***	3.53	95.01 ***	-23.99	85.44 ***	-62.89 ***
PriceRatio	-0.25 ***	-0.22	-0.24 ***	-0.04	-0.71 ***	0.02	-0.92 ***	0.33 **	-0.80 ***	0.73 ***
Foreign	7.86 **	11.28 ***	5.06	28.28 ***	-59.24 ***	22.47 *	-55.04 ***	84.36 ***	-85.27 ***	93.93 ***
Fund	44.09 ***	48.35 ***	40.58 ***	63.96 ***	-30.02 **	47.02 ***	-67.37 ***	65.20 ***	-102.72 ***	81.78 ***
OtherInst	34.83 ***	37.88 ***	28.74 ***	51.63 ***	-36.16 ***	46.91 ***	-55.63 ***	87.16 ***	-47.39 *	131.45 ***
PriceRatio×*Foreign*	-0.08 **	-0.11 ***	-0.05	-0.28 ***	0.59 ***	-0.22 *	0.55 ***	-0.84 ***	0.85 ***	-0.94 ***
PriceRatio×*Fund*	-0.44 ***	-0.48 ***	-0.41 ***	-0.64 ***	0.29 **	-0.47 ***	0.66 ***	-0.66 ***	0.99 ***	-0.83 ***
PriceRatio×*OtherInst*	-0.35 ***	-0.38 ***	-0.29 ***	-0.52 ***	0.36 ***	-0.47 ***	0.55 ***	-0.87 ***	0.45 *	-1.32 ***
MktReturn	0.73 ***	0.73 ***	0.86 ***	0.86 ***	0.56 ***	0.56 ***	0.57 ***	0.57 ***	0.66 ***	0.66 ***
Size		-0.03 ***		-0.14 ***		-0.41 ***		-0.67 ***		-0.58
BM		0.00		0.14 ***		0.74 ***		2.15 ***		6.29
Turnover		-0.13 ***		-0.37 ***		-0.74 ***		-1.26 ***		-2.87
DR		-0.01		-0.07		-0.22 ***		-0.28 ***		-0.39
ETF50		0.08 ***		0.01 ***		-0.44 ***		0.10		1.13
P-value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Adjusted R^2	0.14	0.14	0.16	0.16	0.06	0.07	0.06	0.07	0.06	0.08
Number of Obs.	3,240,659	3,240,659	3,240,659	3,240,659	3,240,659	3,240,659	3,240,659	3,240,659	3,240,659	3,240,659

Table 5 Regression Results for Investment Performance on Fixed Effects

This table presents the regression results for investment performance on fixed effects. Panel A and B present buy and sell trades, respectively. The investment performance of buyer and seller is calculated as the natural logarithm of the stock's ending value in the holding period to the volume-weighted price sorted by trade direction for each investor in each stock, expressed as a percentage. Our holding period lengths include one week, one month, three month, six month, and one year. Following, the approach of Choe, Kho, and Stulz (2005), we calculate the trading price ratio for buyer and seller on a daily basis for each investor in each stock. The buy (sell) ratio of less than 100 indicates the investor groups pay (receive) less than average price and vice versa. *Foreign, Fund,* and *OtherInst* are the dummy variables that equal one when the trade is invested by a foreign investor, a mutual fund, and other Institution, respectively, and zero otherwise. Market return, *MktReturn*, is defined as the rate of return of TAIEX for each trading period. *Size* is computed as the logarithm of market value for each stock at the previous trading day. Turnover rate, *Turnover*, is calculated as the number of shares traded, divided by the number of shares outstanding for each stock at the previous trading day. Book-to-market ratio, *BM*, is calculated as the book value at the end of the prior year divided by the market value of individual stocks at the previous trading day. Depositary receipts, *DR*, is the dummy variables that equal one when the firm have cross-listed stocks across our sample period, and zero otherwise. Exchange traded funds, *ETF50*, is the dummy variables that equal one when the firm have the stock of ETF50 across our sample period, and zero otherwise. We also control the time fixed effects and industrial fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Independent Variables	Investment Performance				
	1 Week	1 Month	3 Months	6 Months	1 Year
Panel A：Buy Trades					
Intercept	84.95 ***	58.35 ***	76.23 ***	148.28 ***	204.23 ***
PriceRatio	-0.85 ***	-0.60 ***	-0.80 ***	-1.52 ***	-2.03 ***
Foreign	-16.70 ***	1.78	-40.77 ***	-132.31 ***	-205.73 ***
Fund	-15.10 ***	13.19 **	-7.38	-89.51 ***	-145.68 ***
OtherInst	-0.40	27.13 ***	14.26	-60.18 ***	-129.87 ***
PriceRatio×Foreign	0.17 ***	-0.02	0.41 ***	1.32 ***	2.06 ***
PriceRatio×Fund	0.15 ***	-0.13 **	0.08	0.91 ***	1.47 ***
PriceRatio×OtherInst	0.00	-0.27 ***	-0.14	0.60 ***	1.30 ***
MktReturn	0.91 ***	1.04 ***	1.06 ***	1.06 ***	1.09 ***
Size	-0.01 **	-0.03 ***	0.00	0.01	0.08 ***
BM	0.00	0.15 ***	0.61 ***	0.88 ***	0.52 ***
Turnover	-0.16 ***	-0.43 ***	-0.85 ***	-1.57 ***	-3.16 ***
DR	0.02 *	-0.03	-0.12 ***	-0.21 ***	-0.51 ***
ETF50	0.03 **	0.35 ***	0.46 ***	1.13 ***	1.75 ***
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.23	0.26	0.27	0.24	0.26
Number of Obs.	3,226,513	3,226,513	3,226,513	3,226,513	3,226,513
Panel B：Sell Trades					
Intercept	21.47 ***	6.41	10.74	10.85	-42.32 **
PriceRatio	-0.21 ***	-0.04	0.07	0.21	0.77 ***
Foreign	11.83 ***	25.55 ***	24.52 **	59.06 ***	96.83 ***
Fund	49.03 ***	62.02 ***	49.34 ***	50.25 ***	84.91 ***
OtherInst	38.98 ***	51.31 ***	52.59 ***	69.78 ***	121.18 ***
PriceRatio×Foreign	-0.12 ***	-0.25 ***	-0.24 **	-0.59 ***	-0.96 ***
PriceRatio×Fund	-0.49 ***	-0.62 ***	-0.49 ***	-0.50 ***	-0.84 ***
PriceRatio×OtherInst	-0.39 ***	-0.51 ***	-0.52 ***	-0.70 ***	-1.21 ***
MktReturn	0.73 ***	0.87 ***	0.65 ***	0.84 ***	0.71 ***
Size	-0.03 ***	-0.12 ***	-0.40 ***	-0.61 ***	-0.65 ***
BM	0.01	0.28 ***	0.92 ***	2.12 ***	5.18 ***
Turnover	-0.13 ***	-0.37 ***	-0.64 ***	-1.04 ***	-2.19 ***
DR	0.02 **	0.06 ***	-0.03	0.12 **	0.63 ***
ETF50	0.11 ***	-0.17 ***	-0.08	-0.07	1.40 ***
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.14	0.18	0.14	0.17	0.15
Number of Obs.	3,240,659	3,240,659	3,240,659	3,240,659	3,240,659

Table 6 Regression Results for Investment Performance Sorted by Stock Volatility

This table presents the relationship between investment performance, trading price ratios and investor types. Following regression (6), we sort firms into high and low volatility. Stocks with the bottom one-second lowest volatility are classified as the low volatility firms; those with the top one-second highest volatility are classified as the high volatility firms. Panel A and B present buy and sell trades, respectively. The investment performance of buyer is calculated as the natural logarithm of the stock's value at the end of the holding period to the trader's volume-weighted execution price multiplied by 100; The investment performance of seller is calculated as the trader's volume-weighted execution price to the natural logarithm of the stock's value at the end of the holding period multiplied by 100. Holding periods include one week, one month, three month, six month, and one year. Trading price ratio, Trading price ratio, *PriceRatio* is defined as the volume-weighted average price on a daily basis sorted by trade direction for each investor in each stock, divided by volume-weighted average price on a daily basis for each stock, multiplied by 100. The buy (sell) ratio of less than 100 indicates the investor groups pay (receive) less than average price and vice versa. *Foreign, Fund, OtherInst* are the dummy variables that equal one when the trade is invested by a foreign investor, a mutual fund, and other Institution, respectively, and zero otherwise. Then, we put the interaction terms of investor dummies and price ratio into the regression model. Control variables include lag firm size, lag book-to-market ratio, lag turnover rate, DR, ETF50 and synchronous market return. We also control the time fixed effects and industrial fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Independent Variables	Low Volatility					High Volatility				
	1 Week	1 Month	3 Months	6 Months	1 Year	1 Week	1 Month	3 Months	6 Months	1 Year
Panel A: Buy Trades										
Intercept	64.54 ***	31.50 ***	78.26 ***	134.46 ***	213.73 ***	112.92 ***	101.23 ***	114.84 ***	221.01 ***	360.98 ***
PriceRatio	-0.64 ***	-0.31 ***	-0.77 ***	-1.32 ***	-2.03 ***	-1.13 ***	-1.00 ***	-1.14 ***	-2.22 ***	-3.71 ***
Foreign	14.73 ***	49.05 ***	-15.62	-87.13 ***	-192.74 ***	-47.75 ***	-47.62 ***	-93.00 ***	-233.34 ***	-409.33 ***
Fund	2.86	31.75 ***	-19.68	-82.72 ***	-155.43 ***	-42.06 ***	-26.82 **	-43.69 **	-164.48 ***	-313.01 ***
OtherInst	23.93 ***	57.59 ***	18.72	-40.44 **	-123.65 ***	-28.44 ***	-12.25	-12.32	-114.47 ***	-285.18 ***
PriceRatio×*Foreign*	-0.15 ***	-0.49 ***	0.16	0.87 ***	1.93 ***	0.48 ***	0.48 ***	0.93 ***	2.33 ***	4.09 ***
PriceRatio×*Fund*	-0.03	-0.31 ***	0.21	0.85 ***	1.59 ***	0.42 ***	0.28 **	0.45 **	1.67 ***	3.16 ***
PriceRatio×*OtherInst*	-0.24 ***	-0.57 ***	-0.18	0.41 **	1.24 ***	0.29 ***	0.12	0.13	1.15 ***	2.86 ***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.20	0.21	0.21	0.21	0.22	0.25	0.28	0.26	0.22	0.21
Number of Obs.	1,613,623	1,613,623	1,613,623	1,613,623	1,613,623	1,612,388	1,612,388	1,612,388	1,612,388	1,612,388
Panel B: Sell Trades										
Intercept	13.21 ***	-17.88 **	-30.17 **	-38.82 **	-49.61 *	33.90 ***	25.53 **	20.38	-23.55	-94.62 **
PriceRatio	-0.13 ***	0.19 ***	0.36 ***	0.49 **	0.65 **	-0.34 ***	-0.23 **	-0.15	0.31	0.98 **
Foreign	10.12 ***	36.92 ***	37.38 ***	77.93 ***	101.41 ***	3.92	14.51	12.72	86.45 ***	106.78 ***
Fund	45.87 ***	79.19 ***	77.30 ***	67.02 ***	83.17 **	39.79 ***	46.22 ***	36.56 *	76.71 ***	126.51 ***
OtherInst	33.25 ***	65.85 ***	85.61 ***	108.28 ***	122.14 ***	31.73 ***	36.43 ***	32.84	88.59 ***	164.32 ***
PriceRatio×*Foreign*	-0.10 ***	-0.37 ***	-0.37 **	-0.78 ***	-1.01 ***	-0.04	-0.14	-0.13	-0.86 ***	-1.06 ***
PriceRatio×*Fund*	-0.46 ***	-0.79 ***	-0.77 ***	-0.67 ***	-0.84 **	-0.40 ***	-0.46 ***	-0.36 *	-0.77 ***	-1.28 ***
PriceRatio×*OtherInst*	-0.33 ***	-0.66 ***	-0.86 ***	-1.09 ***	-1.23 ***	-0.32 ***	-0.36 ***	-0.33	-0.89 ***	-1.65 ***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.08	0.10	0.01	0.03	0.07	0.19	0.22	0.13	0.12	0.09
Number of Obs.	1,619,454	1,619,454	1,619,454	1,619,454	1,619,454	1,620,697	1,620,697	1,620,697	1,620,697	1,620,697

Table 7 Regression Results for Investment Performance Sorted by Stock Ticks

This table presents the relationship between investment performance, trading price ratios and investor types. Following regression (6), we sort firms into high and low Ticks. The current stock prices below 100 dollars are classified as the low ticks firms; those above 100 dollars are classified as the high ticks firms. Panel A and B present buy and sell trades, respectively. The investment performance of buyer is calculated as the natural logarithm of the stock's value at the end of the holding period to the trader's volume-weighted execution price multiplied by 100; The investment performance of seller is calculated as the trader's volume-weighted execution price to the natural logarithm of the stock's value at the end of the holding period multiplied by 100. Holding periods include one week, one month, three month, six month, and one year. Trading price ratio, *PriceRatio* is defined as the volume-weighted average price on a daily basis sorted by trade direction for each investor in each stock, divided by volume-weighted average price on a daily basis for each stock, multiplied by 100. The buy (sell) ratio of less than 100 indicates the investor groups pay (receive) less than average price and vice versa. *Foreign, Fund, OtherInst* are the dummy variables that equal one when the trade is invested by a foreign investor, a mutual fund, and other Institution, respectively, and zero otherwise. Then, we put the interaction terms of investor dummies and price ratio into the regression model. Control variables include lag firm size, lag book-to-market ratio, lag turnover rate, DR, ETF50 and synchronous market return. We also control the time fixed effects and industrial fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Independent Variables	Low Ticks					High Ticks				
	1 Week	1 Month	3 Months	6 Months	1 Year	1 Week	1 Month	3 Months	6 Months	1 Year
Panel A: Buy Trades										
Intercept	84.35 ***	53.92 ***	81.07 ***	155.57 ***	246.20 ***	86.56 ***	109.51 ***	262.06 ***	433.51 ***	700.20 ***
PriceRatio	-0.84 ***	-0.53 ***	-0.79 ***	-1.53 ***	-2.44 ***	-0.88 ***	-1.13 ***	-2.73 ***	-4.54 ***	-7.42 ***
Foreign	-15.10 ***	7.82	-50.61 ***	-153.30 ***	-280.44 ***	-24.40 **	-59.37 **	-225.20 ***	-430.29 ***	-745.02 ***
Fund	-16.10 ***	17.07 **	-13.41	-98.61 ***	-194.39 ***	-8.05	-29.62	-187.75 ***	-393.56 ***	-684.26 ***
OtherInst	1.03	35.54 ***	20.78 **	-52.42 ***	-169.02 ***	1.81	-16.92	-159.86 ***	-341.17 ***	-633.04 ***
PriceRatio×Foreign	0.15 ***	-0.08	0.51 ***	1.53 ***	2.80 ***	0.24 *	0.59 **	2.25 ***	4.30 ***	7.45 ***
PriceRatio×Fund	0.16 ***	-0.16 **	0.15	1.01 ***	1.97 ***	0.08	0.30	1.89 ***	3.95 ***	6.87 ***
PriceRatio×OtherInst	-0.01	-0.35 ***	-0.20 *	0.53 ***	1.70 ***	-0.02	0.17	1.60 ***	3.41 ***	6.33 ***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.23	0.26	0.24	0.21	0.22	0.18	0.18	0.18	0.17	0.17
Number of Obs.	3,037,407	3,037,407	3,037,407	3,037,407	3,037,407	189,106	189,106	189,106	189,106	189,106
Panel B: Sell Trades										
Intercept	23.27 ***	10.74	6.58	-9.31	-38.18	17.25	-38.87	-15.54	-135.50 **	-188.97 **
PriceRatio	-0.23 ***	-0.09	-0.01	0.20	0.51 **	-0.18	0.34	0.07	1.14 *	1.34
Foreign	10.40 ***	23.83 ***	19.78	71.72 ***	73.52 ***	18.27	61.34 **	27.31	141.19 **	102.22
Fund	47.73 ***	59.37 ***	42.77 ***	44.31 **	53.35 *	52.64 ***	104.07 ***	65.15	198.80 ***	191.82 **
OtherInst	38.72 ***	48.87 ***	47.17 ***	78.83 ***	119.93 ***	11.14	58.42 **	27.26	120.00 *	119.03
PriceRatio×Foreign	-0.10 ***	-0.24 ***	-0.20	-0.72 ***	-0.73 ***	-0.18	-0.61 **	-0.27	-1.41 **	-1.02
PriceRatio×Fund	-0.48 ***	-0.59 ***	-0.43 ***	-0.45 **	-0.55 **	-0.53 ***	-1.04 ***	-0.65	-1.99 ***	-1.93 **
PriceRatio×OtherInst	-0.39 ***	-0.49 ***	-0.47 ***	-0.79 ***	-1.21 ***	-0.11	-0.58 **	-0.27	-1.20 *	-1.20
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.15	0.17	0.07	0.07	0.08	0.09	0.10	0.04	0.06	0.08
Number of Obs.	3,050,779	3,050,779	3,050,779	3,050,779	3,050,779	189,880	189,880	189,880	189,880	189,880

Table 8 Regression Results for Investment Performance Sorted by Bearish and Bullish Markets

This table presents the relationship between investment performance, trading price ratios and investor types. Following regression (6), we divide our sample period into the bearish and bullish markets. According to the approaches from prior literatures (see, Bry and Boschan, 1971; Lee, Wu, and Huang, 2015; Pagan and Sossounovs, 2003), we start from the previous eight months of our sample period and use the return of TAIEX to find out the peak and bottom points, so that we can determine the bearish and bullish markets. The bearish market includes January 2010 to June 2010, February 2011 to November 2011, and May 2015, for a total of seventeen months; the bullish market contains July 2009 to December 2009, July 2010 to January 2011, and December 2011 to April 2015, for a total of fifty-four months. Panel A and B present buy and sell trades, respectively. The investment performance of buyer is calculated as the natural logarithm of the stock's value at the end of the holding period to the trader's volume-weighted execution price multiplied by 100; The investment performance of seller is calculated as the trader's volume-weighted execution price to the natural logarithm of the stock's value at the end of the holding period multiplied by 100. Holding periods include one week, one month, three month, six month, and one year. Trading price ratio, *PriceRatio* is defined as the volume-weighted average price on a daily basis sorted by trade direction for each investor in each stock, divided by volume-weighted average price on a daily basis for each stock, multiplied by 100. The buy (sell) ratio of less than 100 indicates the investor groups pay (receive) less than average price and vice versa. *Foreign, Fund, OtherInst* are the dummy variables that equal one when the trade is invested by a foreign investor, a mutual fund, and other Institution, respectively, and zero otherwise. Then, we put the interaction terms of investor dummies and price ratio into the regression model. Control variables include lag firm size, lag book-to-market ratio, lag turnover rate, DR, ETF50 and synchronous market return. We also control the time fixed effects and industrial fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Independent Variables	Bearish Markets					Bullish Markets				
	1 Week	1 Month	3 Months	6 Months	1 Year	1 Week	1 Month	3 Months	6 Months	1 Year
Panel A: Buy Trades										
Intercept	102.35 ***	101.33 ***	113.99 ***	93.13 ***	258.05 ***	80.46 **	49.61 ***	89.02 ***	199.29 ***	293.46 ***
PriceRatio	-1.02 ***	-1.02 ***	-1.16 ***	-0.99 ***	-2.69 ***	-0.80 ***	-0.48 ***	-0.87 ***	-1.96 ***	-2.89 ***
Foreign	-28.06 ***	-37.70 ***	-66.21 ***	-55.81 *	-269.56 ***	-14.61 ***	10.13	-65.97 ***	-213.06 ***	-329.27 ***
Fund	-40.17 ***	-40.14 ***	-55.61 **	-55.37 *	-248.06 ***	1.10	35.91 ***	-11.91	-123.67 ***	-214.37 ***
OtherInst	-17.03 **	-4.77	4.05	1.41	-195.18 ***	5.46 *	37.66 ***	5.73	-89.13 ***	-197.22 ***
PriceRatio×Foreign	0.28 ***	0.38 ***	0.66 ***	0.56 *	2.69 ***	0.15 ***	-0.10	0.66 ***	2.13 ***	3.29 ***
PriceRatio×Fund	0.40 ***	0.41 ***	0.56 **	0.56 *	2.50 ***	-0.01	-0.35 ***	0.14	1.26 ***	2.17 ***
PriceRatio×OtherInst	0.17 **	0.05	-0.04	-0.01	1.96 ***	-0.05	-0.37 ***	-0.05	0.90 ***	1.98 ***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.34	0.33	0.30	0.32	0.19	0.16	0.18	0.17	0.14	0.22
Number of Obs.	773,486	773,486	773,486	773,486	773,486	2,453,045	2,453,045	2,453,045	2,453,045	2,453,045
Panel B: Sell Trades										
Intercept	54.81 ***	30.90 **	16.64	-37.54	-254.45 ***	12.94 ***	-1.05	-6.58	-25.14	-30.60
PriceRatio	-0.55 ***	-0.31 **	-0.20	0.28	2.37 ***	-0.13 ***	0.03	0.15	0.42 **	0.50 *
Foreign	-7.64	11.00	-9.72	84.16 **	263.79 ***	16.90 ***	33.05 ***	41.51 ***	87.37 ***	67.99 **
Fund	16.25 **	43.58 ***	41.85	92.01 **	283.81 ***	57.98 ***	68.57 ***	53.72 ***	66.54 ***	40.76
OtherInst	28.87 ***	41.35 ***	25.39	92.06 ***	319.09 ***	34.85 ***	50.57 ***	59.10 ***	81.05 ***	86.48 ***
PriceRatio×Foreign	0.08	-0.11	0.10	-0.84 **	-2.64 ***	-0.17 ***	-0.33 ***	-0.41 ***	-0.87 ***	-0.67 **
PriceRatio×Fund	-0.16 **	-0.44 ***	-0.43	-0.93 **	-2.84 ***	-0.58 ***	-0.68 ***	-0.53 ***	-0.66 ***	-0.42
PriceRatio×OtherInst	-0.29 ***	-0.42 ***	-0.26	-0.93 ***	-3.20 ***	-0.35 ***	-0.50 ***	-0.59 ***	-0.81 ***	-0.87 ***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.32	0.30	0.12	0.27	0.15	0.07	0.09	0.03	0.01	0.05
Number of Obs.	774,483	774,483	774,483	774,483	774,483	2,466,176	2,466,176	2,466,176	2,466,176	2,466,176

Table 9 Regression Results for Investment Performance Sorted by Investor sentiment

This table presents the relationship between investment performance, trading price ratios and investor types. We use consumer confidence index as the indicator of investor sentiment. Following regression (6), we sort firms into pessimistic and optimistic periods. Stocks with the bottom one-second lowest consumer confidence indexes are classified as the pessimistic period; those with the top one-second highest consumer confidence index are classified as the optimistic period. Panel A and B present buy and sell trades, respectively. The investment performance of buyer is calculated as the natural logarithm of the stock's value at the end of the holding period to the trader's volume-weighted execution price multiplied by 100; The investment performance of seller is calculated as the trader's volume-weighted execution price to the natural logarithm of the stock's value at the end of the holding period multiplied by 100. Holding periods include one week, one month, three month, six month, and one year. Trading price ratio, *PriceRatio* is defined as the volume-weighted average price on a daily basis sorted by trade direction for each investor in each stock, divided by volume-weighted average price on a daily basis for each stock, multiplied by 100. The buy (sell) ratio of less than 100 indicates the investor groups pay (receive) less than average price and vice versa. *Foreign, Fund, OtherInst* are the dummy variables that equal one when the trade is invested by a foreign investor, a mutual fund, and other Institution, respectively, and zero otherwise. Then, we put the interaction terms of investor dummies and price ratio into the regression model. Control variables include lag firm size, lag book-to-market ratio, lag turnover rate, DR, ETF50 and synchronous market return. We also control the time fixed effects and industrial fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Independent Variables	Pessimistic Period					Optimistic Period				
	1 Week	1 Month	3 Months	6 Months	1 Year	1 Week	1 Month	3 Months	6 Months	1 Year
Panel A: Buy Trades										
Intercept	86.48 ***	52.52 ***	101.87 ***	203.64 ***	359.21 ***	84.30 ***	59.36 ***	90.50 ***	165.35 ***	271.75 ***
PriceRatio	-0.85 ***	-0.49 ***	-0.91 ***	-1.81 ***	-3.34 ***	-0.85 ***	-0.60 ***	-0.93 ***	-1.72 ***	-2.78 ***
Foreign	-12.86 **	17.47	-37.05 *	-147.78 ***	-312.74 ***	-16.48 ***	2.93	-59.54 ***	-154.12 ***	-301.99 ***
Fund	-5.71	37.22 ***	-14.34	-120.11 ***	-262.51 ***	-18.63 ***	7.14	-26.40 **	-115.15 ***	-235.71 ***
OtherInst	-2.36	47.04 ***	32.03	-46.68	-214.44 ***	1.73	25.56 ***	-4.68	-93.30 ***	-225.85 ***
PriceRatio×Foreign	0.13 **	-0.18	0.37 *	1.48 ***	3.13 ***	0.16 ***	-0.03	0.60 ***	1.54 ***	3.02 ***
PriceRatio×Fund	0.06	-0.37 ***	0.15	1.21 ***	2.65 ***	0.19 ***	-0.06	0.28 **	1.17 ***	2.39 ***
PriceRatio×OtherInst	0.02	-0.47 ***	-0.32	0.47	2.15 ***	-0.02	-0.25 ***	0.05	0.94 ***	2.26 ***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.25	0.29	0.15	0.12	0.05	0.22	0.23	0.24	0.21	0.19
Number of Obs.	868,885	868,885	868,885	868,885	868,885	2,357,628	2,357,628	2,357,628	2,357,628	2,357,628
Panel B: Sell Trades										
Intercept	26.55 ***	2.77	-43.35 *	-173.84 ***	-246.30 ***	22.31 ***	14.31 *	35.11 **	34.73 *	-4.16
PriceRatio	-0.25 ***	0.01	0.54 **	1.97 ***	2.71 ***	-0.22 ***	-0.14 *	-0.32 **	-0.31	0.08
Foreign	57.43 ***	91.50 ***	170.17 ***	333.45 ***	377.96 ***	-8.82 **	-9.00	-61.46 ***	-35.70 *	-33.47
Fund	56.83 ***	78.10 ***	115.19 ***	244.10 ***	325.00 ***	41.52 ***	50.88 ***	-2.22	-18.27	-14.55
OtherInst	72.79 ***	90.39 ***	115.96 ***	252.88 ***	364.29 ***	20.94 ***	27.75 ***	7.17	26.03	60.95 **
PriceRatio×Foreign	-0.57 ***	-0.92 ***	-1.70 ***	-3.33 ***	-3.78 ***	0.09 **	0.09	0.62 ***	0.36 *	0.34
PriceRatio×Fund	-0.57 ***	-0.78 ***	-1.15 ***	-2.44 ***	-3.24 ***	-0.41 ***	-0.51 ***	0.02	0.17	0.12
PriceRatio×OtherInst	-0.73 ***	-0.90 ***	-1.16 ***	-2.52 ***	-3.64 ***	-0.21 ***	-0.28 ***	-0.07	-0.27	-0.63 **
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.26	0.29	0.15	0.12	0.05	0.11	0.12	0.05	0.05	0.07
Number of Obs.	872,788	872,788	872,788	872,788	872,788	2,367,871	2,367,871	2,367,871	2,367,871	2,367,871

A reexamination of the relationship between innovation and institutional ownership

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Abstract

This paper reexamines the effect of institutional ownership on corporate innovation. Using an updated sample, we confirm that higher institutional ownership leads to more innovations, including more citations received by patents of a firm, and higher patent generality and originality. Nevertheless, we find that the impact of institutional ownership on innovation greatly decreases after 2000, meaning that institutional investors reduce their strength of support for innovation. We conclude that institutional investors do not encourage innovation because of the higher costs of patents after 2000.

JEL classification: G23; G32; O31

Keywords: Institutional Ownership; Innovation; Patent; Patent Cost.

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1. Introduction

The finance literature views institutional investors as important in influencing managers to invest in innovation.[1] To a large extent, the high risk and long-term nature of innovation discourages managers from innovating. For example, myopic managers may cut R&D spending to boost current earnings (Porter 1992, Bushee 1998). Risk-adverse managers tend to avoid innovation because they could be fired merely due to bad luck in a risky investment (Aghion et al. 2013). To overcome this agency problem, institutional investors could monitor managers and encourage them to support innovation.[2] Institutional investors are sophisticated, with more information about innovation, and they generally are long-term investors. Accordingly, institutional investors could prevent managerial myopia (Bushee 1998). Further, Aghion et al. (2013) explain that institutional investors could motivate managers because of their option to sell their stakes if firms do not perform well. Therefore, institutional investors could encourage managers to engage in innovations, which are long-term investments, particularly since their (informed) trading conveys valuable information to outside investors.

However, studies such as that of Aghion et al. (2013) generally examine the relationship between institutional investors and innovation with data ending in year 2000 or earlier. The behavior of institutional investors and the costs of innovation have greatly changed after the tech bubble burst in early 2000. Griffin et al. (2011) find that institutional investors are major purchasers of technology stocks and substantially push the prices of these stocks up during 1997-2000, even they have noticed the overpricing of the stocks. Soon later, they quickly sell off their technology stocks right after mid-March 2000, causing the capital market to collapse. This trading activity of institutional investors obviously challenges the

[1] Baysinger et al. (1991), Eng and Shackell (2001), Hansen and Hill (1991), Hirshleifer and Chordia (1992) and Wahal and McConnell (1999) show a positive relationship between R&D expenditure and institutional investors. In addition to R&D, Aghion et al. (2013), Francis and Smith (1995), and He and Tian (2013) examine the relationship between institutional investors and other innovation proxies such as patent counts and patent citation.

[2] See Aghion et al. (2013), Bushee (1998), Edmans (2009), Eng and Shackell (2001) and Francis and Smith (1995). Francis and Smith (1995) also investigate the incentive contract and governance of institutional investors and suggest that the monitoring role from concentrated shareholders is more effective in inducing innovation whereas the incentive contract, which generally offers short-term compensation plans in diffusely-held firms, is less effective because of the free-rider problem.

monitoring role of institutional investors as drivers of innovation.[3] Moreover, Chordia et al. (2011) suggest that in recent years, the decrease in trading-related friction (such as improvements of trading technology and decreased commissions) causes the institutional investors to trade more actively and to trade on private information more effectively. Thus, the change in trading behaviors of institutional investors may alter their support for innovation.

In addition, patent costs are increasing in the most recent decade (Jaffe and Lerner 2004, Bessen et al. 2014). Innovations usually have spillover effects. Thus, legal protection (patents, for example) induces the firm to engage in innovation activity. However, patent litigation frequently occurs because patents cannot perfectly appropriate know-how and technologies. In the early 1990s, the Congress and U.S. Patent and Trademark Office (PTO) changed the patent law, which partly relaxed the patent examination (Jaffe and Lerner 2004). Accordingly, the number of patents granted increases after the procedural changes. As more patents are granted, patent litigation increases. Bessen et al. (2014) also find that the costs of patent litigation increase substantially since 1999 due to the increase in average cost of lawsuits and the growth in the number of lawsuits. Bessen et al. (2014) show that at the same time, patent benefits only increase modestly. Such findings indicate that the myriad of patent lawsuits may deter under-capitalized startups from innovating.

Therefore, we reexamine the relationship between institutional investors and innovation using an updated sample extended to 2008.[4] First, we study whether the positive relationship between innovation and institutional investors exists in the extended sample. Second, to understand whether the effect of institutional investors on innovation changes after the tech bubble bursts, we split the sample into two subperiods: 1990-2000 and 2001-2008. We divide the sample into two groups because most studies investigating the effect of institutional investors on innovation, including Aghion et al. (2013), Bushee (1998), and Eng and Shakell (2001), use a sample period that ends before 2000. Third, to capture other

[3] Grinffin et al. (2011) argue that their finding is consistent the model of Abreu and Brunnermeier (2003), which explains that a tech bubble persists because rational investors understand that the market will finally burst but meanwhile they want to ride the bubble as it continues to grow and generate high returns.

[4] We do not extend the sample period to more recent years due to the citation truncation problem of patents (Hall et al. 2001, 2005). We illustrate this issue in a later section.

aspects of innovation, we measure two patent citation-based measures: patent generality and patent originality. These two measures of patent quality are constructed by Trajtenberg et al. (1997). Patent generality represents the innovation versatility and patent originality proxies for innovation creativity. Finally, we present explanations of our findings on the change in the relationship between innovation and institutional ownership.

Using the updated sample, we find that institutional ownership is positively associated with patent citation, which is consistent with Aghion et al. (2013). This result is robust under the regression baseline model of Aghion et al. (2013), which includes capital-labor ratio, size of the firm, and R&D intensity as control variables, and other augmented regression models.[5] In addition, we find that institutional investors help to increase the patent quality by using both patent generality and originality. Most importantly, we split our sample into subperiods of before and after the tech bubble burst, and find that the effect of institutional ownership on patent citations largely decreases and becomes less significant after 2000. In the baseline model, the regression coefficient using the subsample after 2000 is about one-third of the regression coefficient of the subsample before 2000. The effect of institutional ownership on patent citations even vanishes in 2008. In the subperiod tests, patent generality and originality remain consistent where the effect of institutional ownership on patent quality largely decreases after 2000.

We offer two explanations for the attenuated impact of institutional ownership after 2000. First, we consider the role of institutional investors. Different types of institution ownership have different incentives to monitor firm spending on innovation (Aghion et al. 2013, Bushee 1998, Edmans 2009, Eng and Shackell 2001, He and Tian 2013). For example, Bushee (1998) finds that managers in firms with more transient institutional investors, who trade stocks frequently and hold small stakes in numerous firms, are likely to cut R&D investment to meet expected near-term earnings. Aghion et al. (2013) find that dedicated institutional investors, who hold large stakes in a limited number of firms, promote more innovation than non-dedicated institutional investors. In addition, Callen and Fang (2013) find that the

[5] For the robust check, we also input firm age, market-to-book ratio, Herfindahl-Hirschman index, entrenchment index (E-index) constructed by Bebchuk et al. (2009), industry effect, and year effect as the control variables in the augmented regressions.

positive effect of dedicated institutional investors on the stock price is weaker in the period of 1996-2008 than the period of 1984-1995, and the impact of transient institutional ownership on stock price becomes more negative during the period of 1996-2008. Thus, we conjecture that the weaker effect of institutional investors on the innovation after 2000 may result from the change in institutional ownership over time.

Second, we conjecture that the patent cost substantially increases since 1999 and accordingly the impact of institutional investors on innovation weakens. A firm could apply for patents in attempt to protect its technology, yet it is likely another firm infringes on such patents, leading to lawsuits. In addition, both Bessen and Meurer (2008) and Bessen et al. (2014) show that the private costs of U.S. patents exceeded the private benefits of patents in many industries in late 1990s. Further, the expansion of firm patents in the recent years increases the aggregate patent maintenance fee paid to the United States Patent and Trademark Office (USPTO). Therefore, the exorbitant patent costs may discourage institutional investors from supporting innovations.

We empirically test the two explanations given above. We follow Bushee (1998) and isolate transient institutional investors from other institutional investors. Bushee (2001) finds that transient institutional investors prefer short-term investments. Non-transient institutional investors (including dedicated institutional investors and quasi-indexers) hold diversified portfolios, have low turnover, and engage in long-term investments. Thus, we examine the effects of transient and non-transient institutional investors on innovation. We find that the impact of both transient and non-transient institutional investors on innovation declines and becomes less significant after 2000. This indicates that our results are not driven by a certain group of institutional investors.

Further, we use the patent cost estimated by Bessen et al. (2014) and examine how patent cost is related to the effect of institutional ownership on corporate innovation. We regress corporate innovation on institutional ownership every year, and then plot the regression slopes of institutional ownership in calendar years. The time-series trend of regression slopes is then compared with the aggregate patent costs. We find that the effect of institutional ownership on innovation gradually decreases as the patent cost increases. We also add the interaction term between the institutional ownership and aggregate patent

cost to the innovation regression, and find that the interaction term is significantly negative. These empirical results indicate that the impact of institutional ownership becomes lower when patents are more costly. Hence, the explanation of patent cost for the weaker effect of institutional investors in recent decade is supported.

Our paper contributes to the literature on the influence of institutional investors on innovation in the three ways. First, we examine whether institutional investors stimulate managers to engage in corporate innovation after the tech bubble crash. This reexamination is important because studies generally examine this issue using data ending before the internet bubble bursts. Second, we provide explanations for the weaker effect of institutional investors on innovation after the tech bubble crash. The higher patent cost appears to explain our findings. Third, most papers use patent citations to measure innovation quality and study the impact of institutional ownership. We further consider patent generality and patent originality since this captures different aspects of innovation quality.

2. Data and Summary Statistics

2.1. Data

Our sample consists of U.S. listed companies where these firms are covered in the Center for Research in Security Prices (CRSP) and Compustat files. We collect U.S. patent related data from European Patent Office (EPO) Worldwide Patent Statistical Database (PATSTAT, 2013 edition) because it is a more detailed and comprehensive database (Bena and Li 2014). Because of the citation truncation problem, in which later patents in a data set have fewer citations because they have not existed for a long time, we terminate our patent data in 2008. The institutional ownership data come from the Thomson-Reuters Institutional Holdings (13F) Database. Furthermore, to control for the possible influence of external governance on the innovation, we adopt the entrenchment index (*E-index*) constructed by Bebchuk et al. (2009). The detailed external governance information is retrieved from the *Investor Responsibility Research Center* (IRRC) publications. Finally, we start the sample from 1990

because the *E-index* data are available since 1990 and Aghion et al. (2013) start their sample from 1991. Our sample consists of 13,563 firm-year observations for 2,788 firms.

2.2. Institutional Ownership

This paper uses two ways to measure institutional ownership. First, we consider all types of institutional investor holding data.[6] We calculate *Institutional Ownership* (*IO*) as the proportion of a firm's aggregated institutional shares to its total outstanding shares.[7] The second way is to desegregate transient and non-transient institutional investors. We follow Bushee (1998, 2001) to divide all institutional investors into three groups: quasi-indexers, dedicated, and transient institutional investors. The monitoring effect of institutional investors takes place via long-term investment in firms. Thus, we calculate the percentage of shares held by transient institutional investors (*TIO*) and the percentage of shares held by non-transient institutional investors (*Non-TIO*), where the latter group includes dedicated institutional investors and quasi-indexers.

2.3. Patent Measures

We employ four measures of innovation activity: patent count, patent citation, patent generality and patent originality. First, patent count (*Count)* represents the number of patents applied for by a firm.[8] Patent count is often used to measure the quantity of innovation in the early literature, such as Griliches (1981).[9] To consider the quality of innovation, we use three other measures of patents.

[6] Upon Thomson-Reuters 13F Database, all institutional investors are divided into five types: banks, insurance companies, investment companies and their managers, investment advisors and all others. The fifth type, all others, includes pension funds, university endowments, and foundations.

[7] Specifically, for calculating *IO*, we merge the institutional shares of the fourth quarter with the total outstanding shares of the CRSP. In addition, we also construct blockholder ownership as alternative institutional ownership measure. Blockholder ownership is defined as the percentage of shares held by all institutional blockholders, who hold at least 5% of outstanding shares. The unreported results of this additional institutional ownership measure remain consistent.

[8] United States Patent and Trademark Office (USPTO) reports patent applications only for those patents that are eventually granted. Following Aghion et al. (2013), we identify the patent count and citation by the patent application year.

[9] Even the patent count cannot show the quality of innovation proxy, we also show its result in the Appendix Table

Second, we calculate the patent citations (*Citations*), which are the total numbers of citations received from all successful patents that are filed by a firm. Patent citations usually have the truncation problem in which later patents receive fewer citations because of their shorter time in existence. To prevent this problem, we adjust the truncation issue following Hall et al. (2001, 2005) to correct the number of citations received by each patent by the application year and technology classification. In addition, we also remove the latest five years of patent data to yield a larger time span to receive forward citations from the firm's patents. Our patent related data is retrieved from PATSTAT 2013 edition. Thus, we stop our patent data at 2008.

Further, we adopt two related indicators of patent citations, patent generality and patent originality, which are suggested in Trajtenberg et al. (1997). These two measures are widely used to understand the influence of patents in the finance literature (Hall et al. 2001, 2005, Hsu et al. 2014, Hsu et al. 2015, Wang and Zhao 2015). The patent generality (*Generality*) captures the extent to which the patent impacts follow-up technical advances across different technological fields. Following Trajtenberg et al. (1997), we calculate *Generality*, which is the range of fields in which the patent is cited by subsequent patents, based on the Herfindahl index of concentration. Specifically, *Generality* is

$$Generality_i = 1 - \sum_{j=1}^{J} \left(\frac{N_{ij}}{N_i} \right)^2, \quad (1)$$

where N_i is the number of forward citations of a patent i, and N_{ij} is the number received from other patents in the same class j (i.e. the same 3-digit international patent classification (IPC code)). A higher generality for a patent indicates that this patent has more influence on subsequent innovations.

Patent originality (*Originality*) captures the range of fields of antecedent patents cited by a patent. Following Trajtenberg et al. (1997), we use a similar formula to measure *Originality*. However, we use the number of previous patents cited by this patent to replace N_i and use the number of previous patents cited by this patent in the same class j to replace N_{ij}. A higher originality for a patent represents that this patent is less subject to a specific area and involves more original ideas. Thus, a firm with a higher patent

A1 as the robustness checks.

originality may be less vulnerable to patent lawsuits from its rivals.

2.4. Other Control Variables

This subsection illustrates other variables used in this paper. First, we control for several firm characteristics, including firm size, age, and the firm growth opportunity. *Size* is the firm size, which is defined as the market value of common equity. Firm age (*Age*) is estimated by the number of years included in the Compustat/CRSP database. This represents the life-cycle stage of a firm. We control for firm size and age because previous studies (e.g., Beckler-Blease 2011, He and Tian 2013) find that large firms and mature firms tend to receive more patent citations. In addition, we control market-to-book (*M/B*) ratio, which presents the investment growth opportunities of companies, because He and Tian (2013) show that firms with high growth opportunity have higher patent counts. *M/B* ratio is the market value of common equity divided by the book value of common equity for the year prior to the patent application year.

Second, we control for the related inputs for a firm's patents, which are viewed as innovation outputs. Following Aghion et al. (2013), we control for the capital-to-labor ratio (*K/L*), which is the capital expenditures divided by its number of employees for the year prior to the CRSP year. In addition, we follow Becker-Blease (2011) and Sapra et al. (2014) to include *R&D Intensity*, which is the research and development expenditures divided by total sales. *R&D Intensity* measures the efforts of the firm for technologies and innovative processes. The *R&D Intensity* is the ex-ante measure of innovation and thus directly influences the patent counts and patent citations, which are ex-post measures of innovation.

Third, we control for the industry competition effect as suggested in previous studies including Becker-Blease (2011), He and Tian (2013) and Aghion et al. (2013). Industry competition is proxied by *HH Index* (Herfindahl-Hirschman index), which is the sum of the squared fraction of industry sales by all firms in the four-digit SIC industry for the year prior to the patent application year. Aghion et al. (2013) and Becker-Blease (2011) show that firms in more competitive markets have greater incentive to

innovate.

Finally, we control for the external governance because Becker-Blease (2011), and O'Connor and Rafferty (2012) show a significant impact of external governance on innovation. Cremers and Nair (2005) suggest that governance mechanisms include two components: internal governance from institutional investors and external governance via takeovers for corporate control. The entrenchment index, *E-index*, constructed by Bebchuk et al. (2009), and *G-index* constructed by Gompers et al. (2003) are two major measures of external governance. In this paper, we use *E-index* rather than *G-index* because Bebchuk et al. (2009) and Hsu et al. (2015) suggest that *E-index*, which only considers six provisions in *G-index*, is more relevant to the firm valuation, abnormal return, and shareholder valuation.[10] The *E-index* is the sum of six unique governance provisions, including staggered boards, limits to amend bylaws, limits to amend charter, supermajority requirements for mergers and for charter amendments, poison pills, and golden parachute arrangements.

2.5. Summary Statistics

Table 1 presents the descriptive statistics where we show mean and median of variables, for full sample period and two subperiods: 1990-2000 and 2001-2008. We winsorize all variables at the top-bottom 1% in this table. We find that the average number of patents (*Counts*) increases after 2000, whereas forward citations (*Citations*) and the influence on different technological fields (*Generality*) both decrease. In addition, higher *Originality* after 2000 implies that more recent patents have higher quality due to their more original ideas. From this table, we conjecture that higher patent counts may be driven by two phenomena: (i) USPTO and Congress examine patent applications more loosely in recent years and (ii) firms spend more resource inputs on innovation (i.e. higher R&D intensity, and higher capital concentration (*K/L*)) after 2000. Further, comparing the mean and median of *Counts* and *Citations*, we find that more patents and their accompanying citations seem to be held by fewer companies. Finally, we

[10] We show the impact of *E-index* on innovation in our empirical result and use *G-index* as the robustness check. The unreported results of *G-index* show that our main arguments are quantitatively consistent.

find that these firms tend to become larger, more entrenched, have more institutional ownership, less growth opportunity, and less market competition after 2000.

[Insert Table 1 here]

3. The Influence of Institutional Ownership on Innovation Activity

This section explores the impact of institutional investors on the firm's innovations, including patent citations, generality, and originality. To examine whether this effect changes after the tech bubble, we reexamine our analyses for each subperiod: 1990-2000, and 2001-2008.

3.1. The Effect of Institutional Ownership on Patent Citations

Table 2 shows the patent citation regression using the sample from 1990 to 2000. We follow Becker-Blease (2011) and use the logarithm of one plus the patent citations, *ln(1+Citations)*, as the dependent variable to ameliorate the skewness in patent citations. In this analysis, we include year dummies and two-digit SIC industry dummies to control for potential effects of year-specific differences and some unobservable effects among industry characteristics. Following Aghion et al. (2013), we compute t-values by using firm-year two-way clustered standard errors. Because studies such as Hall et al. (2005), Miller (2006), Chin et al. (2006), and Aghion et al. (2013) argue that the patent citations tend to be a good measure of the quality of innovation, we show Table 2 as the primary result in this paper.

[Insert Table 2 here]

There are three models in Table 2. Model (1) is our baseline model. It uses control variables similar to those of Aghion et al. (2013). Model (2) additionally incorporates three control variables: *ln(Age), ln(M/B),* and *HH Index*. Finally, Model (3) considers the effect of external governance on innovation by including *E-index*, which measures the extent to which a firm is protected from takeovers.

We state the results of Table 2 as follows. First, the results of our baseline model, Model (1), are

similar to those of Aghion et al. (2013) where all coefficients of variables are positive and significant.[11] Second, coefficients of *ln(Size)* and *ln(R&D Intensity)* are positive and significant at the 1% confidence level. The coefficient on *ln(M/B)* is significantly negative. Namely, firms with larger size and greater R&D efforts are more likely to create more patent citations, a finding consistent with Aghion et al. (2013) and Becker-Blease (2011). In addition, firms with low growth opportunity or which are poorly managed (i.e. firms low with *M/B* ratio) tend to have greater incentive to seek innovations. This finding is consistent with Becker-Blease (2011). Third, the coefficients of the *IO* are positive and statistically significant at the 1% level in all three models. The positive effect of *IO* on innovation implies that institutional investors, who are generally long-term shareholding investors, help to prevent managers from engaging in short-term myopic investment and encourage managers to undertake innovative investment because this activity could increase long-run value. Therefore, after expanding the sample period to 2008, our paper supports the role of institutional ownership on innovation and remains consistent with Aghion et al. (2013), even though Aghion et al. (2013) ends their sample in 1999.

The external governance appears not to affect patent citations given that the coefficient of *E-index* in Model (3) is not significant. Previous studies do not have consistent findings on the effect of external governance on innovation. For example, O'Connor and Rafferty (2012) find that poor external governance of a firm decreases the innovation. However, Becker-Blease (2011) and Manso (2011) find that firms with high entrenchment (i.e. poor external governance) have higher incentive to engage in innovative activity because these firms have less likelihood of being acquired. We conjecture that our insignificant effect of *E-index* may be influenced by the interaction effect between external governance and internal governance. Thus, we incorporate this interaction term into the regressions. The unreported results show a significantly negative coefficient of this interaction term and indicate that firms with greater institutional ownership increase innovation when these firms have poorer external governance.[12]

[11] We also follow Aghion et al. (2013) and perform a Poisson regression for patent citations because citations are count-based data. The Poisson regression results are consistent with our main results.

[12] Cremers and Nair (2005) consider the interaction effect between internal and external governance on the stock return. They find firms with low entrenchment have higher stock returns when such firms have greater institutional

These results imply a complementarity effect between internal and external governance on innovation. Finally, after incorporating this interaction term, the unreported results also show a significantly positive coefficient of *IO*.

3.2. The Effect of Institutional Ownership on Patent Generality and Patent Originality

Table 3 examines the impact of institutional ownership on patent generality and patent originality. It shows the results of the regression analysis based on specifications similar to those of Table 2. In Table 3, Models (1) to (3) report the patent generality and Models (4) to (6) show the patent originality. First, in Table 3, all coefficients of *ln(Size)* are significantly negative, indicating that small firms are more likely to increase their patent generality and originality than large firms. By contrast, larger firms tend to generate more patent citations, as presented in Table 2. This result implies that the patents of smaller firms are likely to have greater versatility for the future innovation and are embedded with more original ideas. In addition, all coefficients of *IO* are positive and significant at the 10% level or better. Nevertheless, the relationship between *IO* and patent generality appears to be weaker than the relationship between *IO* and originality. This is likely because more generalized patents are beneficial to other firms whereas patents with higher originality reduce the chance that the firm may infringe on other patents and be sued. In sum, we find that higher institutional holdings increase managers' intention to innovate, as measured by patent citations, patent generality, and patent originality.

[Insert Table 3 here]

3.3. Some Robustness Checks and Endogeneity

This subsection presents a series of robustness checks to comprehensively verify the positive relationship between innovation output and *IO*. First, we examine the effect of patent counts because most earlier studies such as those of Griliches (1981) and Hall (1993) use the quantity of patents to serve as the

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ownership.

measure of innovation. Appendix Table A1 shows the results of the patent counts using models similar to those in Table 2. The coefficients of *ln(Size)*, *ln(R&D Intensity)*, and *ln(M/B)* are significant and are also consistent with the result of patent citations. The influence of *IO* on the patent counts is positive but becomes weaker than patent citations.[13] This result tends to support previous studies which show that patent counts are less informative than patent citations, such as Hsu (2009), Becker-Blease (2011) and Hirshleifer et al. (2013).

Second, we consider that *IO* may influence the subsequent near-term patent citations. The main result of Table 2 is the regression of *annual IO* on *annual* patent citations at the same year, which is the concept of patent flow. We use patent flow because Hall et al. (2005) demonstrate that patent stock provides less useful information on firm value than patent flow. However, to consider the effect on the possible patent stock, we also construct cumulative patent citations with a three-year horizon. We find that not only does institutional ownership have a significantly positive influence on cumulative patent citations, but also the coefficients of all control variables show consistent results.

The third robustness check is to exclude self-citations from patent citations. Self-citation refers to the inventor's citation from the antecedent inventions patented by the same inventor. Jaffe et al. (1993), Jaffe and Trajtenberg (2002), and Hall et al. (2005) suggest that self-citations and external citations have different informative content. For example, Hall et al. (2005) suggest that self-citations represent internalized spillover levels of technology in a firm and find that self-citations have a more positive effect on a firm's market value than external citations. Specifically, self-citation is more valuable than external citation because high self-citation rates show that the firm has a strong competitive position in a particular technology. Thus, we exclude self-citations to observe whether the relationship between innovation and *IO* holds. We obtain consistent results with Table 2.[14] The coefficients on *IO* range from 0.2345 to 0.3637, which are only about half of the figures for Models (1) to (3) in Table 2. Moreover, we construct

[13] We use the patent counts of firms adjusted by IPC median as the dependent variable and re-implement Models (1) to (3) of Appendix Table A1. Results are similar.

[14] We also examine the alternative situation and regress the self-citations of patents on *IO.* Results are quantitatively similar.

cumulative external citations with a three year horizon, and find that institutional ownership has a significantly positive influence on external patent stocks and that the coefficients of all control variables have consistent results.

The fourth robustness check is related to lagged innovation. It is common to use lagged innovation as the dependent variable since the innovation process takes time. Thus, we relate all control variables in year *t* to patent citations in year *t+1*. The results show a positive and significant impact of *IO* on lagged patent citations. We find that all coefficients are similar to those in Table 2 and results are consistent. Furthermore, we follow Hsu et al. (2014) and consider two- to three-year lagged patent citations. We relate all control variables in year *t* to patent citations in year *t+2* and in year *t+3*. The results remain unchanged.

The fifth robustness check is to consider the grant date of the patent. There is a gap of several years between the patent application date and the publication (or grant) date. Following most previous studies (Aghion et al. 2013, Becker-Blease 2011), our empirical analyses use patent application date as the patent case. However, when we use patent publication year to identify the year the patent was obtained, our findings are similar.

We use two active shareholders to measure the extent of internal governance mechanism as the sixth robust check. The first proxy is the percentage of shares held by all institutional blockholders, who are institutional investors holding at least 5% of all outstanding shares. Blockholders have more voting rights and can put pressure on managers (Shleifer and Vishny 1986, Cremers and Nair 2005). Thus, they could substantially increase the incentive to innovate. Our main results are robust to Table 2. The second proxy is the percentage of share ownership held by the group of public pension funds. Public pension funds can improve some of the asymmetric information problems related to R&D (Hall and Lerner 2009, Chemmanur and Tian, 2011), reducing conflicts of interest between managers and shareholders (Del Guercio and Hawkins 1999). We also obtain results from this proxy of internal governance consistent with our previous results.

The last robustness check concerns our external governance mechanism related to managerial

entrenchment. Both *E-index* and *G-index* measure how managers can be protected and are regarded as an external governance mechanism. We use the *G-index* of Gompers et al. (2003), which represents CEO power as the sum of up to 24 unique provisions, to replace the *E-index*. In the new setting, the coefficient of *IO* is 0.5751, statistically significant at the 1% level. It approximates the coefficient of *IO* in Model 3 of Table 2. The influence of external governance using *G-index* is not significant, as in Table 2. In sum, the results of all robustness checks are consistent with our main finding that *IO* greatly influences innovation activity.

For the endogeneity issues, we follow Aghion et al. (2013) by using the inclusion of a firm in the S&P 500 as the instrumental variables for the *IO*. Conceptually, when a firm is added to the S&P500 index, institutional investors tend to hold the stock for hedging purposes. Moreover, addition to the S&P 500 is not likely to have an impact on innovative activity. Hence, addition to the S&P500 could be an appropriate instrumental variable. Following Aghion et al. (2013), we also perform a two-stage least squares estimation using addition to the S&P 500 as the instrumental variables. In unreported results, we find that *IO* positively affects the patent citations of a firm in our updated sample. Further, the finding that *IO* increases patent generality and originality still holds after controlling for endogeneity via the two-stage least squares estimation.

3.4. Subperiod Analysis for Effects of Institutional Ownership on Innovation

This subsection investigates how the effect of institutional ownership on innovation activity changes over time. We split the sample period into two periods: 1990-2000 and 2001-2008, for the following reasons. First, the tech bubble bursts in early 2000. Second, Chordia et al. (2011) and Chordia et al. (2014) show that institutional investors trade more actively due to reduction of trading-related friction in recent years. Third, Bessen et al. (2014) find that patent costs and patent litigation dramatically increase since 1999. Finally, Aghion et al. (2013) stop their sample at 1999. Thus, 2000 is a natural cut off for the extended sample.

Table 4 shows the subperiod results of the regression for patent citations. First, the coefficients of *ln(Size)* and *ln(R&D)* are still significantly positive after 2000. However, the influence of *ln(M/B)* becomes less significant after 2000. More importantly, in the baseline of Model (1), the coefficient of *IO* before 2000 is 0.7466, which is larger and more significant than in Table 2. By contrast, the slope of *IO* after 2000 becomes only 0.285, which is significant at the 5% confidence level. The statistical significance is weakened, while the economic significance falls to almost one-third of its level before the year 2000. We also test the *IO* coefficient difference between the two subperiods. The Wald statistic is 4.15, which is significant at the 5% level. Furthermore, after including three control variables: *ln(Age), ln(M/B),* and *HH Index* in Model (2), the coefficient of *IO* before 2000 is also larger and more significant than the coefficient of *IO* after 2000. Finally, after adding the *E-index* in Model (3), the slope of *IO* before 2000 is quite significant. However, it is not significant after 2000.[15]

[Insert Table 4 here]

We also replicate our analyses of Table 3 for each subperiod. Table 5 shows the results for patent generality and originality in the subsample analysis. The coefficients of *IO* before 2000 are respective 0.0291, 0.0317, and 0.0455, in Models (1) to (3), and they are significant at the 5% confidence level or better. By contrast, the coefficients after 2000 are all not significant at 0.0008, 0.0028, and -0.0027 in Models (1) to (3), respectively. In addition, all coefficients of *IO* before 2000 are positive and significant in Models (1) to (3). However, the effects of *IO* after 2000 all disappear. Similarly, in patent originality, Models (4) to (6) show significantly positive coefficients of *IO* before 2000 but the coefficients of *IO* are not significant after 2000.

[Insert Table 5 here]

To sum up this subsection, the effect of institutional ownership on patent citations is much weaker after 2000. The effect of institutional ownership after 2000 is about half or even one-third of that before 2000. In addition, the effects of institutional ownership on patent generality and originality disappear after

[15] When we adopt cumulative patent citations, use lagged patent citations, or exclude self-citations from patent measure, as in the previous section, the effect of institutional ownership on patent citations also decreases after 2000.

2000. Why does the institutional ownership effect become weaker after 2000? We discuss this issue in next section.

4. Why Does the Effect of Institutional Ownership on Innovation Decrease After 2000?

This section considers why the effect of institutional ownership becomes weaker after 2000. We propose two explanations. First, we conjecture that this change may be driven by certain groups of institutional investors because investment behavior varies across different types of institutional investors. Second, changes in patent cost may explain our findings because the patent cost becomes exorbitant after 2000.

4.1. Different Types of Institutional Ownerships

The shareholding periods vary across different types of institutional investors. In general, transient institutional investors hold shares for the short-term, while dedicated institutional investors and quasi-indexers, who possess diversified portfolios with low turnover, hold shares for the long-term (Bushee 2001). These different holding horizons may cause institutional investors to have different expectations about innovations. Bushee (2001) finds the firms with more transient institutional ownership cut more R&D investment to reach the earnings goals. In addition, in recent years, the influence of different types of institutional ownerships changes. Callen and Fang (2013) find that the monitoring effect of dedicated institutional investors on stock price becomes weaker and the adverse effect of transient institutional ownerships on stock price is stronger in recent years. Thus, we conjecture our findings may be driven by the effects of certain groups of institutional ownership.

To examine this, we divide all institutional investors into two groups: transient institutional investors and non-transient institutional investors, which include dedicated institutional investors and quasi-indexers, because Bushee (2001) finds that the transient institutional investors appear

to discourage innovation. We use *TIO* and *Non-TIO* as the percentage of shares held by transient institutional investors and the percentage of shares held by non-transient institutional investors, for each firm. Next, we respectively regress patent citations, *ln(1+Citations)*, on the *TIO* and *Non-TIO* and show the results in Table 6. In this empirical result, the effects of *ln(Size)* and *ln(R&D Intensity)* and *ln(M/B)* on innovations remain consistent with Table 6. Further, before 2000, the effects of both transient and non-transient institutional investors on patent citations are significantly positive. However, after 2000, the effect of transient institutional investors disappears and the coefficients of non-transient institutional investors are less significant. Specifically, both groups have less influence on patent citations after 2000.[16] The findings given in Table 6 do not show which group is the main influence behind the decreases in overall institutional ownership effect on innovation. Therefore, the lower effect of institutional ownership on patent citations after 2000 is not driven by the influence of a certain group of institutional investors.

[Insert Table 6 here]

4.2. Patent Cost

Patents have become more expensive in the most recent decade. Bessen and Meurer (2008) find that patent costs exceed benefits in all industries, except chemical and pharmaceutical, at the end of the 1984 to 1999 period. Bessen et al. (2014) extend their data and find that the gap between patent cost and benefits is larger over time, especially after 1999. They discover that there is a sharp surge in patent litigation costs since 1999 because of increases in the number of lawsuits and the average unit cost of litigation. They also find that though patent costs increase over time, patent rents have not changed

[16] For a robustness check, we also follow Cremers and Nair (2005) and focus on the share held by public pension funds since they tend to be long-holders and good monitors of the firm. The unreported result for the impact of public pension funds is also lower after 2000.

significantly. Accordingly, we argue that the surge in patent costs could affect the effectiveness of *IO* on firm innovation after 1999.

To investigate this prediction, we perform the following analyses. First, we examine the relationship between patent costs and the effect of institutional ownership on innovations. We retrieve aggregate patent litigation costs from Bessen et al. (2014). The patent litigation costs, which are the minimum estimates of wealth lost from litigation for publicly listed firms, are related to lawsuit filing numbers and the success rate of patent owners on validity issues in patent lawsuits. Since the patent litigation costs are time-series data, we need the institutional ownership effect for each year. Specifically, for each calendar year, we estimate the coefficient of *IO* on patent citations using Model (1) in Table 2. Figure 1 shows the trends of the coefficients of *IO* and the patent litigation cost. These two variables appear to have opposite trends over time. As each year passes, there is a sharp decline in the *IO* effect along with a surge in patent costs, indicating that patent cost helps to explain the decreasing effect of *IOs* on innovation after 2000.

[Insert Figure 1 here]

Moreover, we add the patent cost and the interaction term between *IO* and patent cost to the regression analyses. Specifically, we use the more complicated regression setting of Model (3) by incorporating these two variables and respectively use three innovation proxies, patent citations, generality, and originality, as dependent variables.[17] We use the logarithm of aggregate patent litigation costs of Bessen et al. (2014), *ln(Patent Costs)*, as the proxy of patent cost.

Table 7 shows the regression results when considering patent costs. First, we find that higher patent costs lead to lower patent citations and patent generality, but greater patent originality. This result is consistent with the economic implications of higher patent cost, which encourage the firm to engage in the more original innovation to avoid lawsuits. Second, the coefficients of $IO \times ln(Patent\ Costs)$ are negative and statistically significant for patent citations, generality and originality, with statistical significance at the 5% confidence level or better. This shows *IO* has a weaker influence on innovation,

[17] We do not put year dummies in these regressions because the patent costs are time-series data.

when a firm has greater patent litigation costs. The first regression in Table 7 shows that the effect of institutional ownership on patent citations is equal to $28.1468 - 1.1671 \cdot \ln(Patent\ Costs)$. By this equation, we show that *IO* has a negative effect on patent citations when the patent cost is exceeds roughly 29,773 million. In Figure 1, patent costs are generally larger than 29,773 million after 2000, though 2003 is an obvious exception. Therefore, the patent costs help to explain the lower influence of institutional ownership on innovations after 2000. After 2000, institutional investors are more conservative in innovative activities when patent litigation costs are higher, and accordingly reduce their encouragement of innovation.

[Insert Table 7 here]

5. Conclusions

This paper reexamines the effect of institutional ownership on innovation because institutional investors may change their opinions of technology investment after the internet bubble bursts, and patents become more expensive. Our updated sample from 1990 to 2008 shows that institutional investors have a positive influence on patent citations. This result is also consistent with studies such as Aghion et al. (2013). In addition, higher institutional ownership also improves the patent generality and originality of a firm. Our finding still holds after robustness checks and after considering possible endogeneity issues.

We then divide the sample into 1990-2000 and 2001-2008 because most previous studies only target sample periods before the tech bubble crash. The empirical results show that, after 2000, the effect of institutional ownership on patent quality becomes less significant. Particularly, its effect on patent generality and originality disappears.

To understand why the effect of institutional ownership becomes weaker after 2000, we investigate two explanations. First, this change may be the result of institutional investor behavior. By examining the impact of transient and non-transient institutional ownership, we find that both groups have a lower influence on the patent citations after 2000. This finding cannot distinguish which group is the main result

to cause the change after 2000. Thus, this first explanation is not supported.

Second, we conjecture that the weaker effect of institutional ownership after 2000 may result from higher patent cost because the patent cost becomes exorbitant in recent years. We find that, as years passed, there was a sharp decline in the effect of institutional ownership along with the surge of patent costs. In addition, we find that the impact of institutional ownership is weaker when patents are more costly. Therefore, the change in patent cost is able to explain why institutional investors tend not to encourage managers to engage in innovation after the tech bubble bursts.

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Table 1 Descriptive Statistics

	Full sample		*Before 2000*		*After 2000*	
Variable	Mean	Median	Mean	Median	Mean	Median
Counts	32	4	28	4	38	5
Citations	333	34	432	56	140	10
Generality	0.1945	0.1520	0.2641	0.2494	0.0726	0.0000
Originality	0.2804	0.2665	0.2694	0.2543	0.2996	0.2906
Institutional Ownership	0.3566	0.3200	0.3028	0.2580	0.4329	0.4793
K/L	0.0547	0.0346	0.0481	0.0313	0.0647	0.0400
Size	3,713	342	2,458	223	5,920	589
R&D Intensity	0.9230	0.0827	0.9362	0.0766	1.1445	0.1049
Age	16.8350	12.0000	15.0020	10.0000	20.0710	15.0000
M/B Ratio	4.4001	2.5704	4.7353	2.5794	3.8688	2.5551
HH Index	0.3099	0.193	0.2946	0.1897	0.3366	0.2053
E-Index	2.1789	2.0000	2.0411	2.0000	2.3235	2.0000

Notes. This table presents the descriptive statistics for full sample period and two subperiods: 1990-2000 and 2001-2008. *Counts* are the number of patents applied for by a firm. *Citations* are the number of citations of patents applied for by a firm. *Generality* is the range of fields that a patent is cited by subsequent patents based on the Herfindahl index of concentration, which is the sum of squared ratio of forward-citations that belong to the same patent class divided by number of total forward citations. *Originality* captures the range of fields that a patent cites from antecedent patents based the similar formula by using the backward-references to replace forward-citations. *Institutional Ownership* is the percentage of shares held by institutional investors. *K/L* is the capital expenditures (in millions) divided by its number of employees (in thousands). *Size* is the market value of common equity (in millions). *R&D Intensity* is the R&D expenditures divided by sales. *Age* is the number of years since being included in the Compustat database. *M/B ratio* is the *Size* divided by book value of common equity. *HH Index* is the Herfindahl-Hirschman index, which is the sum of the squared fraction of industry sales by all firms in the four-digit SIC industry. *E-Index*, which is entrenchment index constructed by Bebchuk et al. (2009). All variables are winsorized at the top-bottom 1%.

Table 2 Patent Citations Regression

Variable	Model (1)	Model (2)	Model (3)
Intercept	2.8306	2.8510	1.2680
	(9.231)	(8.460)	(1.387)
Institutional Ownership	0.5169	0.4883	0.6025
	(3.643)	(3.358)	(2.802)
ln(K/L)	0.0816	0.0708	0.0732
	(1.886)	(1.583)	(0.804)
ln(Size)	0.4197	0.4400	0.5544
	(15.468)	(15.697)	(10.924)
ln(R&D Intensity)	0.1450	0.1549	0.2573
	(6.457)	(6.765)	(5.581)
ln(Age)		0.0368	-0.0517
		(0.880)	(-0.513)
ln(M/B)		-0.0866	-0.1490
		(-3.759)	(-2.613)
HH Index		-0.2349	-0.3258
		(-1.586)	(-1.385)
E-Index			-0.0008
			(-0.017)
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
N	13563	13108	5998
Adjusted R^2	0.369	0.372	0.428

Notes. This table presents regression analysis of patent citations. The dependent variable is *ln(*1+*Citations)*. *Institutional Ownership* is the percentage of shares held by institutional investors. Other independent variables are defined as in Table 1. We control for industry dummies (upon two-digit SIC code) and year dummies in each regression. Numbers in the parentheses are t-values where t-values are computed by firm-year two-way clustered standard errors of Petersen (2009) and Thompson (2011).

Table 3 Patent Generality and Originality Regressions

Dependent Variable	Patent Generality			Patent Originality		
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Intercept	0.3517	0.3505	0.3757	0.4111	0.3992	0.3305
	(8.590)	(8.421)	(9.274)	(7.827)	(7.396)	(11.000)
Institutional Ownership	0.0162	0.0181	0.0166	0.0226	0.0212	0.0316
	(2.450)	(2.505)	(1.947)	(2.784)	(2.471)	(2.998)
ln(K/L)	-0.0010	-0.0014	-0.0020	0.0023	0.0020	0.0064
	(-0.493)	(-0.677)	(-0.745)	(0.828)	(0.684)	(1.294)
ln(Size)	-0.0067	-0.0062	-0.0055	-0.0101	-0.0097	-0.0098
	(-4.570)	(-4.330)	(-3.018)	(-8.227)	(-6.962)	(-4.150)
ln(R&D Intensity)	-0.0017	-0.0022	0.0013	-0.0051	-0.0048	-0.0042
	(-1.320)	(-1.599)	(0.685)	(-3.329)	(-2.843)	(-1.407)
ln(Age)		-0.0033	-0.0051		-0.0008	-0.0017
		(-1.559)	(-1.248)		(-0.330)	(-0.340)
ln(M/B)		-0.0008	0.0025		-0.0015	0.0010
		(-0.378)	(1.056)		(-0.776)	(0.304)
HH Index		0.0010	0.0050		0.0153	0.0161
		(0.131)	(0.577)		(1.555)	(1.308)
E-Index			-0.0035			-0.0020
			(-2.210)			(-0.846)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	13563	13108	5998	13563	13108	5998
Adjusted R^2	0.314	0.315	0.436	0.064	0.065	0.079

Notes. This table presents regression analyses of patent generality and originality. The dependent variable of Models (1) to (3) is *ln(1+Generality)*, and the dependent variable of Models (4) to (6) is *ln(1+Originality)*. *Generality* and *Originality* are defined in Table 1. *Institutional Ownership* is the percentage of shares held by institutional investors. Other independent variables are defined as in Table 1. We control for industry dummies (upon two-digit SIC code) and year dummies in each regression. Numbers in the parentheses are t-values where t-values are computed by firm-year two-way clustered standard errors of Petersen (2009) and Thompson (2011).

Table 4 Patent Citations Regression - Subperiod Analysis

	Model (1)		Model (2)		Model (3)	
Dependent Variable	*Before 2000*	*After 2000*	*Before 2000*	*After 2000*	*Before 2000*	*After 2000*
Intercept	2.7522	0.8997	2.7286	0.8413	0.8467	0.7396
	(8.405)	(2.802)	(7.579)	(2.361)	(0.702)	(1.372)
Institutional Ownership	0.7466	0.2850	0.6972	0.2618	1.0180	0.2499
	(3.976)	(2.071)	(3.602)	(1.822)	(3.456)	(1.317)
ln(K/L)	0.0531	0.1218	0.0374	0.1202	-0.0271	0.1375
	(1.117)	(2.086)	(0.745)	(2.055)	(-0.224)	(1.573)
ln(Size)	0.4134	0.4237	0.4411	0.4293	0.6482	0.4747
	(14.191)	(11.152)	(14.184)	(11.172)	(9.867)	(8.918)
ln(R&D Intensity)	0.1625	0.1143	0.1777	0.1125	0.3098	0.2060
	(5.883)	(4.609)	(6.477)	(4.779)	(4.694)	(4.671)
ln(Age)			0.0245	0.0889	-0.1562	0.1024
			(0.608)	(1.123)	(-1.397)	(0.903)
ln(M/B)			-0.0995	-0.0634	-0.3129	-0.0639
			(-3.370)	(-2.061)	(-3.747)	(-1.233)
HH Index			-0.1862	-0.4208	-0.4474	-0.3378
			(-1.084)	(-1.885)	(-1.594)	(-1.004)
E-Index					0.0029	0.0001
					(0.049)	(0.000)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	8626	4937	8329	4779	3130	2868
Adjusted R^2	0.230	0.404	0.236	0.406	0.262	0.434

Notes. This table presents regression analyses of patent citations for two subperiods: 1990-2000 and 2001-2008. The dependent variable is *ln(*1+*Citations)*. *Institutional Ownership* is the percentage of shares held by institutional investors. Other independent variables are defined as in Table 1. We control for industry dummies (upon two-digit SIC code) and year dummies in each regression. Numbers in the parentheses are t-values where t-values are computed by firm-year two-way clustered standard errors of Petersen (2009) and Thompson (2011).

Table 5 Patent Generality and Originality Regressions- Subperiod Analysis

Dependent Variable	Patent generality						Patent originality					
	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)		Model (6)	
	Before 2000	*After 2000*	*Before 2000*	*After 2000*	*Before 2000*	*After 2000*	*Before 2000*	*After 2000*	*Before 2000*	*After 2000*	*Before 2000*	*After 2000*
Intercept	0.3590	0.1146	0.3525	0.1233	0.3722	0.1599	0.4034	0.2626	0.3936	0.2555	0.2739	0.3230
	(9.516)	(8.249)	(8.948)	(8.903)	(6.161)	(9.359)	(7.581)	(8.898)	(7.271)	(8.298)	(5.813)	(6.243)
Institutional Ownership	0.0291	0.0008	0.0317	0.0028	0.0455	-0.0027	0.0322	0.0119	0.0334	0.0089	0.0490	0.0199
	(2.651)	(0.211)	(2.570)	(0.653)	(3.072)	(-0.659)	(2.607)	(1.474)	(2.600)	(1.066)	(3.413)	(1.523)
ln(K/L)	-0.0012	-0.0016	-0.0016	-0.0014	-0.0062	0.0014	0.0008	0.0045	-0.0005	0.0058	-0.0014	0.0120
	(-0.374)	(-0.858)	(-0.530)	(-0.791)	(-1.402)	(0.740)	(0.260)	(1.037)	(-0.147)	(1.304)	(-0.231)	(1.889)
ln(Size)	-0.0104	-0.0003	-0.0098	-0.0004	-0.0076	-0.0027	-0.0113	-0.0083	-0.0098	-0.0091	-0.0065	-0.0115
	(-7.160)	(-0.338)	(-6.325)	(-0.491)	(-2.685)	(-1.571)	(-9.547)	(-3.940)	(-7.415)	(-3.565)	(-2.172)	(-3.963)
ln(R&D Intensity)	-0.0034	0.0020	-0.0038	0.0014	-0.0001	0.0019	-0.0074	-0.0008	-0.0073	0.0001	-0.0058	-0.0026
	(-2.024)	(3.124)	(-2.047)	(1.850)	(-0.033)	(1.375)	(-4.567)	(-0.420)	(-3.840)	(0.048)	(-1.590)	(-0.638)
ln(Age)			-0.0048	-0.0032	-0.0088	-0.0013			-0.0036	0.0042	-0.0039	0.0001
			(-1.969)	(-0.883)	(-1.440)	(-0.269)			(-1.651)	(0.888)	(-0.730)	(0.013)
ln(M/B)			-0.0013	0.0021	0.0011	0.0049			-0.0041	0.0020	-0.0037	0.0031
			(-0.466)	(1.210)	(0.284)	(2.117)			(-1.853)	(0.754)	(-0.793)	(0.774)
HH Index			0.0117	-0.0020	0.0078	0.0043			0.0045	0.0432	0.0004	0.0431
			(1.117)	(-0.273)	(0.563)	(0.639)			(0.365)	(3.198)	(0.029)	(2.375)
E-Index					-0.0061	-0.0025					-0.0011	-0.0039
					(-2.605)	(-1.656)					(-0.359)	(-1.449)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	8626	4937	8329	4779	3130	2868	8626	4937	8329	4779	3130	2868
Adjusted R^2	0.082	0.257	0.082	0.258	0.112	0.352	0.066	0.059	0.066	0.063	0.076	0.075

Notes. This table presents regression analyses of patent generality and originality for two subperiods: 1990-2000 and 2001-2008. The dependent variable of Models (1) to (3) is *ln(1+Generality)*, and the dependent variable of Models (4) to (6) is *ln(1+Originality)*. *Generality* and *Originality* are defined in Table 1. *Institutional Ownership* is the percentage of shares held by institutional investors. Other independent variables are defined as in Table 1. We control for industry dummies (upon two-digit SIC code) and year dummies in each regression. Numbers in the parentheses are t-values where t-values are computed by firm-year two-way clustered standard errors of Petersen (2009) and Thompson (2011).

Table 6 Patent Citations Regression- Shares Held by Transient and Non-Transient Institutional Investors

Types	*Transient institutional investors*						*Non-transient institutional investors* (dedicated institutional investors and quasi-indexers)					
	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)		Model (6)	
	Before 2000	*After 2000*	*Before 2000*	*After 2000*	*Before 2000*	*After 2000*	*Before 2000*	*After 2000*	*Before 2000*	*After 2000*	*Before 2000*	*After 2000*
Intercept	2.7109	-1.5598	2.6405	-1.5696	0.8398	-1.4260	2.7484	-1.3058	2.7462	-1.2863	0.9081	-1.1546
	(8.420)	(-4.701)	(7.417)	(-3.777)	(0.705)	(-2.426)	(8.529)	(-3.729)	(7.723)	(-2.781)	(0.748)	(-1.830)
TIO (Transient Institutional Ownership)	0.9710	0.2686	0.9106	0.2812	1.6862	0.0968						
	(2.395)	(0.866)	(2.250)	(0.907)	(2.696)	(0.232)						
Non-TIO (Non-transient Institutional Ownership)							1.0648	0.4405	1.0109	0.3988	1.3532	0.4059
							(4.576)	(2.423)	(4.104)	(2.095)	(3.627)	(1.736)
ln(K/L)	0.0649	0.1290	0.0440	0.1267	-0.0055	0.1482	0.0509	0.1193	0.0362	0.1184	-0.0275	0.1366
	(1.373)	(2.156)	(0.869)	(2.113)	(-0.045)	(1.675)	(1.067)	(2.049)	(0.723)	(2.029)	(-0.227)	(1.559)
ln(Size)	0.4402	0.4377	0.4640	0.4402	0.6541	0.4764	0.4114	0.4227	0.4396	0.4292	0.6442	0.4762
	(15.622)	(11.346)	(15.718)	(11.377)	(10.069)	(8.871)	(14.370)	(11.236)	(14.468)	(11.252)	(9.777)	(8.983)
ln(R&D Intensity)	0.1444	0.1092	0.1710	0.1098	0.2986	0.2045	0.1681	0.1172	0.1795	0.1139	0.3129	0.2080
	(5.320)	(4.440)	(6.271)	(4.675)	(4.477)	(4.673)	(6.099)	(4.739)	(6.528)	(4.850)	(4.716)	(4.714)
ln(Age)			0.0551	0.1052	-0.1175	0.1279			0.0125	0.0820	-0.1723	0.0874
			(1.418)	(1.348)	(-1.067)	(1.142)			(0.301)	(1.036)	(-1.525)	(0.771)
ln(M/B)			-0.1165	-0.0678	-0.3314	-0.0619			-0.0940	-0.0610	-0.2982	-0.0634
			(-3.879)	(-2.220)	(-3.937)	(-1.189)			(-3.236)	(-1.963)	(-3.565)	(-1.207)
HH Index			-0.1645	-0.4269	-0.4079	-0.3390			-0.2022	-0.4245	-0.4573	-0.3411
			(-0.955)	(-1.898)	(-1.438)	(-1.009)			(-1.174)	(-1.889)	(-1.630)	(-1.004)
E-Index					0.0232	-0.0004					0.0015	-0.0013
					(0.386)	(-0.008)					(0.025)	(-0.029)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	8626	4929	8329	4771	3130	2860	8626	4929	8329	4771	3130	2860
Adjusted R^2	0.224	0.401	0.231	0.404	0.253	0.432	0.231	0.403	0.237	0.406	0.262	0.433

Notes. This table presents regression analyses of patent citations for two subperiods: 1990-2000 and 2001-2008. The dependent variable is *ln(1+ Citations)*. We follow Bushee (1998) to classify all institutional investors into "*Transient Institutions*", "*Dedicated institutions*", and "*Quasi-indexers*". We respectively calculate the percentage shares held by transient institutions (*TIO*) and the percentage shares held by non-transient institutional investors (*Non-TIO*), which include the dedicated institutional investors and quasi-indexers, for each firm. Models (1) to (3) are for *Transient Institutions*, and Models (4) to (6) are for Non-transient institutional investors. Other independent variables are defined as in Table 1. We control for industry dummies (upon two-digit SIC code) and year dummies in each regression. Numbers in the parentheses are t-values where t-values are computed by firm-year two-way clustered standard errors of Petersen (2009) and Thompson (2011).

Table 7 Patent Citations Regression- Role of Patent Cost

Dependent Variable	*ln(1+Citations)*	*ln(1+Generality)*	*ln(1+Originality)*
Intercept	18.6279	1.6251	-0.3249
	(2.856)	(4.552)	(-1.983)
Institutional Ownership	28.1468	1.3780	0.5486
	(4.609)	(4.223)	(2.174)
ln(K/L)	0.1047	-0.0007	0.0074
	(1.143)	(-0.228)	(1.537)
ln(Size)	0.5302	-0.0067	-0.0100
	(10.785)	(-3.177)	(-4.225)
ln(R&D Intensity)	0.1992	-0.0027	-0.0039
	(4.226)	(-1.349)	(-1.262)
ln(Age)	-0.1166	-0.0055	-0.0010
	(-1.098)	(-1.326)	(-0.198)
ln(M/B)	0.0024	0.0110	0.0014
	(0.038)	(3.357)	(0.422)
HH Index	-0.3646	-0.0013	0.0148
	(-1.571)	(-0.144)	(1.199)
E-Index	-0.1064	-0.0074	-0.0013
	(-1.710)	(-3.151)	(-0.597)
ln(Patent Costs)	-0.7570	-0.0542	0.0305
	(-2.718)	(-3.421)	(4.548)
Institutional Ownership × ln(Patent Costs)	-1.1671	-0.0577	-0.0216
	(-4.534)	(-4.181)	(-2.040)
Industry dummies	Yes	Yes	Yes
Year dummies	No	No	No
N	5998	5998	5998
Adjusted R^2	0.331	0.330	0.069

Notes. This table presents regression analysis of patent citations. The dependent variable is *ln(*1+*Citations)*, *ln(1+Generality)*, and *ln(1+Originality)*, respectively. *Institutional Ownership* is the percentage of shares held by institutional investors. Other independent variables are defined as in Table 1. Patent Cost is the aggregate patent litigation costs from Bessen et al. (2014). We control for industry dummies (upon two-digit SIC code) in each regression. Numbers in the parentheses are t-values where t-values are computed by firm-year two-way clustered standard errors of Petersen (2009) and Thompson (2011).

Figure 1 Trend Analysis of Coefficients of Institutional Ownership and Patent Cost

Notes. This figure plots the trends of the coefficients of institutional ownership and patent cost. We use Model (1) of Table 2 to calculate the coefficient of institutional ownership on patent citations for each calendar year. We plot these annual coefficients as the sold line and the unit of the coefficients is indicated in the left vertical axis. Patent Cost, the dashed line, is the aggregate patent litigation costs from Bessen et al. (2014).

Appendix Table A1 Patent Counts Regression

Dependent Variable	Model (1)	Model (2)	Model (3)	Model (4)
Intercept	0.9434	0.7462	-1.1200	-0.6652
	(2.560)	(1.985)	(-2.082)	(-0.297)
Institutional Ownership	0.2682	0.1710	0.2351	11.8920
	(2.705)	(1.740)	(1.515)	(3.833)
ln(K/L)	0.1147	0.0989	0.1175	0.1388
	(3.767)	(3.166)	(1.700)	(1.901)
ln(Size)	0.3663	0.3751	0.4783	0.5161
	(16.574)	(17.004)	(11.924)	(12.331)
ln(R&D Intensity)	0.0590	0.0950	0.1659	0.1767
	(4.148)	(6.746)	(5.062)	(4.953)
ln(Age)		0.1472	0.1827	0.1590
		(4.838)	(2.397)	(1.919)
ln(M/B)		-0.1035	-0.1582	-0.1346
		(-4.786)	(-3.523)	(-2.911)
HH index		-0.0443	-0.1996	-0.2351
		(-0.420)	(-1.199)	(-1.313)
E-Index			0.0248	0.0031
			(0.718)	(0.081)
ln(Patent Costs)				-0.0650
				(-0.704)
IO × ln(Patent Costs)				-0.4896
				(-3.798)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	No
N	13563	13108	5998	5998
Adjusted R^2	0.390	0.406	0.357	0.331

Notes. This table presents regression analysis of patent count. The dependent variable is *ln(*1+ *Counts)*. *Institutional Ownership* is the percentage of shares held by institutional investors. Other independent variables are defined as in Table 1. We control for industry dummies (upon two-digit SIC code) and year dummies in each regression. Numbers in the parentheses are t-values where t-values are computed by firm-year two-way clustered standard errors of Petersen (2009) and Thompson (2011).

MONETARY POLICY AND FINANCIAL DOMINANCE

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ABSTRACT

Financial dominance is the situation of losing value of local currency unities against the international currency unities even though the interest rate has been increased in order to take the increasing inflation rate of a central bank under control.

In the countries where financial dominance is in the question, monetary policy cannot be used in order to take the inflation under control.

Financial dominance is a situation that the central banks applying the inflation targeting will never want to encounter.

The Central Banks and other monetary authorities accepting that the essential purpose of the Central Banks is to provide the price stability have been adopting different monetary policy regimes in order to realize this target .

Financial dominance has the meaning of preventing the transferring mechanism as required by wreaking the relationship between market interests and the short term interests determined by central banks for the public debts and therefore the decline of the effectiveness of monetary policy. Governments try to meet their budget deficits by borrowing from the financial markets exceeding the incomes expenditure.

Financial dominance states a situation that monetary policy becomes ineffective. The monetary policy is under the pressure of fiscal policy. The reason of this pressure is public deficits requiring continuity.

The country that has been exposed to financial dominance among the developing countries and has the feature of presenting a case study for us is Brazil. Brazil confronted with the problem of financial dominance between 2002-2003 year. It passed the 2015 year by recession and the recession conditions will continue quite likely in 2016. Growth forecast for 2015 year is -%3.4 and for 2016 is -%2.6.

This article discuss and give samples about this subject **.**

Keywords: financial dominance, inflation, monetary policy

JEL Classification:H 11 Structure, Scope, and Performance of Government**, G38 -** Government inflation, monetary policy, Policy and Regulation, **E31** Price Level • Inflation • Deflation

1.FINANCIAL DOMINANCE

Financial Dominance and Financial Discipline Concept: Financial dominance states a situation that monetary policy becomes ineffective. The monetary policy is under the pressure of fiscal policy. The reason of this pressure is public deficits requiring continuity. There are two ways on financing public debts: borrowing or coinage. It is thought that the financial of the public deficits will not cause inflation by borrowing but the deficits being financed by coining will cause inflation. However, Sargent and Wallace state that public deficits are inflation and even borrowing is more inflationary than monetization. This theory named as monetarist arithmetic being unpleasant claims that the reason of the inflation is not monetary widening, and the solution will not monetary precautions. This mechanism works in this way. When continuous public deficits are financed by borrowing, interests are getting increase. Even interest payments emerge by new borrowing. The moment that Lenders start to be worry about returning of debts, the only thing that the economy management can do is to coin money. In the inflation consisting in this situation, if the debts had been made monetisation since at the beginning, they would have been higher than the inflation to be consisted. (Sezgin 2015) Therefore, if there is financial dominance, fiscal policy will be effective , monetary policy will not. Another effective situation that fiscal policy will be effective is the approach of FTPL. This approach don't accept the viewpoint of "inflation is always and everywhere a monetary situation" and it states that the reason of the inflation is public deficits and debt stock stemming from deficit. (Uygur, 2001b:11)

According to the traditional transition mechanism, central banks aim at total claim conditions by changing short-term interests and thus affecting inflation (Kara vd. 2008:26) However, monetary policy is ineffective because of public deficits and debt stocks. Therefore, transition mechanism don't work, short-term interest rates can't be effective on inflation. Even, quite the contrary, there can even consist an additive effect .Because of an increase in inflation, monetary authority goes to interest rate hike. The interest rate hike will bring saving attractive. By abolishing demand increase causing inflation, the inflation will return its previous level. If the debt load of the public sector is high, it will increase the borrowing cost and will make borrowing difficult. Except creating debt capacity by coining for economy management and downgrading the debt level and borrowing cost by the inflation to be consisted, there will not be choice. In this situation, the interest increase will cause higher inflation contrast to what is expected.

The reason of why monetary policy has become ineffective, in other words, the reason of the financial dominance is that there is not financial discipline. In an economy that financial discipline is not found, debt stock will increase. In the existence of high debt and on-going public deficits, the cost of borrowing will increase since the worries related to maintainability of borrowing will increase , the cost of borrowing will increase. As it is seen, the most important effective in terms of financial dominance is financial discipline. While the lack of financial discipline causes financial dominance, the presence of the financial discipline is determinant on abolishing financial dominance. Financial situation is a frame that the things to be done are stated in order to make debt stocks sustainability being unmovable situation as a result of the intervenor state understanding, There are many things in this frame. It hosts different concepts from healing public service performance to increasing productivity of public sector, from decreasing expenditures to investing more noninterest, to providing maintability of noninterest borrowing. it is an anchor being applied commonly in the developing countries where the doubts related to reversibility of debtsare high, the cost of

borrowing is high, that have noninterest high debt stock, (Karakurt and Akdemir, 2010:246-247)

Financial dominance has the meaning of preventing the transferring mechanism as required by wreaking the relationship between market interests and the short term interests determined by central banks for the public debts and therefore the decline of the effectiveness of monetary policy. Governments try to meet their budget deficits by borrowing from the financial markets exceeding the incomes expenditure. However, this situation, in the countries where public debt is so high, causes transferring the most of the sources of giving debts in the financial markets to public and decreasing significantly the credit opportunity to be given to private sector. In such a situation, since the effectiveness of the transmission mechanism is lost for interest general level and credit market channel's directly, for expectation channel indirectly, the monetary policy doesn't become effective enough on demand and inflation. Therefore, providing financial discipline and having low financial dominance is a precondition for the inflation targeting regime to be successful.

It is used commonly as a performance criteria by IMF. Noninterest surplus is one of the methods developed for measuring and targeting analyticaly annual performances of public institutions. (Cansız, 2006:69) Beforehand, the economies having firstly a deficit constantly, they have increased debt stock. (İnan, 2003:19) Now, noninterest surplus should pay penance of these first sins. Reaching of debt stock to levels of unmovable have caused noninterest concept to gain importance. Noninterest is the rest of amount after taking out the primarily costs from budget incomes. (Tanner and Ramos, 2002:3) Noninterest is important for two views. The first is to give guarantee to debtees . While the debt load is much, the maintability of borrowing can be provided by firm fiscal policies and therefore, by noninterest surplus (Güdal, 2008:422) The function of noninterest surplus is the addition of a debt payment capacity over national rate of increase. Therefore, firstly the debt stock will be prevented, then debt stock will be decreased. Secondlyit provides the pressure over borrowing to be easy. (Heinemann and Winschel, 2001) Noninterest debt stock is important on decreasing debt stock and declining borrowing costs. However, it is not enough. Real interest rates and rate of growth are two important parameters. (Woodford, 1996:16-18) Creating additional source in order to pay interest decrease both the need of borrowing and real interests. Maintability borrowing means the rate of debt stock to national revenue to stay fix in long term.. (Ceylan. 2010:390) There are various variants affecting the perception of the maintability of debts. Growing of National income, debt stock of public, real interest and noninterest surplus are the fundamentals of them. (Ulusoy vd. 2006:9-10)

The inflation having important effects in all economic indicators are important in terms of sustainability of debt. (Motley, 1983:31)Noninterest can provide contribution to the sustainability of borrowing by declining the inflation down. In the analysis of sustainability of borrowing, the approach of interperiod borrowing constraint becomes prominent. This approach means that borrowing is not possible to sustain with new borrowing, what makes borrowing sustainability is noninterest surplus. (Aslan, 2009:229) Noninterest surplus reaches to its target provides the necessity of borrowing of public section, and quick decline of risk premium, and declining the effect of crowding-out and financial constraint of private section. (Özmen and Yalçın, 2007:8) there are a few things to be made to give noninterest surplus: increase income, decline non-interest expenditures or make realize both of them together. They are usual public income taxes. (Kelman, 1979:853)Therefore, income increase means the increase in the tax income. Because, in the developed countries, the 90,95% of all incomes are tax incomes.. (İlhan, 2007:2) In the stability programmes that especially developing countries carry out, incomes for once only by disposing public goods and business

in order to realize the targets in short-term have been provided, in this way, it is seen that the criteria of performance have been tried to made. (Aydoğdu, 2004:18) The most healthy way of increasing the tax incomes is to decline the tax leakage by spreading them to base, therefore, increase the tax revenue in healthy way. The first thing to be done in order to spread the tax to base is to prevent black economy. Black economy decrease the tax potential by narrowing the tax basis. (Lucinda and Arvate, 2005:16) Exceptions cause a similar effect to black economy (Saatçi, 2007:94)

2. FINANCIAL DOMINANCE AND MONETERY POLICY

Financial dominance is the situation of losing value of local currency unities against the international currency unities even though the interest rate has been increased in order to take the increasing inflation rate of a central bank under control. In the economies that financial dominance situation is not valid; making interest rate increase is resulted with gaining value of local currency unity. However, the international investors who evaluate the possibility of failure to service the public debt as high avoid from bearing the risk of the related country by thinking that the possibility of failure to service the public debt together with the increase of the interest rate has increased further. In other words, they use the portfolio choices for accomplishing capital outflows from the country that they have thought that it may bring the public debt not to be paid by increasing the interest rate and whose public debt is high. The process ends by not accomplishing it's any target of a central bank which tries to take the inflation rate under control and to increase the value of country's currency unit by increasing interest rate.
(Tunca 2017, http://ardatunca.blogspot.com.tr)

In the countries where financial dominance is in the question, monetary policy cannot be used in order to take the inflation under control. However, the monetary policy has lost its function by the reasons explained above. Under these conditions, the way of controlling the inflation and providing the price stability is to use the fiscal policies.

In an economy that financial dominance is valid; two factors determine the currency increase emerging by the interest increase: the level of possibility of public debt not to be serviced and the international investors' degree of avoiding the risk. The possibility and rating calculations related to both factors can be made according to mathematical and econometric models. At this point, the rate of country's debt to national income, the currency unit composition and expiry of the debt and the possibility of not servicing of the debt are important factors affecting the degree of risk avoidance of investors.
http://ardatunca.blogspot.com.tr

The possibility of emerging of financial dominance in the developed countries is low. After 2008 crisis, the rates of the public debts of the developed countries to national income have increased significantly. However, there is not a market perception like not paying their debts of these countries and no any central bank of developed country could not enter the interest increase process.

Financial dominance is a situation that the central banks applying the inflation targeting will never want to encounter. Besides, inflation targeting works sturdily in developed countries rather than developing countries due to the conditions to be successful..Therefore, it is not suitable and right for a country that may confront with the financial dominance risk to apply the inflation targeting through monetary policy.

The country that has been exposed to financial dominance among the developing countries and has the feature of presenting a case study for us is Brazil. Brazil confronted with the problem of financial dominance between 2002-2003 year. It passed the 2015 year by recession and the recession conditions will continue quite likely in 2016. Growth forecast for 2015 year is -%3.4 and for 2016 is -%2.6.

3. FINANCIAL DOMINANCE AND PRACTISES

While Brazil tried to pull the inflation rate to %4.5, the realization of 2015 year was %9.6.The rate of budget deficit to national income is at the level of %6 and the rate of public debt to national income is at the level of %34.3 as of November 2015.

The interest rate of 10-year government bonds of Brazil is around %15.9. Banco Central do Brasil has brought the policy interest rate (Selic) being %7.25 in October 2012 to the level of %14.25 as a final. The rate was 11.75% at the beginning of 2015. In other words, the policy interest was increased in 2015. However, Dolar/Real currency being at the value of 2.70 at this time last year is now at the level of 4.03.

Real has experienced a 49% loss in value in a year despite of the interest rate hike of the Central Bank and inflation has increased as it hasn't been taken under control. (Tunca 2017, http://ardatunca.blogspot.com.tr)

Concerning the rate of national income when compared with the European countries, the public debt of Brasil is not so high. However, an economical structure depending on natural resources including petrol is in the question and a decline in global commodity prices has been being happened. This situation keeps the economy of Brasil at the recession conditions and there is a political turmoil because of corruptions in the country. Under these conditions, the international investors see the risk of non-payment of public debt high and try to avoid the risk of Brasil.

4.INFLATION TARGETING

The policy of inflation targeting which is adopted by many countries as a main monetary policy. This framework necessitated credibility, accountability, transparency and independency of Central Banks in the design and practice of monetary policy and in this respect these prerequisites . (Büber, 2006 s.3)

The idea that inflation has been always and everywhere a monetary issue has monetary policies spread in order to provide price stability. As monetary policy providing the price stability, monetary targeting policy has been applied firstly in world economies. By the reason that the relationship of money amounts with prices has been weaken, while the monetary targeting policy is left, exchange rate targeting policies have been taken place. However, because of the extreme changes happening in the exchange rate, as soon as economic crisis becomes frequent, the directly targeting policy of inflation has started to be widespread. Financial dominance is a factor limiting the monetary policy. Because of the budget deficits lasting for long years, the debt stocks increasing have been limiting the monetary policy effectiveness, have been causing financial dominance. The policy interest being the main tool of monetary policy don't perform as stability provider, but perform the function of stability deteriorate because of the public debt stocks.

The Central Banks and other monetary authorities accepting that the essential purpose of the Central Banks is to provide the price stability have been adopting different monetary policy regimes in order to realize this target and have been applying .

First, at the beginning of the 1990s, some countries adopted the inflation targeting as the monetary policy regime. The main reason for the switch to inflation targeting in these countries is that there are a number of objectionable aspects of other monetary policy regimes. The inflation targeting as monetary policy strategy has spread from OECD countries integrated with small another world to many developing economies taken place in East Europe, Latin America and Asia. The first adopting inflation targeting country in 1990 is New Zealand. Canada has followed this country in 1991, England has followed this country in 1992, and Sweden and Australia have followed this country in 1993. The Finland and Spanish had accepted the inflation targeting before being the member of the Economic and Monetary Union . In the developing countries such as Besides, Chilli, Israel, Mexico and Brasil, the inflation targeting has been adopted and they have accepted to get through (Demirhan, 2002: 67).

5- THE PRECONDITIONS OF INFLATION TARGETING REGIME

In order to make the regime of inflation targeting apply and to be successful, it requires that some preconditions should be provided in economy. These preconditions:

1. Dependency on the price stability target firmly (focusing on target)
2. There is Independence, accountable and reliable a Central Bank
3. Having Strong and developed a financial markets
4. Low financial dominance
5. Providing technical infrastructure

6. CONCLUSION

In terms of monetary policy, the critical point is that there is no financial dominance. In an economy where there is financial dominance, monetary policy can not be effective in ensuring price stability. It can be said that even price stability will affect negatively. When the traditional transmission mechanism increases interest rates, demand will weaken and inflation will weaken. And when the interest rates decrease, the demand tends to revive and increase inflation.

The increase in interest has served not for price stability but for instability. Monetary policy seems to be ineffective even at a time when financial balances are in place. This shows us that financial dominance in the Turkish economy is structural. As stated in the fiscal theory of the price level, the price stability in the Turkish economy is determined by the public economy, the monetary policy should be coordinated with the fiscal policy, contrary to the expectation of monitoring the monetary policy independent of the fiscal policy

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A comparative study on UK banks and building societies around the global financial crisis

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Abstract

Global financial crisis affected mostly to all types of financial institutions. In the UK, for example, in 2008, one mortgage bank was fully nationalised and two other big retail banks were partly owned by the government. Another demutualised society was part nationalised. Mutual building societies were also affected and one building society was part nationalised. Two others, Britannia, second largest building society, merged with mutual bank and became part of the Co-operative banking group. Later on Co-operative bank itself went into problem and the Co-Operative Group no more owns the bank. Kent Reliance also struggled in the financial crisis and transferred its business to a new bank. Since the financial crisis, several building societies merged with other building societies. Main aim of these consolidations is to ensure their survival and overcome the financial problem faced during that period. This paper considers the comparative study of UK banks and building societies in the recent financial crisis. Paper thoroughly analyses operating behaviour of UK's banks and largest building societies around the banking crisis and also assesses the implication of crisis to different financial institutions. Particularly paper compares the behaviour of those banks which did not seek government help to those which were bailout by the government and those building societies which were either rescued or changed their form with those which continued around the financial crisis. The impact of crisis will be different because of their size, their business models and differences in flexibility in their operation. For example, it

was argued that building societies will have severe impact because of their reliance on retail funds particularly in a low interest rate environment. The paper also considers whether business models adopted by the financial institutions changed after the financial crisis. In addition increase in levies on financial services compensation scheme will also have more impact to particularly small building societies.

A Study of Stock Price Index in Taiwan Based on Text Sentiment Analysis

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ABSTRACT

Related issues of stock investment have always been quite concerned whether investors, investment experts or other people still hesitating to get into the stock market. Although we can speculate on the future trend from the historical pulsation of the stock market, relevant news still have some effects on the short-term stock market, but it has always been easily ignored by the public. With the development and popularization of community forum media, which has now become a tool most people use to browse and discuss. However, investors are not able to pay attention to the social media article information every day and turn it into an investment that can be used to make related decisions for investment. Therefore, based on the general technical index, this study uses different sentiment indicators to generate different forecasting model and input variable combinations in predicting the growth rate of the stock price index, including "technical index", "technical index + At", "technical indicators + Bt" and "technical index + At + Bt".

Finally, this study finds out the cost and gamma parameters for each input variable combination by the support vector regression model. After training and testing for the model, we found that adding two different sentiment indicators into the technical index can effectively reduce the error rate of prediction for the stock price growth rate. It is the best combination of model variables in this study.

Keywords: Social Media, Sentiment Analysis, Stock Market Index, TAIEX, Support Vector Regression

FRAUD AND POLITICAL CONNECTIONS – EVIDENCE FROM CHINA

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ABSTRACT

This study investigates the association of firms' political connections and their likelihood of involving in fraud. The extant literature has documented several motivations that induced firms to commit fraud, such as the need to comply with debt covenants (Church, McMillan, & Schneider, 2001) and the pressure to raise funds from the financial market (Dechow, Sloan, & Sweeney, 1996). The literature has also established that a firm's political connections could improve firms' performance by providing easier access to bank loans (Claessens, Feijen, & Laeven, 2008), lower cost of capital (Boubakri, Guedhami, Mishra, & Saffar, 2012), and greater likelihood of capturing government contracts (Goldman, Rocholl, & So, 2013). Therefore, the political connections are expected to reduce firms' pressures to report "better numbers" and thus restrict firms' motivations to engage in fraud. This prediction has not been empirically tested in the literature yet. Our study is one of the first few trying to address this issue. Consistent with our prediction, we find firms with at least one politically connected independent board director are less likely to engage in fraud. State-owned firms are also less likely to engage in fraud.

Keywords: Fraud, Political connections, State ownership

INTRODUCTION

This study investigates the association of firms' political connections and their likelihood of involving in fraud. The extant literature has documented several motivations that induced firms to commit fraud, such as the fear of unable to meet the financial analysts forecast (Yu, 2008), the need to comply with debt covenants (Church, McMillan, & Schneider, 2001) and the pressure to raise funds from the financial market (Dechow, Sloan, & Sweeney, 1996). The literature also has established that a firm's political connections could improve firms' performance by allowing the firm to expand to more markets (Luo, 2003), accessing capital more easily (Wu, Wu, & Liu, 2008), easier access to bank loans (Claessens, Feijen, & Laeven, 2008), lower cost of capital (Boubakri, Guedhami, Mishra, & Saffar, 2012), greater likelihood of capturing government contracts (Goldman, Rocholl, & So, 2013), and enhancing its monopoly status (Naughton, 2008). Therefore, the political connections are expected to reduce firms' pressures to report "better numbers" and thus restrict firms' motivations to engage in fraud. This prediction has not been empirically tested in the literature yet. Our study is one of the first few trying to address this issue.

Firms could gain political connections via many ways. Some firms are born with political connections because their majority shareholder is the government, such as the State-Owned Enterprises (SOEs) in China. Firms could also gain political connections via the political connections of their employees, such as CEOs and board of directors. Although firms could also establish political connections by making political contributions, this method of gaining political connections is riskier because there is no guarantee the politician who received the contribution would win in the election. We argue the political connections brought by ownership and employees are more stable and reliable. Therefore, we chose to study the Chinese contest which have a large number of SOEs as well as politically connected CEOs and board of directors.

We predict firms with state ownership (SOEs) are less likely to involve in fraud, because the political connections could bring many benefits to the firm, and the pressure to report better or fraudulent numbers is lower in SOEs. In addition, we also predict firms with at least one independent board of directors are less likely to engage in fraud for two reasons. First, similar to the state ownership, the political connections from independent directors would help the firm reduce the incentives for fraud. Second, one of independent directors' main duties is to monitor the management for the best interests of investors, therefore, independent board of directors will restrict firms' fraud activities.

Unlike independent directors, whose compensation is generally not related to firm performance, CEOs' compensation is commonly linked to firm performance. Some evidence in the literature shows that CEOs' equity compensation has influence on firms' fraud behaviors (Erickson, Hanlon, & Maydew, 2006; Johnson, Ryan, & Tian, 2009). CEOs' political connections might restrict firms' fraud, but this restriction may be limited because it could be cancelled out by the incentives related to compensation. Therefore, in this study, we do not predict the relationship between fraud and CEO's political connections.

To summarize, we have two hypotheses: first, firms with political connected board of directors are less likely to involve in fraud. Second, the firms with the government as

the majority shareholder is less likely to involve in fraud.

Hypothesis 1: The likelihood of a firm involving in fraud is negatively associated with the presence of political connected board of directors.

Hypothesis 2: The likelihood of a firm involving in fraud is negatively associated with firms' state ownership.

The next section of the paper describes our data and introduces our research methodology, which is followed by section 3 of descriptive results and section 4 of regression results. Section 5 concludes the paper and discusses the contribution of the study.

DATA AND RESEARCH DESIGN

Sample

Our sample starts with 400 firms included in two indexes—CSI SOE 200 and CSI POE 200 (privately owned enterprises) —for 13 years from 2003 to 2015 based on the index components of 2014. The 200 firms in CSI SOE 200 are the largest 200 state-owned firms among all the public A-share companies listed on the Shanghai or Shenzhen stock exchanges. A firm is defined as a SOE if the ultimate controller is the central or local government, and the government could control the firms via the State-owned Assets Supervision and Administration Commission of the State Council (SASAC), the parent company of the public firms, or other SOEs (Lin & Milhaupt, 2013). POEs are publicly-traded firms whose largest shareholder is not the government and the 200 firms in CSI POE 200 are this type of firms with largest market capitalization. Our sample consists of both SOEs and non-SOEs, which are arguably the largest and most important 400 firms in China.

Table 1: Sample Selection

Initial Sample (firm-year observations)	5,200
Deletions due to missing data for	
Prior IPO	-675
CEO's political connection	-848
Board's political connection	-50
Control variables	-555
Sample size	3,072

Politically connected independent boards of directors

We manually gathered information on independent board members from annual financial reports. We followed the prior research (Peng, Sun, & Markóczy, 2015) and recorded the political conncetions information from the Profile of Directors and Senior Managers sections in the annual reports. We collected the independent board members' names, background information, and the type (dependent vs. independent) from the annual reports. The type of independent director is clearly documented in the annual report. We defined a politically connected independent board members (PBOD) as a

dummy variable equal to 1 if at least one independent director sitting on the board is or was a member of the National People's Congress (NPC) or the Chinese People's Political Consultative Conference (CPPCC) and equal to 0 otherwise. We collected the CEO political background information following the same procedure. We defined a politically connected CEO (PCEO) as a dummy variable equal to 1 if at least the CEO is or was a member of the NPC or CPPCC and equal to 0 otherwise.
Our fraud data is retrieved from Shanghai or Shenzhen stock exchanges' disclosures. While all incidents that violated regulations are disclosed, we focused on fraud incidents, such as reporting fraudulent income, reporting fraudulent assets, containing material mistakes in the financial reports, and missing material information. We define a firm was involved in fraud in a given year if the firm is disclosed by Shanghai or Shenzhen Stock Exchanges that this firm violated regulations due to fraudulent behaviors in this year. Our dependent variable whether a firm-year observation engaged in fraud (Fraud) is a dummy variable in our study and equals to 1 if the firm was found to be involved in fraud in this year, and 0 otherwise.

We obtained financial-related data and market-related data from Capital IQ. The SOE information was obtained from the China Security Index website. The dummy variable SOE equals 1 if the firm is included in the CSI SOE 200 and equals 0 if the firm is included in the CSI POE 200.

Table 1 describes our data selection procedure. Of the 5,200 (400 firms x 13 years) firm–year observations, 675 went public after the initial sample year of 2003. Among the remaining observations, 898 were missing political connection information on CEOs and/or board members from their annual reports. We then merged the data with finance- and market-related data from Capital IQ. After we deleted cases with missing data, the final sample size consisted of 3,072 firm–year observations.

Regression Model
We test the likelihood of a firm engaged in fraud, and we use the logit model controlling for industry and years. We first include commonly used factors that signals the pressure or motivation for fraud in the regression model, including return on assets (ROA), financial leverage (LEV), market-to-book ratio (MTB), and net loss (LOSS). Then we include a few factors that may restrict firms' fraud behaviors, including firm size (SIZE) and CEO tenures (TENURE). Finally, we introduce the three factors of interest—politically connected CEO (PCEO), politically connected independent board members (PBOD) and state ownership (SOE)—to the regression model. Formally, the model used to test our two hypotheses is as follows:

$$Fraud_{it} = \beta_0 + \beta_1 PBOD_{i,t-1} + \beta_2 SOE_t + \beta_3 PCEO_{i,t-1} + \beta_4 SIZE_{i,t-1} + \beta_5 MTB_{i,t-1} + \beta_6 LEV_{i,t-1} + \beta_7 TENURE_{i,t-1} + \beta_8 ROA_{i,t-1} + \beta_9 LOSS_{i,t-1} + \beta\, Years + \beta\, Industries + \varepsilon$$

Where:
Fraud: a dummy variable that equals to 1 if the firm was reported by Shanghai or Shenzhen Stock Exchange to be involved in fraud in a given year, and 0 otherwise
PCEO: a dummy variable that takes the value of 1 if the CEO is or was an NPC or CPPCC member, and 0 otherwise
PBOD: a dummy variable that takes the value of 1 at least one independent director on board is or was an NPC or CPPCC member, and 0 otherwise

SOE: a dummy variable that takes the value of 1 if the company is included in the China Security Index (CSI) State-owned Enterprises 200 (Central SOE 200), and 0 if the company is included in the China Security Index (CSI) Private-owned Enterprises 200 (Central POE 200)
SIZE: the natural logarithm of total assets
MTB: calculated as the firm's market value divided by the firm's book value in this year
LEV: calculated as long-term debt at current year-end divided by book value of equity at current year-end
TENURE: the number of years that this CEO has been on this position
ROA: net income in the current year divided by the beginning balance of total assets
LOSS: a dummy variable that a firm reported a net loss

Hypothesis 1 predicts a negative relationship between fraud and the politically connected board of directors and Hypothesis 2 predicts a negative relationship between fraud and the state ownership. and negative β_1 and β_2 would support the first two hypotheses. We did not predict the sign of β_3 because of the competing theories, and it is not conclusive the politically connected CEOs will be more likely to involve in fraud or not.

DESCRIPTIVE RESULTS

Descriptive statistics

Table 2 reports the summary statistics for the variables. Panel A reports the descriptive statistics for the dependent variable *Fraud*. Panel B reports the descriptive statistics for the continuous variables (*ROA, MTB, LEV, TENURE and SIZE*). Panel C presents the descriptive statistics for the discrete variables (*PCEO, PBOD, SOE, and LOSS*).

Panel A indicates that 10% of the firm-year observations in our sample involved in fraud during our sample years. Panel B shows the average ROA of Chinese companies is about 8%, and the MTB ratio is 3.89. The mean LEV of 0.748 suggests a relatively high leverage rate in China. On average, CEOs serve four years in this position.

Panel C presents the descriptive statistics for PCEO, PBOD, SOE, and LOSS. Our data show that about 21% of independent board directors had political connections via NPC or CPPCC membership and that about 18% of the CEOs were NPC or CPPCC members, consistent with prior studies (Wu, Wu, Zhou, & Wu, 2012). SOEs and non-SOEs were almost evenly distributed in our sample. Only 5% of the firm-year observations reported a net loss during our sample period.

Our sample covers 13 years and is consisted of firms from 65 industries. In our regression, we control for both year and industry effects.

Table 2: Summary Statistics for Dependent and Independent Variables

Panel A: Dependent Variables				
Variable	Value	Percentage	Value	Percent
Fraud*it*	1	10.00%	0	90.00%

Panel B: Continuous Variables					
Variable	**Mean**	**Std Dev**	**25th**	**50th**	**75th**
$SIZE_{i,t-1}$	9.379	1.873	8.081	9.056	10.345
$ROA_{i,t-1}$	0.081	0.096	0.026	0.060	0.114
$TENURE_{i,t-1}$	4.293	3.272	2	3	6
$LEV_{i,t-1}$	0.748	2.376	0.149	0.446	0.924
$MTB_{i,t-1}$	3.888	7.419	1.674	2.736	4.792
Panel C: Discrete variables					
Variable	**Value**	**Percent**		**Value**	**Percent**
$PCEO_{i,t-1}$	1	18.31%		0	81.69%
$PBOD_{i,t-1}$	1	21.73%		0	78.27%
$LOSS_{i,t-1}$	1	4.80%		0	95.20%
SOE_i	1	55.69%		0	44.31%

Variable definitions

Dependent variable:

$Fraud_{it}$ = a dummy variable that equals to 1 if the firm was reported by Shanghai or Shenzhen Stock Exchange to be involved in fraud in a given year, and 0 otherwise;

Independent variables:

$SIZE_{it}$ = natural log of market value;

ROA_{it} = ROA calculated as the net income for firm i in year t divided by total assets for firm i in year t-1;

$TENURE_{it}$: the number of years that this CEO has been on this position

MTB_{it} = Market-to-book ratio calculated as the market value of common equity divided by book value of common equity at end of current year;

LEV_{it} = Leverage calculated as long-term debt at current year-end divided by book value of equity at current year-end;

Discrete variables:

$PBOD_{it}$ = The politically connected independent director is a dummy variable that equals to 1 if at least one independent director on board is or was a member of NPC or CPPCC, and equals to 0 otherwise;

$PCEO_{it}$ = The politically connected CEO is a dummy variable that equals to 1 if the CEO is or was a member of NPC or CPPCC, and equals to 0 otherwise;

SOE_i = SEO is a dummy variable that takes the value of 1 if the firm is included in the CSI SOE 200 index, and takes the value of 0 if the firm is included in the CSI POE 200 index;

$LOSS_{it}$ = a dummy variable that a firm reported a net loss.

Correlations

Table 3 presents the Pearson correlation matrix for dependent and independent variables. The correlation between Fraud and PBOD is negative and significant in 1 percent (untabulated), suggesting firms with politically connected independent directors are less likely to involve in fraud. The correlation between SOE and Fraud is also negative and significant, indicating firms controlled by government are less likely to be associated with fraud. Both of our hypotheses are support in the correlation table. However, the hypotheses must be tested in a multivariable regression after controlling

for other factors that impact firms' fraud behaviors. The correlation between Fraud and PCEO is negative but is insignificant (P-value=0.539).

The correlation between SIZE and SOE is high, which is not a surprise because SOEs are larger than non-SOEs in China. If we drop one of the two from the regression model, the results do not change qualitatively. Therefore, we keep both variables in our regression model. No other correlations are higher than 50%, suggesting no other significant multicollinearity concerns in this study.

Table 3: Variable Correlations

	Fraud	PBOD	PCEO	SOE
PBOD	-0.079	1.000		
PCEO	-0.010	0.064	1.000	
SOE	-0.121	0.208	-0.027	1.000
SIZE	-0.080	0.309	0.153	0.518
MTB	0.034	-0.109	-0.088	-0.159
LEV	0.064	-0.021	0.007	-0.004
TENURE	-0.009	0.018	0.194	-0.059
ROA	-0.058	-0.100	-0.039	-0.098
LOSS	0.069	-0.040	-0.055	-0.053

	SIZE	MTB	LEV	TENURE	ROA
MTB	-0.320	1.000			
LEV	0.058	-0.191	1.000		
TENURE	0.155	-0.025	-0.044	1.000	
ROA	-0.221	0.327	-0.248	0.040	1.000
LOSS	-0.118	0.053	0.169	-0.079	-0.138

EMPIRICAL RESULTS

We test our two hypotheses by using Logit Model. The regression results are presented in Table 4. We found Fraud is negatively associated with PBOD, and this association is significant in 5 percent level. Therefore, our Hypothesis 1 that firms with at least one politically connected independent board of director are less likely to be involved in fraud. We argue this is because the independent board directors' political connections help firms relax the pressure to report better numbers in financial reports. In addition, politically connected board members are probably monitoring the firms more closely. We also find that fraud is negative associated with SOE, and this relationship is significant in 1 percent. Our hypothesis 2 is supported by this finding. Similar to the political connections brought by independent directors, the state ownership also brings many benefits to the firms, such as lower tax rates and easier accesses to funds. Therefore, state-owned firms have less incentives to engage in fraud. The association between fraud and PCEO is negative but not significant. We speculate CEOs face multiple incentives: on the one hand, politically connected CEOs might be motivated

to engage in fraud to gain higher compensation, since a large percentage of compensation is based on firm performance; on the other hand, their pressure might be relaxed by their political connections. Due to the conflicted incentives, CEOs may take different actions making our results insignificant.

Fraud is positively and significantly associated with Leverage level (LEV). Firms with a higher leverage ratio is more likely to be exposed to debt covenants, therefore, they are more likely to commit fraud. There is a significant negative relationship between fraud and ROA. Firms with better performance have less incentives to engage in fraud. Fraud is also negatively associated with CEO tenure (TENURE). CEOs who are not engaged in fraud are probably staying in a firm for a longer time. SIZE and LOSS are significantly associated with Fraud, although only partially significant. Fraud is negatively associated with firm size. Larger firms may have more financial analysts following them (Bhushan, 1989) and their reputation costs are expected to be larger if they are found to commit fraud. Fraud is positively associated with LOSS, probably because firms with losses are more desperate and more likely to commit fraud.

Table 4: Test of Hypotheses

Dependent Variable: Fraud	Logit Model
PBOD (H1)	**-0.396**
	(2.18)*
SOE (H2)	**-0.552**
	(3.37)**
PCEO	0.126
	(0.76)
SIZE	-0.143
	(1.94)
MTB	-0.020
	(0.74)
LEV	2.140
	(5.03)**
TENURE	-0.039
	(1.97)*
ROA	-0.039
	(2.69)**
LOSS	0.490
	(1.88)
Intercept	0.650
	(0.84)
Industries	Included
Years	Included
Pseudo R2	0.114
N	3,072

* $p<0.05$; ** $p<0.01$

To test if our hypotheses are sensitive to the regression model we used, we re-test our hypotheses by using two other models: ordinary least squares (OLS) and probit model. The regression results are reported in Table 5. Overall, the results do not change

qualitatively. The two hypotheses are still supported after the models are changed. The coefficients of PCEO are still insignificant. The results for control variables are similar in Table 5 and Table 4. These results suggest our findings are robust and do not change based on different regression models.

Table 5: Robustness Tests

	OLS	Probit
PBOD (H1)	**-0.035**	**-0.221**
	(2.28)*	**(2.35)***
SOE (H2)	**-0.055**	**-0.287**
	(3.53)**	**(3.27)****
PCEO	0.007	0.090
	(0.42)	(1.00)
SIZE	-0.011	-0.084
	(1.69)	(2.13)*
MTB	-0.001	-0.010
	(0.34)	(0.73)
LEV	0.209	1.190
	(4.87)**	(5.11)**
TENURE	-0.004	-0.021
	(1.94)	(1.96)
ROA	-0.004	-0.017
	(2.71)**	(2.30)*
LOSS	0.064	0.288
	(2.09)*	(1.96)
Intercept	0.526	0.308
	(5.67)**	(0.69)
Industries	Included	Included
Years	Included	Included
R2/ Pseudo R2	0.09	0.114
N	3,072	3,072

* $p<0.05$; ** $p<0.01$

CONCLUSION

Our study investigates the association between fraud and firms' political connections. We find that a politically connected independent board of directors could reduce the likelihood of firms engaging in fraud. We also find SOEs are less likely to be engaged in fraud. Our findings suggest that political connections help improve firms' performance, reduce firms' financial reporting pressure, and therefore, they are less likely to commit fraud.

Our study's contributions to the literature and the practice are threefold. First, although the composition of board has been found to influence fraud, the political connections of board has not been studies yet. To the best of our knowledge, we are the first study to address this issue. We provide evidence to the literature that the political connections

of boards have influence on the chances of fraud. Second, our study provides a way to efficiently reduce firms' probability to engage in fraud. By adding one politically connected independent board director, the likelihood of firms involving in fraud will be significantly reduced. Third, while China has becoming the second largest economy entity in the world, the understanding of Chinese firms is still limited, especially SOEs. Our study contributes to the understanding of SOEs by investigating the association between fraud and the state ownership.

The limitation of our study is that we only test Chinese firms, and more evidences are needed to examine whether our findings can be extended to other countries, especially countries with fewer SOEs. We call for other studies to validate the findings by testing the hypotheses in other contexts.

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On the Importance of Text Analysis for Stock Price Prediction using Financial Report Approach

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Abstract

In recent years, with the development of the Internet of Things combined with open data, the technique of text-mining helps readers quickly find and analyze the most important information, which is considered an important field.

In the field of financial analysis, most of the past studies used financial data as the basis for analyzing the stock price of the company and predict the future development. With the development of technology and the improvement of the efficiency of processing high-dimensional data, data-mining is applied to financial statements. On the non-structural information, excavated more discoveries, and combined traditional data and non-structured textual data, analyzed relevant financial data, topical information and other factors by using machine learning.

Keywords: 10-K financial report, Text Mining Analysis, Latent Dirichlet Allocation