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CONTENTS

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EFFECTS OF INCREASED COMPETITION ON SMALL-SIZED AUDITORS IN TAIWAN: FIGHT OR FLIGHT?

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ABSTRACT

Taiwan established the Certified Public Bookkeepers Act to regulate tax agents in providing services to small and medium-sized enterprises in 2004. The Act enhances the capabilities of tax agents in competing business with auditors. Auditors face increased competition in rendering services to the same target clients as tax agents. What is the responding measure, fight or flight, for auditors? Based on both economic theory and business competitive strategy theory, this study investigates the effects of the Certified Public Bookkeepers Act in 2004 on small-sized auditors in Taiwan. Empirical results indicate that both businesses and operating performance of auditors are better after the regulation, consistent with the responding measure of fight. This study contributes knowledge to the literature and conveys managerial implication to the practitioners.

JEL: M41, L51

KEYWORDS: Tax Agents, Auditors, Proprietorship Public Accounting Firms, Operating Performance

INTRODUCTION

Both tax agents and auditors provided tax and accounting related services to small and medium-sized enterprises in Taiwan over the past six decades. Before 2004, auditors provided these services with a legal license, certified public accountants. But tax agents have no professional qualifications. This leads to an inferior situation for tax agents to compete the services with auditors. To establish a sound tax and accounting agency system, Taiwanese Ministry of Finance initiated a draft to regulate tax agents in 1987. Soon after announcement of the draft, tax agents held a parade to express their strong support of it. In contrast, auditors claimed that the approved businesses in the draft will result in over 80% business overlap between tax agents and auditors. Auditors also held a parade to express their deep concerns about the draft in the same year. After more than one decade of controversy, the Legislative Yuan in Taiwan passed the Certified Public Bookkeepers Act in 2004 (hereafter "the 2004 ACT"). The 2004 ACT entitles tax agents a legal professional designation, Certified Public Bookkeeper, and enhances their capabilities in soliciting and expanding businesses (Ma 2001).

Article 13 of the 2004 ACT stipulates that tax agents may provide the following services: (1) declarations and applications related to tax assessment, and tax-related consulting services; (2) corporate registrations related to business operations, changes, suspension, discontinuation and other registered matters; (3) accounting and bookkeeping. Because both tax agents and auditors can offer these services to the same target clients, small and medium-sized enterprises (SMEs), this study defines the services above as "common businesses".

Passage of the 2004 ACT directly enhanced the competitiveness of tax agents in serving common businesses. What are the effects of the 2004 ACT on auditors? What are the responding measures taken by auditors, fight or flight, to the new economic landscape? In economic theory, auditors will flight due to the inexpensive service fees charged by tax agents and easy accessibility by clients of tax agents. In terms of business competitive strategy, auditors will fight to survive by measures such as upgrading service quality or expansions of common businesses. Few researches examine the effects of increased competition from two conflicting theories. We reconcile both perspectives to fill the research gap, a motivation of this study.

According to the 2019 White Paper on Small and Medium Enterprises in Taiwan, SMEs account for 97.64% of Taiwanese enterprises in 2018 (Ministry of Economic Affairs, 2019). Examining the effects of the 2004 ACT on auditors is an issue worthy of exploration for both regulators and practitioners. In Taiwan, SMEs are served mainly by proprietorship public accounting firms and tax agents. Accordingly, this study defines auditors as proprietorship public accounting firms, a small-sized firm. To investigate the effects on auditors, this study defines the years before 2004 as the pre-act period and the years after 2004 as post-act period. We utilize accounting profits and economic productivities to measure the operating performance of auditors. Based on the Article 13 of the 2004 ACT, this study groups common businesses into three categories, tax and consultation, corporate registration and accounting and bookkeeping services.

Empirical results show that both total common businesses and operating performance of auditors are better in the post-act period. For the three components of common businesses, both tax and consultation, and accounting and bookkeeping services are better in the post-act period. Furthermore, common businesses contribute more to the operating performance in the post-act period. With results, this study fills the research gap and contributes knowledge to the literature. Further, our results convey managerial implications to the practitioners of public accounting profession, especially the auditors of proprietorship public accounting firms. The remainder of this study is organized as follows. In the next section, we review the relevant literature and develop hypotheses. We then describe our data and methodology and discuss the empirical results in the following sections. This study closes with conclusions and future research suggestions.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Prior to passage of the Certified Public Bookkeepers Act in 2004 (hereafter the 2004 ACT), relevant researches focused on legal aspects or suggestions to regulators (Ma, 1998; Liu, 1998; Yang, 1999). In the first year after the implementation of the 2004 ACT, Yu (2005) investigates its impacts on the businesses of public accounting firms and tax agents using a questionnaire survey. Results indicate the 2004 ACT benefits tax agents in their accounting and tax-related services and has a limited impact on the small-sized public accounting firms. Chen, Huang, and Wang (2010) also conduct a questionnaire survey to examine the effects of 2004 ACT on auditors, including auditors in large, medium, and small-sized public accounting firms. They find a negative impact on the common businesses of public accounting firms. Particularly, small-sized public accounting firms are the most affected firms.

The previous studies noted here examine the impacts of the 2004 ACT on public accounting firms by questionnaires. Using a questionnaire to investigate an issue has the advantage of few restrictions on time and space and can allow collection of information from a large number of respondents simultaneously. However, its major defect is that respondents with vested interests in the issue will answer the questions by subjective perceptions or feelings in context of the time. We argue that prior studies examining the impacts of 2004 ACT by questionnaire encounter similar dilemma. Instead of using a questionnaire, this study takes an official long-term data set to reexamine the issue.

In practice, public accounting firms have provided the common businesses for decades and maintain a long-term partnership with their clients. However, the 2004 ACT entitles the tax agents as a professional, which benefits them in the provision of the common businesses and in competing with the auditors. Under the new operating landscape, auditors face increased competition in businesses. To respond, they will take some countermeasures, such as improving service quality, providing more value-added services or actively expanding businesses.

When firms have a competitive marketplace and several similar products available for consumers, Porter (1980) claims that taking a competitive strategy is important for firms to achieve above average position and generate a superior return on investment. Porter (1980) establishes four different types of competitive strategy, including cost leadership strategy, differentiation leadership strategy, cost focus strategy, and differentiation focus strategy. The driving factor of differentiation leadership strategy is to identify a product attribute which is unique from competitors in the industry. When a product can differentiate itself from other similar products or services in the market through superior brand quality and value-added features, it will be able to charge premium prices to cover higher cost.

Klein and Leffler (1981) state that provision of high-quality products is the only way for companies to earn a continual stream of rental income. The rental stream will be lost if low quality output is deceptively produced. Further, the present discounted value of this rental stream will be greater than the one-time wealth increase obtained from low quality production. When product attributes are difficult to observe prior to purchase, Shapiro (1983) infers that consumers may use the quality of products produced by the firm in the past as an indicator of present or future quality. Under the situation, the benefits of producing high quality items will accrue in the future through the effect of building up a reputation. Reputation formation is a type of signaling activity, the quality of items produced in previous periods serves as a signal of the quality of those produced during the current period.

In tough economic conditions, quality differentiation separates from competitors by reducing customer sensitivity to price and protecting products from other competition that lowers profits. High-quality products allow companies to avoid price-based competition that undermines profits (Gale and Swire, 1977). In other words, better quality ensures that companies can receive premium prices and generate higher profits (Porter, 1980; Klein and Leffler, 1981; Shapiro, 1983). From the business competitive strategy theory, what is the action taken by auditors, fight or flight? Auditors will fight and actively expand the common businesses and improve service quality to face the increased competition situation. Hence, this study expects that common businesses and operating performance will be better in the post-act period and establishes the following hypotheses.

Hypothesis 1-1: Common businesses of auditors are better in the post-act period.

Hypothesis 1-2: Operating performance of auditors is better in the post-act period.

For auditors, common businesses are their primary services and referred to as non-audit services. Prior researches indicate that non-audit services positively relate to the operating performance of auditors (Chen, Chang, and Lee, 2008; Donohoe and Knechel, 2014; Frankel, Johnson, and Nelson, 2002). Passage of the 2004 ACT leads to increased competition of the common businesses for auditors. This will push auditors to improve the service quality of common businesses due to awareness of crisis. We expect that the performance effects of common businesses in the post-act period will be higher. Namely, common businesses contribute more to operating performance in the post-act period and the following hypothesis is formed.

Hypothesis 1-3: Common businesses contribute more to the performance of auditors in the post-act period.

Tax and consultation services, one of the three components of common businesses, include business tax and business income tax filing services. In addition, auditors help owners of enterprises to handle their individual income tax filings and estate tax declaration, as well as the declaration of tax related to labor insurance or Taiwanese second-generation national health insurance. Like a doctor of an enterprise and a guardian for public investors, auditors often give advices to their clients for services regarding Company Act, Income Tax Act, Business Entity Accounting Act and financial regulations. Auditors establish long-term and close relationship with clients and familiarize their daily operation and businesses. Auditors provide professional services to clients and make feasible management advices to them (Lai, 2000). Based on the market niches, auditors integrated and expanded tax and consultation services to SMEs after the 2004 ACT. Instead of flight, auditors fight to improve service quality to respond to the increased competition in operating environment. This study expects that tax and consultation services will be better after the 2004 ACT. Further, we predict that effects of tax and consultation service on performance will be higher after the 2004 ACT. As a result, this study establishes the following hypotheses:

Hypothesis 2-1: Tax and consultation services of auditors are better in the post-act period.

Hypothesis 2-2: Tax and consultation services contribute more to the performance of auditors in the post-act period.

The next component of common businesses is corporate registration services. In practice, they include the registration of a new company, a branch of a foreign company or individual company, a home-based worker (such as, SOHO), a direct selling or franchise chain store, a labor union or trade union, an academic association, a cram school, and a clinic. Corporate registration services also cover the set-up of a company or its subsidiary in Taiwan, China, Hong Kong, and Southeast Asia. In addition, auditors provide the attestation of registered capital, but tax agents are not allowed to serve. Before the 2004 ACT, tax agents provided most corporate registration services in Taiwan (Lai, 2000). We argue that auditors, after the 2004 ACT, will take the action of fight to improve their service quality. Under the increasingly competitive environment and crisis awareness, this study expects that corporate registration services increase in the post-act period and performance effects in the post-act period will be higher, and establishes the following hypotheses:

Hypothesis 3-1: Corporate registration services of auditors are better in the post-act period.

Hypothesis 3-2: Corporate registration services contribute more to the performance of auditors in the post-act period.

The final component of common businesses is accounting and bookkeeping services. Tax agents have rendered these services for the past six decades from the authorization of Business Entity Accounting Act in Taiwan. Article 5 of this Act is the legal source basis for tax agents before 2004. SMEs are the primary clients of auditors and tax agents. Accounting and bookkeeping businesses of SMEs are relatively simple and easy to treat. Auditors do not have advantage in rendering the services. In addition, tax agents charge lower service fees than auditors. Auditors therefore compete at lower service fees, resulting in lower revenues. However, crisis awareness of auditors motivates them to improve service quality under the increasingly competitive operating environment (Gale and Swire, 1977; Porter, 1980; Klein and Leffler, 1981; Shapiro, 1983). This study argues that auditors will fight to respond. Thus, we expect that accounting and booking services will increase in the post-act period and their performance effect will be higher after the 2004 ACT. We establish hypotheses as follows:

Hypothesis 4-1: Accounting and bookkeeping services of auditors are better in the post-act period.
Hypothesis 4-2: Accounting and bookkeeping services contribute more to the performance of auditors in the post-act period.

DATA AND METHODOLOGY

This study takes empirical data from the 1992-2016 Census Report of Public Accounting Firms in Taiwan. The Financial Supervisory Commission (FSC) administers the survey annually to collect business information about all registered public accounting firms for macro-economic analysis and industrial policy development. The FSC publishes the survey annually with average response rate of over eighty percent. Items surveyed include quantitative information on total revenues and their composition, and total expenses and their composition. It also includes the demographics of various levels of auditors, consisting of partners, managers, and assistants. For information privacy, the FSC discloses no identity information about individual public accounting firms, resulting in a pooled cross-sectional data which contains cross-sectional and time-series information.

Increasing research utilize pooled data because it enables investigators to exploit the entire available sample. Further, statistics obtained from pooled data reflect the mean effects of independent variables during the sampling period and are more accurate than the yearly estimates (Geletkanycz and Hambrick, 1997). Pooled data, however, suffers from the econometric problem of correlation between residual terms. To verify the problem, we conduct Durbin-Watson (DW) test and obtain DW statistics between 1.42 and 2.11, which implied a low correlation between residual terms. The sample period of this study covers 25 years. This study deflates all monetary variables by the yearly Consumer Price Index to account for inflation. After deleting outliers, this study reaches the final number of observations 13,049, including 6,135 in pre-act period and 6,914 in post-act period.

Based on the structure-conduct-performance (S-C-P) theoretical framework from the industrial organization literature (Cowling and Waterson, 1976; Ballas and Fafaliou, 2008), this study establishes the following equations to test the hypotheses.

$$COMMONBIZ\ (TCS, CRS, ABS) = \beta_0 + \beta_1 DVTIME + \beta_2 TRAIN + \beta_3 EXP + \beta_4 MKS + \beta_5 EDU + \beta_6 TAIEX + \varepsilon \qquad (1)$$

$$PROFIT\ (PRODUC) = \beta_0 + \beta_1 DVTIME + \beta_2 COMMONBIZ + \beta_3 DVTIME * COMMONBIZ + \beta\_4\ TRAIN + \beta\_5\ EXP + \beta\_6\ MKS + \beta\_7\ EDU + \beta\_8\ TAIEX + \varepsilon \qquad (2)$$

Where:

COMMONBIZ	=	Total common businesses;
TCS	=	Tax and consultation services;
CRS	=	Corporate registration services;
ABS	=	Accounting and bookkeeping services;
PROFIT	=	Accounting profits;
PRODUC	=	Economic productivities;
DVTIME	=	1 if the year is after 2004, and 0 otherwise;
TRAIN	=	Training expenses of auditors;
EXP	=	Work experience of auditors;
MKS	=	Market share of individual auditors;
EDU	=	Education level of auditors;
TAIEX	=	Economic indicator;
ε	=	Error term.

Equation (1) investigates the impacts of the 2004 ACT on common businesses and Equation (2) examines the relationship between common businesses and operating performance of auditors. Based on the hypotheses, β_1 in Equation (1), and β_1 and β_3 in Equation (2) are predicted to be positive.

The first dependent variable is revenues of total common businesses (*COMMONBIZ*). Further, its three components include revenues of tax and consultation (*TCS*), revenues of corporate registration (*CRS*), and revenues of accounting and bookkeeping (*ABS*). Another dependent variable is operating performance of proprietorship public accounting firms. This study measures it by accounting profits (*PROFIT*) and economic productivities (*PRODUC*). Accounting profits are defined as total revenues minus total expenses. In a proprietorship public accounting firm, annual income of the sole owner included salaries and operating profits sharing of the firm. In calculating accounting profits, salaries are a component of total expenses; the higher the salaries the sole owner receives, the less accounting profits the firm has. Taiwanese laws and regulations require the allocation of accounting profits to the sole owners annually. Hence, it makes no difference to sole owners whether they receive salaries or not in terms of their total annual income. In addition, the criteria for salary payment to sole owners vary across firms. Following previous studies (Chen, Chang, and Lee, 2008), we add the sole owners' salaries back into accounting profits to reduce the artificial noise. In addition, human capital is the key input of a public accounting firm. We follow prior studies and define another indicator of operating performance as economic productivity of proprietorship public accounting firms (Chen, Yang, and Yang, 2012). Operational definitions of the two dependent variables are as follows.

PROFIT = total revenues - total expenses + annual salaries of sole owners

PRODUC = total revenues ÷ ending numbers of auditors

The research variable of this study is a dummy variable of the time period, *DVTIME*, to distinguish the periods before and after the 2004 ACT. *DVTIME* is defined as 1 if the year is after 2004 and 0 otherwise.

In econometrics, factors affecting the common businesses and operating performance of public accounting firms should be controlled to increase the credibility of empirical results. This study incorporates variables discussed or empirically documented in previous literature as control variables. Public accounting firms are a knowledge and labor-intensive professional organization. In a typical public accounting firm, its human capital includes academic education level, work experience and professional training of auditors (Boynton, Johnson, and Kell, 2001).

The Certified Public Accountant Act in Taiwan requires a bachelor's degree or above to be an employee of public accounting firms. Education level (EDU) is an explicit knowledge of an organization and positively contributes to the operating performance of public accounting firms (Lee, Liu, and Wang, 1999; Liu 1997; Brocheler, Maijoor, and Witteloostuijn, 2004). Work experience (EXP) is an implicit knowledge of a professional organization, which contributes positively to the profitability or operating performance of public accounting firms (Fasci and Valdez, 1998; Aldhizer, Miller, and Moraglio, 1995; FRC, 2006). Work experience could indirectly improve job performance through the accumulation of work knowledge (Schmidt, Hunter, and Outerbridge ,1986). Continuing professional education is a world-wide requirement for auditors to maintain professional competence and keep knowledgeable about the professional skill, accounting, and auditing standards. Prior studies indicate a positive relationship between professional training and operating performance (e.g., Russell, Terborg, and Powers, 1985; Delaney and Huselid, 1996; Creter and Summey, 2003; Nafukho and Hinton, 2003). Specifically, professional training (TRAIN) improves audit quality (Meinhardt, Moraglio, and Steinberg, 1987; FRC, 2006) and financial performance of public accounting firms (e.g., Chen, Goan, and Chen, 2011; Chen, Yang, and Yang, 2012; Yang, Chen, and Yang, 2013).

In addition, size has a material impact on performance of public accounting firms and is defined as annual market share (MKS). Local economy affects the financial performance of public accounting firms (Reynolds and Francis, 2001). This study includes the Taiwan Stock Exchange Capitalization Weighted Stock Index (TAIEX) as an economic indicator to control the effect of operating environment. Previous researchers identify some drivers of audit quality, including the education level of auditors (Lee, Liu, and Wang, 1999; Liu, 1997), the professional training of auditors (Meinhardt, Moraglio, and Steinberg, 1987; FRC, 2006), and the work experience of auditors (Aldhizer, Miller, and Moraglio, 1995; FRC, 2006). We include them as control variables in the regression equations, an audit-quality-controlled model.

EMPIRICAL RESULTS

Table 1 displays descriptive statistics of proprietorship public accounting firms for the sample period, pre-act, and post-act periods, respectively. Mean accounting profits (PROFIT) and economic productivities (PRODUC) are \$851,281 and \$693,666. Mean total common businesses (COMMONBIZ) are \$1,504,669 and its three components average \$747,966 for tax and consultation (TCS), \$217,977 for corporate registration (CRS) and \$538,726 for accounting and bookkeeping (ABS) services. Mean professional training (TRAIN) equals 5.83 and its amount before logarithm transformation is \$26,797. Average work experience (EXP) is 38.87, indicating the average age of employees is about 39 years old. Average education level (EDU) is 14.90, meaning that the average education level of employees lies between junior college degree and bachelor degree. Mean market share (MKS) of 0.023 percent represents the size of proprietorship public accounting firms is relatively small.

This study estimates standardized regression coefficients for each independent variable to increase comparisons between variables. The standardized coefficient is the standardized correlation coefficient with values lying between -1 and +1. The higher absolute value of standardized coefficients predicts more variations in the dependent variable. We also conduct some checks for econometric problems, such as White's (1980) robust standard error to correct for heteroscedasticity, variance inflation factors (VIFs) for multi-collinearity between independent variables. The VIF for independent variable Xi was defined as 1/(1-RSQi), where RSQi was the R2 from the regression of Xi on the remaining k-1 predictors. If Xi was highly correlated with the remaining predictors, its VIF was very large. In econometrics, a VIF greater than 10 implies serious multi-collinearity existing between independent variables. All the VIEs in this study are less than 10.

Results of the relationship between the 2004 ACT and total common businesses are displayed in Table 2. The coefficient on the dummy variable of time period, DVTIME, is significantly positive ($t = 21.714$, $p < 0.01$), indicating that common businesses are better in the post-act period. Hypothesis 1-1 is supported.

Table 1: Descriptive Statistics

Variables	Mean Pre-act Post-act	S.D. Pre-act Post-act	Min. Pre-act Post-act	Max. Pre-act Post-act	Q1 Pre-act Post-act	Median Pre-act Post-act	Q3 Pre-act Post-act
PROFIT	851,281	1,009,210	5,270,741	19,067,226	189,311	613,515	1,234,161
	872,105	1,089,628	3,430,687	19,067,226	178,708	630,052	1,277,355
	830,141	931,632	5,270,741	9,709,118	194,151	600,209	1,200,549
PRODUC	693,666	538,848	31	12,488,032	399,119	612,128	871,954
	674,749	535,876	676	12,488,032	384,480	584,874	839,499
	710,451	540,956	31	9,807,934	416,119	644,855	904,773
COMMONBIZ	1,504,669	1,896,909	0	24,552,783	219,825	830,891	2,107,287
	1,374,259	1,932,804	0	24,552,783	186,849	690,476	1,861,593
	1,620,387	1,856,967	0	17,872,309	252,704	986,607	2,335,192
TCS	747,966	1,429,396	0	24,546,904	0	74,890	856,638
	610,996	1,343,844	0	24,546,904	0	46,838	603,790
	869,505	1,490,827	0	11,330,200	0	107,371	1,166,418
CRS	217,977	375,139	0	7,754,280	12,167	101,419	274,861
	254,720	446,795	0	7,754,280	22,593	117,247	309,138
	185,374	293,647	0	3,923,886	4,501	88,349	250,907
ABS	538,726	1,234,476	0	16,895,438	0	0	472,672
	508,544	1,251,151	0	16,311,216	0	0	387,900
	565,508	1,218,955	0	16,895,438	0	3	535,892
TRAIN	5.83	4.84	0	15.69	0	8.15	9.94
	4.80	5.01	0	15.69	0	0	9.83
	6.75	4.50	0	14.50	0	8.57	10.02
EXP	38.87	7.40	25	65	33.33	37.50	43.00
	36.52	6.81	25.63	65	31.67	35	40.00
	40.96	7.28	25	65	35.38	40	45.00
EDU	14.90	1.73	0	30	14.10	15.00	16.00
	14.30	2.03	0	30	13.78	14.46	15.17
	15.44	1.17	9.00	23	14.67	15.50	16.00
MKS	0.023	0.024	0	0.502	0.007	0.016	0.030
	0.031	0.030	0	0.502	0.011	0.023	0.040
	0.016	0.014	0	0.108	0.005	0.012	0.022
DVTIME	0.51	1	0	1	1	1	1
	0	0	0	0	0	0	0
	1	0	1	1	1	1	1

This table shows the descriptive statistics of variables for the sample period, pre-act period, and post-act period, respectively. The number of sample observations is 13,049 including 6,135 in the pre-act period and 6,914 in the post-act period. Variable definitions are as follows: PROFIT: accounting profits; PRODUC: economic productivities; COMMONBIZ: total common businesses; TCS: tax and consultation services; CRS: corporate registration services; ABS: accounting and bookkeeping services; TRAIN: professional training; EXP: work experience of auditors; EDU: education level of auditors; MKS: market share (in percentage); DVTIME: dummy variable of time period.

Table 2: Regression Results of Total Common Businesses

$COMMONBIZ = \beta_1 + \beta_1 DVTIME + \beta_2 TRAIN + \beta_3 EXP + \beta_4 MKS + \beta_5 EDU + \beta_6 TAIEX + \varepsilon_1$	
Variables (Pred. Sign)	**Std. Coe.** (t-statistics)
Research Variable	
DVTIME (+)	0.205***
	(21.714)
Control Variables	
TRAIN (+)	0.014*
	(1.818)
EXP (+)	-0.034***
	(-4.291)
MKS (+)	0.602***
	(72.79)
EDU (+)	0.013
	(1.613)
TAIEX (?)	0.078***
	(8.738)
Adjusted R^2	0.344
F-statistic	1044.795***
Durbin-Watson	1.865
N	13,049

*This table reports the regression results of the relationship between the 2004 ACT and total common businesses. N = the number of observations. ***,**,* denote significance at the 1%、5% and 10% levels, respectively. The t-value of each coefficient is shown in brackets. See Table 1 for variable definitions.*

Next, we examine the effects of total common businesses on the operating performance of proprietorship public accounting firms. Empirical results of research variables are shown in Table 3 and control variables are omitted to save space. Operating performance is defined as accounting profits (*PROFIT*) and economic productivities (*PRODUC*). A dummy variable of time period, *DVTIME*, appears as a research variable and an interaction. In econometrics, the interaction term should be taken into account when determining the relationship between DVTIME and dependent variable. We take a first-order differentiation over *DVTIME* and have a value of 228,709 (-0.011 + 0.152*1,504,669) when dependent variable is *PROFIT*. If the dependent variable is *PRODUC*, we have a value of 164,009 (-0.077 + 0.109*1,504,669). Both positive values indicate that operating performance of proprietorship public accounting firms is better in the post-act period and support Hypothesis 1-2.

As shown, we have significantly positive coefficients on total common businesses (*COMMONBIZ*) either the dependent variable is *PROFIT* or *PRODUC* ($t = 13.359$, $p<0.01$ and $t = 11.419$, $p < 0.01$). Consistent with previous studies, it indicates that the association between common businesses and operating performance is positive. The interaction terms of dummy variable and common businesses, *DVTIME*COMMONBIZ*, are positive significantly for *PROFIT* and *PRODUC* ($t = 8.392$, $p < 0.01$ and $t = 14.288$, $p < 0.01$). It represents that total common businesses contribute more to the operating performance in the post-act period than in the pre-act period. Namely, performance effects of common businesses are higher in the post-act period, which lends a support to Hypothesis 1-3.

Table 3: Regression Results of the Effects of Total Common Businesses on Operating Performance

$$PROFIT\ (PRODUC) = \beta_0 + \beta_1 DVTIME + \beta_2 COMMONBIZ + \beta_3 DVTIME*COMMONBIZ + \beta_4 TRAIN + \beta_5 EXP + \beta_6 MKS + \beta_7 EDU + \beta_8\ TAIEX + \varepsilon_3$$

Variables (Pred. Sign)	*PROFIT* (t-statistics)	*PRODUC* (t-statistics)
Research Variables		
DVTIME (+)	-0.077***	-0.011
	(-6.487)	(-1.141)
COMMONBIZ (+)	0.174***	0.121***
	(13.359)	(11.419)
*DVTIME*COMMONBIZ* (+)	0.109***	0.152***
	(8.392)	(14.288)
(Results of control variables are omitted for save of space)		
Adjusted R^2	0.273	0.514
F-statistic	566.592***	1590.061***
Durbin-Watson	1.975	1.981
N	12,043	12,043

*This table reports the regression results of the effects of total common businesses on operating performance as operating performance is defined as accounting profit and economic productivities, respectively. N = the number of observations. ***,**,* denote significance at the 1%、5% and10% levels, respectively. The t value of each coefficient is shown in brackets. See Table 1 for variable definitions.*

To examine the common businesses in further, this study divides them into three components, including tax and consultation services (TCS), corporate registration services (CRS), and accounting and bookkeeping services (ABS). We display empirical results in Table 4 with control variables omitted to save space. As shown, the coefficients on the dummy variable of time period, DVTIME, are significantly positive ($t = 15.694$, $p < 0.01$ and $t = 10.906$, $p < 0.01$) in Panel A and C but insignificantly positive in Panel B. The results indicate that both tax and consultation services (TCS), and accounting and bookkeeping services (ABS) are better in the post-act period. Consistent with expectations, the results lend support to both hypotheses 2-1 and 4-1. There is no significant difference in corporation registration services (CRS) between pre-act and post-act periods. Hypothesis 3-1 received no support.

Given the results of three items of common businesses above, we explore their effects on operating performance and present empirical results in Tables 5. Column A displays the association between tax and consultation services (*TCS*) and operating performance, accounting profits (*PROFIT*) and economic productivities (*PRODUC*). As the dummy variable of time period, DVTIME, appears in itself and in the interaction term, the first-order differentiations of *DVTIME* show a value of 53,106 (= 0.053 + 0.071* 747,966) for PROFIT and 19,447 (= -0.020 +0.026*747,966) for *PRODUC*. Results above represent that operating performance of proprietorship public accounting firms in the post-act period is better than that in the pre-act period. Consistent with expectation and the results in Table 3, Hypothesis 1-2 receive support. Finally, the interaction terms of *DVTIME*TCS* are significantly positive for performance of PROFIT and *PRODUC* ($t = 6.783$, $p < 0.01$ and $t = 2.084$, $p < 0.05$). This implies that performance effects of tax and consultation services are higher in the post-act period. That is, tax and consultation services contribute more to the performance of auditors in the post-act period and hypothesis 2-2 is supported. Further, the coefficients on tax and consultation services (*TCS*) are significantly positive for performance of PROFIT and *PRODUC*. The results indicate that the association between tax and consultation services and operating performance is positive, consistent with prior researches.

Table 4 Regression Results of the Three Individual Items of Common Businesses

TCS (CRS) (ABS) = $\beta_0 + \beta_1$DVTIME + β_2TRAIN + β_3EXP + β_4MKS + β_5EDU + β_6TAIEX+ε	
Variable (Pred. sign)	**Std. Coefficients (t-statistics)**
Panel A: Tax and Consultation Services *(TCS)*	
DVTIME (+)	0.169***
	(15.694)
(Results of control variables are omitted for save of space)	
Adjusted R^2	0.144
F-statistic	337.835***
Durbin-Watson	1.947
N	12,043
Panel B: Corporation Registration Services *(CRS)*	
DVTIME (+)	0.002
	(0.219)
(Results of control variables are omitted for save of space)	
Adjusted R^2	0.155
F-statistic	367.524***
Durbin-Watson	1.958
N	12,043
Panel C: Accounting and Bookkeeping Services *(ABS)*	
DVTIME (+)	0.119***
	(10.906)
(Results of control variables are omitted for save of space)	
Adjusted R^2	0.122
F-statistic	280.269***
Durbin-Watson	1.965
N	12,043

*This table reports the regression results of the relationship between the 2004 ACT and three individual items of common businesses. Panel A shows results of tax and consultation services (TCS). Panel B shows results of corporate registration services (CRS), and Panel C is results of accounting and bookkeeping services (ABS). N = the number of observations. ***,**,* denote significance at the 1%、5% and 10% levels, respectively. The t value of each coefficient is shown in brackets. See Table 1 for variable definitions.*

Regression results of the association between corporate registration services (*CRS*) and operating performance are shown in Column B. The first-order differentiations over *DVTIME* show positive, which are 12,643 (= 0.078+0.058*217,977) for performance of PROFIT and 11,989 (= -0.002+0.055*217,977) for performance of *PRODUC*. This indicates that operating performance of proprietorship public accounting firms is better in the post-act period and Hypothesis 1-2 receives a support. The coefficients on interaction terms of *DVTIME*TCS* are significantly positive for performance of *PROFIT* and *PRODUC* ($t = 6.710$, $p < 0.01$ and $t = 5.259$, $p < 0.01$). It represents that performance effects of corporate registration services are higher in the post-act period and Hypothesis 3-2 is supported. Consistent with prior studies, the positive coefficients on corporate registration services (*CRS*) for performance of *PROFIT* and *PRODUC* indicate a positive association between corporate registration services and operating performance.

Column C lists the results of the relationship between accounting and bookkeeping services (ABS) and operating performance. We conduct a first-order differentiation over *DVTIME* and obtain positive values that are 59,799 (= 0.070 + 0.111*538,726) for performance of PROFIT and 51,718 (= -0.005 + 0.096*538,726) for performance of *PRODUC*. Consistent with expectation, results above indicate that operating performance of proprietorship public accounting firms in the post-act period is better and Hypothesis 1-2 receives support. Coefficients on the interaction terms of *DVTIME*ABS* are significantly positive for performance of *PROFIT* and *PRODUC* (t = 11.346, p < 0.01 and t = 8.097, p < 0.01). It represents that performance effects of accounting and bookkeeping services are higher in post-act period and Hypothesis 4-2 receives support. However, this study has negative coefficients on accounting and bookkeeping services (ABS) for performance of *PROFIT* and *PRODUC*. Inconsistent with prior studies, it indicates a negative association between accounting and bookkeeping services and operating performance.

Table 5 Regression Results of the Effects of Three Individual Items on Operating Performance

PROFIT (PRODUC) = $\beta_0 + \beta_1 DVTIME + \beta_2 TCS\ (CRS, ABS) + \beta_3 DVTIME*TCS\ (CRS, ABS) + \beta_4 TRAIN + \beta_5 EXP + \beta_6 MKS + \beta_7\ EDU + \beta_8 TAIEX + \varepsilon$		
Variables (Predicted sign)	***PROFIT*** **(t-statistics)**	***PRODUC*** **(t-statistics)**
Panel A: Tax and Consultation Services *(TCS)*		
DVTIME (+)	0.053***	-0.020*
	(5.960)	(-1.875)
TCS (+)	0.134***	0.201***
	(13.078)	(16.262)
*DVTIME*TCS* (+)	0.071***	0.026**
	(6.783)	(2.084)
(Results of control variables are omitted for save of space)		
Adjusted R^2	0.504	0.271
F-statistic	1526.487***	559.142***
Durbin-Watson	1.976	1.977
N	12,043	12,043
Panel B: Corporation Registration Services *(CRS)*		
DVTIME (+)	0.078***	-0.002
	(8.258)	(-0.147)
CRS (+)	0.021***	0.019*
	(2.556)	(1.883)
*DVTIME*CRS* (+)	0.058***	0.055***
	(6.710)	(5.259)
(Results of control variables are omitted for save of space)		
Adjusted R^2	0.476	0.232
F-statistic	1370.385***	456.292***
Durbin-Watson	1.955	1.973
N	12,043	12,043
Panel C: Accounting and Bookkeeping Services *(ABS)*		
DVTIME (+)	0.070***	-0.005
	(7.847)	(-0.498)
ABS (+)	-0.040***	-0.041***
	(-4.115)	(-3.504)
*DVTIME*ABS* (+)	0.111***	0.096***
	(11.346)	(8.097)
(Results of control variables are omitted for save of space)		
Adjusted R^2	0.479	0.233
F-statistic	1385.016***	459.178***
Durbin-Watson	1.949	1.966
N	12,043	12,043

*This table reports the regression results of the effects of three individual items on operating performance as operating performance is defined as accounting profit and economic productivities, respectively. Panel A show results of tax and consultation services (TCS). Panel B provides results of corporate registration services (CRS), and Panel C indicates results of accounting and bookkeeping services (ABS). N = the number of observations. ***,**,* denote significance at the 1%、5% and 10% levels, respectively. The t value of each coefficient is shown in brackets. See Table 1 for variable definitions.*

Empirical results above confirm our expectations that auditors fight to respond to the increased competition in the operating environment of common businesses. We summarize the testing results of hypotheses in Table 6 as follows.

Table 6 Testing Results of Hypotheses

Hypotheses	Statement and Testing Results
H1-1	Common businesses of auditors are better in the post-act period. Results: Supported.
H1-2	Operating performance of auditors is better in the post-act period. Results: Supported.
H1-3	Common businesses contribute more to the performance of auditors in the post-act period. Results: Supported.
H2-1	Tax and consultation services of auditors are better in the post-act period. Results: Supported.
H2-2	Tax and consultation services contribute more to the performance of auditors in the post-act period. Results: Supported.
H3-1	Corporate registration services of auditors are better in the post-act period. Results: Not supported.
H3-2	Corporate registration services contribute more to the performance of auditors in the post-act period. Results: Supported.
H4-1	Accounting and bookkeeping services of auditors are better in the post-act period. Results: Supported.
H4-2	Accounting and bookkeeping services contribute more to the performance of auditors in the post-act period. Results: Supported.

CONCLUDING COMMENTS

Passage of the Certified Public Bookkeepers ACT (hereafter “the 2004 ACT”) in Taiwan enhanced the capabilities of tax agents in providing services to small and medium-sized enterprises. In contrast, auditors face increased competition in rendering services to the same target client as tax agents. What is the responding measure, fight or flight, for auditors? Based on both economic theory and business competitive strategy theory, this study investigates the effects of the 2004 ACT on auditors in Taiwan. To conduct the research, this study utilizes data from 1992 to 2016 Census Report of Public Accounting Firms in Taiwan collected by the Financial Supervisory Commission annually. Regression equations are developed to investigate the impacts of the 2004 ACT on businesses and their relationship to operating performance of auditors. The services both bookkeepers and auditors can offer to the same target clients are defined as “common businesses” including tax and consultation services, corporate registration services and accounting and bookkeeping services.

Given the control of audit quality, both common businesses and operating performance of auditors are better in the post-act period. Common businesses have higher performance effects after the 2004 ACT. Main results above indicate that auditors take the action of fight to face the increased competition in rendering common businesses. The results are consistent with the competitive strategy theory, such as Porter (1980), Klein and Leffler (1981), Shapiro (1983), and Gale and Swire (1977). Our findings that fight is an appropriate solution to respond to an increased competition situation contribute additional knowledge to the economic theory and competitive strategy theory.

In terms of the three components of common businesses, tax and consultation, and accounting and bookkeeping services are better in the post-act period and contribute more to the operating performance of auditors in the post-act period. Corporate registration services have higher performance effects in the post-act period but their association with operating performance is negative. With findings, this study extends Yu (2005) and Chen, Huang, and Wang (2010) and contributes knowledge to accounting literature.

In total, common businesses and operating performance of auditors are better in the post-act period and common businesses have higher performance effects after the 2004 ACT. Positive effects of the 2004 ACT on auditors suggest that practitioners, such as auditors or other service providers, take a positive strategy to respond to the increased competition in operating environment.

Common businesses include tax, consultation, accounting and bookkeeping services. They are also referred to as non-audit services in accounting. Provision of non-audit services leads to subsequent improvements in operating performance and reductions in operating risk (Donohoe and Knechel, 2014; Banker, Chang, and Natarajan, 2005. Long-lasting relationship between auditors and their clients results in a low turnover of auditors (Lai 2000; Chang and Lin, 2000). Auditors own a better professional image than tax agents and provide a wider range of services including attestation/audit services.

Auditors are suggested to expand their businesses from the traditional, low-margin audit services to the relatively new, high-margin non-audit services. Specifically, auditors are advised to expand their businesses of tax and consultation services. Both tax and consultation services are knowledge-intensive businesses. Further, auditors render tax attestation and appeals or administrative litigation services but tax agents are not allowed. Focusing on the tax and consultation services results in a natural market segmentation from tax agents.

This study includes some factors in the regression model to control service quality of auditors, including education level of auditors, professional training of auditors, and work experience of auditors. Instead of direct testing service quality of auditors, we control the drivers of audit quality, a limitation of this study. Because tax agents compete for common businesses with auditors, the number of tax agents theoretically affects the operating performance of proprietorship public accounting firms. This study does not include it in the regression model due to data unavailability, another limitation of this study.

The owners of proprietorship public accounting firms are either males or females. Future studies are advised to investigate the role of gender in the proprietorship public accounting firms. Namely, exploring the effects of the 2004 ACT on the common businesses of male-owned and female-owned public accounting firms is an interesting and implicative issue.

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DETERMINANTS OF PRICE RESPONSE TO CANADIAN BOUGHT DEALS AND MARKETED UNDERWRITTEN EQUITY OFFERS:-EVIDENCE BEFORE AND AFTER THE CANADIAN SOX

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ABSTRACT

This paper examines determinants of price response to announcing Canadian bought deals and marketed underwritten equity offers. It includes periods before and after the passage of Canadian SOX. This is a critical government law equivalent to the U.S. Sarbanes-Oxley Act. Both laws have had important effect on changes in governance and compliance for public companies. Bought deals and marketed underwritten offers are two standard methods of issuing equity by publicly traded firms. Did the Canadian law influence the determinants of price response for both underwriting methods? From fifteen different determinants, this study shows trading shares volume is the only common determinant for bought deals for the pre- and post-Canadian SOX periods. Mostly, for shares listed on the Toronto Stock exchange (and not cross-listed in the U.S.). Marketed underwritten offers do not show consistent determinants for the pre- and post-Canadian SOX periods. Also, none of the expected determinants are significant during the post-Canadian SOX period for marketed underwritten offers. In essence, the Canadian law had a different effect on expected determinants for bought deals and marketed underwritten offers, respectively.

JEL: G24, G32

KEYWORDS: Price Response, Bought Deals, Marketed Underwritten Offers, Canadian SOX, Sarbanes-Oxley, Seasoned Equity Offerings, Cross-Listed

INTRODUCTION

This study explores the effect of Canadian SOX (CSOX) on expected determinants of shares price response to seasoned equity offering announcements for bought deals and marketed underwritten offers. Announcing shares of common stock has a significant impact on the share price of common stock. The price response is an important signal of market value for company issuers. The empirical evidence shows the market reaction to common stock offers is on the range of minus two percent to minus three percent of shares value (Lee and Masulis, 2009). The drop in share price represents a high indirect cost for issuers. Many studies identify relevant determinants that explain the market reaction to stock offer announcements. However, there is no consensus. This paper identifies the determinants of the market reaction to seasoned stock offerings of bought deals and marketed underwriting offers before and after CSOX. Bought deals and marketed underwritten offers are typical underwriting methods for issuing shares in the stock market by Canadian exchange-traded companies. Both methods need to comply with different demands by securities regulators and have different characteristics (Pandes, 2010; Gunay and Ursel, 2015). The Canadian legislation provides an unusual experiment to analyze determinants of the price response to stock offerings. Canadian SOX is a law similar to the U.S. Sarbanes-Oxley Act of 2002. After the passage of Sarbanes-Oxley, Canada, and other countries passed similar legislation (Rubalcava, 2012a). The objectives of these laws are improving corporate governance and better disclosure of publicly traded companies. Correct disclosure of events such as announcing seasoned stock offerings must comply with rules by both legislations. Seasoned equity offerings (SEOs) are common stock offers that occur after an initial public offering or IPO. This manuscript builds on Rubalcava's (2015) study on the effects of

Sarbanes-Oxley on expected determinants of seasoned equity offerings by Canadian cross-listed firms. Also, on Rubalcava's (2018) study on the impact of the Canadian SOX for bought deals and marketed underwritten offers. Rubalcava (2015) analyzes the market reaction to bough deals and firm commitment (or underwritten offers) by Canadian cross-listed issuers only. On the other hand, Rubalcava (2018) examines the price response for bought deals and marketed underwritten offers for all Canadian issuers (cross-listed and non-cross-listed). However, both studies do not examine specific determinants of price response for bought deals and firm commitment, respectively. Thus, it is worth exploring the price response and determinants of each underwriting method under Canadian SOX. Main contributions of this study are as follows. First, it extends above studies by examining relevant determinants of price response for each underwriting method and whether they hold after the passage of Canadian SOX. Second, the findings will offer guidance to Canadian firms when deciding which underwriting method is more suitable. This will mitigate the negative price response at the offer announcing date. Sample includes overall stock offers, including cross-listed and non-cross-listed, respectively. Cross -listed offers are those simultaneously issued on the Toronto Stock exchange and U.S. major exchanges (NYSE, NASDAQ, and AMEX). Offers listed only on the Toronto Stock Exchange are non-cross-listed.

This study finds trading shares volume is the only common determinant of price response for bought deals for the pre- and post-Canadian SOX periods, respectively. However, this finding is for shares listed on the Toronto Stock exchange only. On the other hand, it does not find consistent determinants for the pre- and post-Canadian SOX periods for marketed underwritten offers. For these offers, the expected determinants that are relevant are for the post-Canadian SOX period only. In short, the findings show the Canadian law had a different effect on expected determinants for bought deals and marketed underwritten offers, respectively. The rest of the paper is as follows. Next section presents a review of literature. The following section presents the data and methods. Next section presents and discusses the results. The last section reports the conclusions.

LITERATURE REVIEW

Canadian SOX (CSOX) is a legislation passed in October 2002 and became effective in December 2005. CSOX is similar to the Sarbanes-Oxley Act passed by U.S. Congress in July 2002. Their motive is restoring confidence in capital markets eroded by well documented corporate wrongdoing (for example, Enron, Tyco, Global Crossing, Nortel, and Bre-X). However, CSOX is less strict than Sarbanes-Oxley on disclosure of financial information, including seasoned stock offerings. Reason is that CSOX rules focus on much smaller Canadian companies, so including the same rules as Sarbanes-Oxley would be costly and cumbersome (Ben-Isai, 2008). Eckbo, Masulis, and Norly (2007) consider worth exploring the effects of regulatory changes such as Sarbanes-Oxley on seasoned equity offerings (SEOs). As an extension of Eckbo et al. suggestion, this paper examines the effects of Canadian SOX on expected determinants of price response to stock offers for Canadian bought deals and marketed underwritten offers.

Bought deals and marketed underwritten offers are two important methods for underwriting seasoned equity offerings. The main differences between both underwriting methods based on Pandes (2010) and Gunay and Ursel (2015) are as follows. Bought deals (accelerated offers or overnight offers) have fewer registration needs compared with marketed underwritten offers. (In the U.S. bought deals are similar to *shelf offers* and marketed underwritten offers known as firm commitment or *non-shelf offers.)* For bought deals, the issue date is the same as announcement date. For marketed underwritten offers, the issue date is several days after the announcement. Bought deals do not have a *market-out* clause; unlike marketed underwritten offers, which they do. *Market-out* clause means that if stock price declines, the investment bank cannot cancel the issue for bought deals, unlike marketed underwritten offers, which it can. Bought deals do not have *road shows;* unlike marketed underwritten offers, which they do. *Road shows* is the procedure followed by investment banks and issuers to market common stock to investors. Their objective is estimating the proper offer price and potential demand for common stock offers.

A negative market reaction usually occurs when a company announces a seasoned stock offering. The price response to seasoned equity offerings is, on average, around minus two percent in the U.S. (Eckbo, Masulis, and Norli, 2007). It is around minus 1.86 percent for Canadian firms (Pandes, 2010). The literature on the determinants of price response to seasoned stock offerings is vast. Eckbo et al. (2007) present a detailed review on stock offer determinants. A favored explanation for the negative market reaction to offer announcements is the adverse selection theory by Myers and Majluf (1984). It assumes managers have superior information than outside investors. So, when a company announces a stock offering, investors presume an overvaluation of the stock. Therefore, they adjust the price downward resulting in a negative price response. Studies supporting this theory are, for example, Eckbo and Masulis (1995), Johnson, Serrano, and Thompson (1996), Lee and Masulis (2009), and Akhibe and Whyte (2015). However, other theories that may explain the market reaction to stock offers include ideas such as price pressure, agency costs, intended use of offering revenues, and risk, among others. Relevant studies are as as follows. Price pressure (Scholes, 1972; Asquith and Mullins, 1986; Masulis and Korward, 1986; Korajczyk, Lucas, and McDonald, 1990; Loderer, Cooney, and Van Drunnen, 1991; Slovin, Sushka, and Bendeck, 1994). Agency costs (Jensen and Meckling, 1976; Leland and Pyle, 1977; Fields and Mais, 1994; Jung, Kim, and Stulz, 1996, Kim and Purnanandam, 2006; 2014). Intended use of offer revenues (Masulis and Korwar, 1986; Walker and Yost, 2008; Hull, Kwak, and Walker, 2009). Risk (Lin, You, and Lin, 2008). Most determinants in this study are from above research. The methods section presents details of these determinants. The objectives of this study are to answer the following research questions. Are determinants of price response for Canadian bought deals (and marketed underwritten offers) announcements the same before and after Canadian SOX? What are the determinants for each underwriting method -before and after Canadian SOX- for cross-listed and non-cross-listed offers? Findings will help Canadian firms when deciding the underwriting method for stock offers, and mitigate the negative price response after their announcement.

DATA AND METHODOLOGY

The sample consists of 851 seasoned equity offerings (SEOs) by Canadian firms –cross-listed on the NYSE, AMEX and NASDAQ and those listed on the Toronto Stock Exchange (TSX) only (non-cross-listed). The overall period is from 1999 to 2011, which includes two similar periods: the pre-CSOX period from 1999 to 2005 and the post-CSOX period from 2006 to 2011. Bought deals are 690 (183 in the pre-CSOX period and 507 in the post-CSOX period). Pre-CSOX bought deals include 63 cross-listed and 120 non-cross-listed. Post-CSOX bought deals include 57 cross-listed and 450 non-cross-listed. Marketed underwritten offers are 161 (109 in pre-CSOX period and 52 in post-CSOX period). Pre-CSOX marketed underwritten offers include 54 cross-listed and 55 non-cross-listed. Post-CSOX marketed underwritten offers include 21 cross-listed and 31 non-cross-listed. Having similar pre- and post-CSOX periods provide reliable results on whether the offer price response determinants are common before and after Canadian SOX. Period 2 includes years of the financial crisis (2007, 2008, and 2009). (The impact that each of these years had on price response is examined in the section of empirical results). FP Advisor and the System for Electronic Documents Analysis and Retrieval (SEDAR Canada) are sources of data for seasoned equity offerings. (FP Advisor is data service provider of "information about Canadian public and private companies, company directors, archival financial information, special analytical tool, and lead list generator," https://fpadvisor.financialpost.com). These data include the offer announcement and issue dates, offer size, issue purpose, underwriting type (marketed underwritten offer, bought deal), overallotment option, lead underwriters, cross and non-cross-listed offers, and offering location (domestic, global). The Canadian Financial Markets Research Centre (CFMRC) is the source of market data. These include daily stock prices, volumes, number of trades, S&P/TSX value-weighted index, and monthly number of shares outstanding. Statistics Canada provides the Canadian monthly T-bill rate (a proxy for the risk-free rate). The Center for Research in Security Prices (CRSP) is the source for the U.S. value weighted index and U.S. monthly T-bill rate (risk-free rate). The sample does not include data with errors or missing values.

Abnormal Returns Model

An International Asset Pricing Model examines the price response - abnormal return - around announcing date of stock offerings. The model controls for domestic and U.S. market risk premium (mostly for cross-listed issues) –similar to Foerster and Karoly's (1999).
The model is as follows.

$$R_{it} = a_i + b_i R_{mt}^{TSX} + c_i R_{mt}^{US} + d_i R_{mt}^{TSX} * Dum1 + e_i R_{mt}^{US} * Dum1 + \xi_{1i} DumPreCAR_t + \xi_{2i} DumAD_t + \varepsilon_{it} \quad (1)$$

Where R_{it} is excess return for trades completed on the Canadian Stock Market for issuer *i.* R_{mt}^{TSX} and R_{mt}^{US} are stock market proxies for the Canadian and U.S. stock market, respectively. The model uses dummy variables to capture abnormal returns for event windows before (*DumPreCAR*) and during the announcement (*DumAD*). Estimates of abnormal returns uses 200 trading days before the announcing date and ending 75 trading days after the announcing. Dummy variable *Dum1* accounts for possibility the systematic risk (beta) could change by the SEO announcement. It is equal to one for each day in the period from two to 26 days after announcing day (AD). $DumPreCAR_t$ is a dummy variable that occurs in the pre-announcing window period. It is equal to one for days -26 through -2 before announcing day of the stock offer, i.e., [AD-26, AD-2], and is zero otherwise. This dummy variable controls for abnormal performance before the announcing date. $DumAD_t$ measures price response or abnormal return around offer announcing date. It is equal to one on the three-day announcing date [AD-1, AD+1], and is zero otherwise. The three-day period captures price response on offer announcing date. The $3\xi_{2i}$ is a three-day cumulative abnormal return or *CAR* for firm *i* for the SEO announcing date, [AD-1, AD+1], and used for marketed underwritten offers only. Bought deals uses an adjusted *CAR* (CAR_{adj}) as in Pandes (2010). The formula is $CAR_{adj} = \left(\frac{1}{1-a}\right) CAR + \frac{a}{(1-a)} (\frac{P_c - P_0}{P_c})$ where a is number of shares issued divided by number of shares outstanding after the issue; P_c is closing stock price prior the offer announcement; and P_o is offering price. This formula removes the price discount effect on *CAR* for bought deals -estimated around the stock offer announcement-, unlike marketed underwritten offers -estimated before closing day of the issue. Price discount occurs when offer price is lower than closing price on the day before the issue. This is also an important issuance cost for companies (not examined here).

Determinants of Price Response for Bought Deals and Marketed Underwritten Offers

The cross-sectional model that examines relation between price response or abnormal return to offer announcements (*CAR)* and expected determinants is as follows:

$$CAR_i = a_0 + (a_1 + \delta_{Beta} DumPer2) Beta_i + \left(a_2 + \delta_{Runup} DumPer2\right) Runup_i + \left(a_3 + \delta_{OfferSize} DumPer2\right) OfferSize_i + (a_4 + \delta_{LeadUnderwriter} DumPer2) LeadUnderwriter_i + \ldots + a_t DYearCrisis_{2007} + \cdots + a_{t+n} DYearCrisis_{2009} + \varepsilon_i \quad (2)$$

Equation (2) captures the effect of each determinant on *CAR* simultaneously for the pre- and post-CSOX periods, respectively. Coefficient estimates a_0, $a_1 \ldots a_{t+n}$ show the extent at which the price responds to stock offerings. These coefficients are for *all* bought deals (or marketed underwritten offers) and for *cross-listed* and *non-cross-listed* issues, respectively. Determinants in equation (2) are from the literature review section and other studies on price response of seasoned equity offerings. It does not include determinants from all major studies because of data constraints. However, it uses proxy measures for relevant determinants. Their identifiers and descriptions are as follows. *DumPer2* is a dummy variable that equals one during the post-CSOX period and zero for the pre-CSOX period (*DumPer1*).

DumPer2: interacts with expected determinants to capture the distinct effect of each determinant on price response for the pre- and post-CSOX periods, respectively. *Beta* is a proxy for systematic risk (Lin, You, and Lin, 2008). It is coefficient b_i of the Canadian market risk premium from equation (1). A positive coefficient estimate means a favorable price response to the offer announcement.

Runup : is the abnormal return for stock offer pre-offer announcing window [AD-26, AD-2] from equation (1). It represents stock performance (price run-up) before the announcing date, and measures information asymmetry. A positive coefficient estimate implies reduced information asymmetry (Myers and Majluf, 1984; Asquith and Mullins, 1986; Bayless and Chaplinky, 1996).

OfferSize: is the ratio of offer size to total number of shares outstanding before announcing date. It measures price pressure (Scholes, 1972; Asquith and Mullins, 1986; Masulis and Korward, 1986; Korajczk, Lucas, and McDonald (1990); Loderer, Cooney, and Van Drunnen, 1991; Slovin, Sushka, and Bendeck, 1994). A negative coefficient sign would show an inelastic price demand for the stock offer.

LeadUnderwriter: is the number of times an investment bank appears as a lead underwriter in a stock offer and measures underwriter prestige. A positive coefficient estimate would show lead underwriters have a favorable impact on offer price response. It is because of their higher efficiency in assigning the stock offering (Jeon and Ligon, 2011)

DumGlo: is a dummy variable equals one for a shares issued concurrently in the U.S. and Canada and zero if issued in Canada only. This dummy applies for cross-listed offers only. A negative coefficient estimate means equity offers placed outside Canada would have a negative effect on offer price response compared to domestic issues (Rubalcava, 2012b)

DumOAO: is a dummy variable equals one if the shares offering has an overallotment option and zero otherwise. A positive coefficient estimate would show no overpricing of the stock offering (Ritter, 1998).

VolTO : is the shares trading volume turnover. It is equal to daily annualized shares trading volume divided by total number of shares outstanding pre-offer announcing. It is a proxy for non-information related trading -low information asymmetry- (Easley et al., 1996). A positive coefficient estimate would imply a favorable price response because of reduced (unfavorable) private information associated with the offer announcement.

ChTrades: is the change in average number of trades between period [AD-120, AD-61] and period [AD-60, AD-2], where AD is the announcing date of stock offer. It proxies for information-related volatility (Jiang and Kryzanowski, 1998). A negative coefficient estimate means the offer announcement represents unfavorable information content, resulting in negative price response.

RSecondary: is the ratio of number of shares sold by existent shareholders to total number of shares offered, as in Lee and Masulis (2009). Secondary equity offerings do not increase the capital of the firm, unlike primary offers, which they do. Secondary offerings produce agency problems between inside owners and outside investors. Empirical evidence shows that when insiders sell stock in their own company (secondary offers), the market response is more harmful than primary offers (Fields and Mais, 1994**;** Kim and Purnanandam, 2006, 2014).

RetVolatility: is the standard deviation of daily stock returns for shares of issuer *i* during three months before the offer announcing date. The return volatility is a measure of price uncertainty (Lee and Masulis, 2009).

D0 to *D4:* are dummy variables that classify the purpose of the stock offer as follows: *D0* (unknown), *D1* (working capital), *D2* (capital investment), *D3* (general corporate) and *D4* (debt decrease). The five categories are from FP Advisor's database. Studies showing that intended use of funds is relevant in explaining the price response to equity offerings are Walker and Yost (2008) and Hull, Kwak, and Walker (2009). Other studies using similar proxies as controls are Masulis and Korwar (1986), Hull and Moellenberndt (1994). A positive (negative) coefficient estimate on the dummies means a positive (negative) offer price response.

$DYearCrisis_{\tau:}$ are dummy controls for annual economic conditions before and during the financial crisis period (2006-2009). Coefficient estimates on years of the financial crisis period (2007- 2009) show the impact each year had on price response to stock offer announcements. ε_I is the error term and assumed to be independently and normally distributed; i.e., $\varepsilon_I \sim N(0,\sigma^2)$

RESULTS

Descriptive Statistics

Table 1 reports the mean (median) Cumulative Average Abnormal Returns (CAAR) at the three-day announcement date of seasoned equity offerings (SEOs) for bought deals (Panel A) and marketed underwritten offers (Panel B), using equation 1. The CAAR reported are for *all* SEOs, including *cross-listed* and *non-cross-listed* for the pre- and post-CSOX periods, respectively. Based on Panel A, the weighted mean CAAR for *all* bought deals is -1.83 percent (-2.88 percent for *cross-listed* and -1.61 for *non-cross-listed*). On the other hand, from Panel B, the weighted mean CAAR for *all* marketed underwritten offers is -3.49 percent (-2.92 percent for *cross-listed* and -4.0 percent for *non-cross-listed*). Last column reports p-values for the difference in mean (median) CAAR between the pre- and post-CSOX periods. Number of SEOs is in brackets – the asterisk (*) shows significance at ten percent level.

Panel A, of Table 1, shows the p-values for the difference in mean (median) CAAR are not significant for *all* bought deals (mean p-value of 0.5187), including *cross-listed* (mean p-value of 0.3605) and *non-cross-listed* (mean p-value of 0.4271), respectively. On the other hand, Panel B shows the p-value for the difference in mean (median) CAAR is significant at ten percent level for *all* marketed underwritten offers only (mean p-value of 0.0902). These preliminary results suggest Canadian SOX had a small impact on price response to offer announcements for the entire sample of marketed underwritten offers only. On the other hand, number of total SEOs for bought deals during the pre- and post-CSOX period is 183 and 507, respectively, which represents an increase of 177 percent (unreported). In contrast, number of total SEOs for marketed underwritten offers during the pre- and post-CSOX period is 109 and 52, respectively. This is a drop of fifty two percent (unreported). These results show number of marketed underwritten offers has decreased significantly in last years compared with bought deals, which is consistent with Gunay and Ursel (2015) findings.

Table 1: CAAR of SEOs for Bought Deals and Marketed Underwritten Offers

Panel A: Bought Deals			
	Pre-CSOX	**Post-CSOX**	**P-value Diff. Mean (Median)**
All SEOs	[183]	[507]	
Mean	-2.16%	-1.71%	0.5187
(Median)	(-2.57%)	(-2.42%)	(0.8766)
Cross-Listed	[63]	[57]	
	-2.22%	-3.60%	0.3605
	(-2.49%)	(-2.87%)	(0.780)
Non-Cross-Listed	[120]	[450]	
	-2.13%	-1.47%	0.4271
	(-2.59%)	(-2.37%)	(0.8259)
Panel B: Marketed Underwritten Offers			
	Pre-CSOX	**Post-CSOX**	**P-value diff. Mean (Median)**
All SEOs	[109]	[52]	
Mean	-2.76%	-5.04%	0.0902*
(Median)	(-3.39%)	(-5.34%)	(0.0721)*
Cross-Listed	[54]	[21]	
	-2.38%	-4.30%	0.4271
	(-2.72%)	(-4.23%)	(0.2089)
Non-Cross-Listed	[55]	[31]	
	-3.13%	-5.55%	0.1040
	(-3.70%)	(-5.86%)	(0.2212)

Panel A reports the mean and median CAAR (Cumulative Average Abnormal Return) for all seasoned equity offerings (SEOs) of bought deals, including cross-listed and non-cross-listed for the pre-CSOX and post-CSOX periods, respectively. The CAAR formula for bought deals is $CAR_{adj} = \left(\frac{1}{1-a}\right) CAR + \frac{a}{(1-a)} \left(\frac{P_c - P_0}{P_c}\right)$. *CAR is the three-day cumulative abnormal return or CAR for firm i for offer announcing date, [AD-1, AD+1], or* $3\xi_{2i}$ *in equation 1. It applies for marketed underwritten offers only. Letter 'a' is the number of shares issued divided by number of shares outstanding after the issue;* P_c *is the closing stock price prior offer announcement; and* P_0 *is offering price. Similarly, Panel B reports the mean and median CAAR for marketed underwritten offers. Number of SEOs is in brackets. Asterisk (*) show significance at 10 percent level using t-test for the mean and Wilcoxon/Mann-Whitney for the median (in parenthesis). Number of seasoned equity offerings (SEOs) is in brackets.*

Regression Results

This section presents regressions results of price response or abnormal returns (CAAR) on expected determinants for bought deals and marketed underwritten offers, respectively, using equation 2. Table 2 reports regressions of mean CAAR on expected determinants for bought deals for *overall* SEO sample (620), including *cross-listed* (120) and *non-cross-listed* (570). Specifically, it reports coefficient estimates of expected determinants for the pre-CSOX and post-CSOX periods for *overall* SEOs, *cross-listed* and *non-cross-listed*, respectively. Coefficient estimates of determinants for *overall* SEO sample capture the full effect on price response to offer announcement, regardless of whether the issuer is cross-listed or non-cross-listed. By dividing the *overall* sample into *cross-listed* and, *non-cross-listed* offers allows knowing the importance of price response captured by each of these categories. The asterisks *, ** and *** in the table stand for significance at ten, five and one percent levels, respectively. (Note: This section describes statistical significance of coefficient estimates as follows: slightly significant (*), significant (**), and highly significant (***). Also, coefficient estimates presented in Tables 2 and 3 consider the interaction effect of dummy *DumPer2* (i.e., post-CSOX period) or dummy *DumPer1* (i.e., pre-CSOX period) on CAAR for each determinant. This section does not report coefficients of these interacting dummies to save valuable space. Table 2 presents only the coefficient estimates reflecting net effects on CAAR for the pre- and post-CSOX periods. For illustration purposes, the section presents the effect of *DumPer2* only for *Beta*.) Explanation of the coefficient estimates is as follows. The coefficient estimate of *Beta* is the average coefficient b_i of Canadian market risk premium (R_{mt}^{TSX}) from equation (1). *Beta* coefficient for *overall* SEOs is significant at five percent level (0.0226) for the pre-CSOX period only (regression 1). The coefficient estimate of the interaction between *Beta and DummPer2 (Beta*DumPer2)* is negative and slightly significant (-0.0231 unreported). The coefficient estimate for the post-CSOX period is -0.0005 (which is equal to 0.0226-0.0231) and is not significant (regression 2). It represents net effect of *Beta* on CAAR for the post-CSOX period. Similarly, the coefficient estimate of *Beta* for *non-cross-listed* SEOs is highly significant for the pre-CSOX period only (0.0377, regression 5). The coefficient of *Beta*DumPer2* is negative and significant (-0.0388 unreported). Thus, the coefficient estimate for the post-CSOX period is -0.0011 (which is equal to 0.0377-0.0388) and is not significant (regression 6). This shows *Beta* has positive effect on price response of the stock offering at announcing date for bought deals. In other words, the higher the systematic risk of the stock, the higher the market reaction. (The average coefficient estimate c_i or *beta* of U.S. market risk premium R_{mt}^{US} is not significant in all regressions and not reported here).

The coefficient estimate of *Runup* is positive and highly significant for *overall* SEOs during the post-CSOX period only (0.0565, regression 2). In the same vein, the coefficient estimate of same determinant is highly significant for *non-cross-listed* issues (0.0605, regression 6). These results show price run-up has positive effect on offer price response because of reduced information asymmetry, which is consistent with low information asymmetry, as in Myers and Majluf (1984).

The coefficient estimate of the dummy variable *DumGlo* is negative and significant for *overall* SEOs during the pre-CSOX period only (-0.0757, regression 1). Similar significance occurs for *DumGlo* for *cross-listed* offers in the pre-CSOX period only (-0.0835, regression 3). It shows that stock offers placed outside Canada get an adverse market reaction compared with those placed on Canada only. (These results apply to *cross-listed* issuers only). The coefficient estimate of *DumOAO* is positive and slightly significant for *overall* SEOs during the pre-CSOX period (0.0283, regression 1) and highly significant during the post-CSOX period (0.0248, regression 2). For *cross-listed* SEOs, the coefficient estimate is significant during the pre-CSOX period only (0.0540, regression 3). However, for non-cross-listed SEOs, the coefficient is highly significant for the post-CSOX period only (0.0234, regression 6). These results show the significance of *DumOAO* is not uniform between cross-listed and non-cross-listed for the pre- and post-CSOX period. A positive coefficient estimate for *DumOAO* shows a stock offer with an overallotment has a positive response by investors, implying not overpricing (Ritter, 1998).

The coefficient estimates of *VolTO* are positive and significant for *overall* SEOs and *non-cross-listed* offers during the pre- and post-CSOX periods, respectively (regressions 1, 2, 5 and 6). However, it is not significant for *cross-listed* offers (regressions 3 and 4). The results show trading volume turnover for the former stock offering reflects low information related volatility. In other words, the equity offerings will be more easily placed at more favorable prices (Dichev, Huang, and Zhou, 2014). The coefficient estimate of *ChTrades* is significant for *overall* SEOs in the post-CSOX period only (-0.0737, regression 2). A negative coefficient estimate shows that changes in number of trades have an unfavorable effect on offer price response. These results suggest the offer represents harmful information content (Jiang and Kryzanowksi, 1998). The coefficient estimate of *RSecondary* is negative and highly significant for *overall* offers (-1.4200, regression 2) and for *non-cross-listed* offers (-3.6700, regression 6), during the post-CSOX period only. This reveals investors unwelcome stock issues sold by existing shareholders (which are not capital raising). Also, it may reflect agency problems between insider shareholders and new (outside) shareholders (Field and Mais, 1994; Kim and Purnanandam, 2006). The coefficient estimate of *RetVolatility* is positive and slightly significant for *non-cross-listed* offers and the pre-CSOX period only (1.1255, regression 5). This result shows return volatility has a positive but marginal effect on price response of stock offerings. Which it is counterintuitive because return volatility reflects price uncertainty (Lee and Masulis, 2009).

About variables for intended use of the shares offering, the only significant determinant is *D1* (working capital). The coefficient estimate of *D1* is negative and significant for *overall* (-0.0564, regression 2) and negative and highly significant for *non-cross-listed* offers (-0.0647, regression 6); both for the post-CSOX period only. These findings reveal the market does not react favorably when the intended use of funds is financing working capital (operating costs). No other variables for intended use of funds are significant in all regressions. About year dummy variables related to the financial crisis (2007-2009), the signed coefficient estimates (unreported) that are at least slightly significant are as follows. For *overall* offers, the coefficient estimate is positive and significant for 2007 (0.0231) and positive and slightly significant for 2008 (0.0246). For *cross-listed* offers, the coefficient estimate is negative and slightly significant for 2009 (-0.0694) only. For *non-cross-listed* offers, the coefficient estimates are positive and significant for 2007 (0.0224) and 2008 (0.0282). These results show the financial crisis period had different effect on *cross-listed* and *non-cross-listed* offers, respectively.

Table 2: Regressions of CAAR on Expected Determinants for Bought Deals: Pre- and Post-CSOX Periods

	Overall SEOs		**Cross-Listed**		**Non-Cross-Listed**	
Variables	**(1) Pre-CSOX**	**(2) Post-CSOX**	**(3) Pre-CSOX**	**(4) Post-CSOX**	**(5) Pre-CSOX**	**(6) (Post-CSOX**
Constant	-0.0127	-0.0127	-0.0378	-0.0378	-0.0025	-0.0025
Beta	0.0226**	-0.0005	-0.0072	-0.0092	0.0377***	-0.0011
Runup	0.0231	0.0565***	-0.0822	-0.0571	0.0547	0.0605***
OfferSize	-0.0878	0.0051	0.1149	-0.0520	-0.0881	0.0074
LeadUnderwriter	-0.0085	-0.0044	-0.0034	0.0071	-0.0091	-0.0049
DumGlo	-0.0757**	-0.0276	-0.0835**	0.0133	--	--
DumOAO	0.0283*	0.0248***	0.0540**	0.0417	0.0066	0.0234***
VolTO	0.254**	0.0062**	0.2210	-0.1710	0.2250**	0.0693***
ChTrades	103.9263	-0.0737**	43.8000	-0.0512	127.3300	-3.6700
RSecondary	-0.4000	-1.4200***	-0.8200	0.03700	-1.2500	-2.0900***
RetVolatility	-0.2807	0.1640	1.1133	-0.4840	1.1255*	0.2062
D1	-0.0197	-0.0564**	-0.0265	-0.0252	-0.0255	-0.0647***
D2	-0.0050	-0.0243	-0.0592	0.0371	0.0103	-0.0361
D3	-0.0043	-0.0229	-0.0532	0.0484	0.0198	-0.0376
D4	-0.0056	-0.0027	0.0034	0.0744	-0.0083	-0.0187
R-square	0.136	0.136	0.349	0.349	0.151	0.151
Adjusted R-square	0.089	0.089	0.096	0.096	0.102	0.102
Number of SEOs	183	507	63	57	120	450

This table reports coefficient estimates from regressions of Cumulative Average Abnormal Returns (CAAR) for bought deals on expected determinants. It includes overall SEOs for the pre-CSOX period (regression 1) and post-SOX period (regression 2) by Canadian issuers. Similarly, regressions (3) and (4) show coefficient estimates for the pre-and-post CSOX periods for cross-listed issuers; and regressions (5) and (6) for non-cross-listed issuers. The model of CAAR on expected determinants is $CAR_i = a_0 + (a_1 + \delta_{Beta}DumPer2)Beta_i + (a_2 + \delta_{Runup}DumPer2)Runup_i + (a_3 + \delta_{OfferSize}DumPer2)OfferSize_i + (a_4 + \delta_{LeadUnderwriter}DumPer2)LeadUnderwriter_i + \ldots + a_t DYearCrisis_{\tau=2007} + \ldots + a_{t+n}DYearCrisi_{\tau=2009} + \varepsilon_i$. *The section Determinants of Price Response for Bought Deals and Marketed Underwritten Offers defines CAR and expected determinants; also, it examines coefficient estimates. ***, ** and * stand for significance at the 1, 5 and 10 percent levels*

Table 3 reports regressions of abnormal returns (CAAR) on expected determinants for marketed underwritten offers for *overall* SEOs (161), including *cross-listed* (75) and *non-cross-listed* (86), using equation 2. Coefficient estimates with significance are for the pre-CSOX period only, and only for *overall* and *cross-listed* SEOs. Explanation of coefficients is as follows. The coefficient estimate of *Runup* is positive and significant for *overall* SEOs (0.0843, regression 1) and *cross-listed* offers (0.1485, regression 3) for the pre-CSOX period only. These results show cumulative returns pre-announcement have a positive effect on shares price by lowering the offer information asymmetry, which is consistent with Myers and Majluf (1984). On the other hand, the coefficient estimate of *OfferSize* is negative and highly significant for *cross-listed* offers and the pre-CSOX period only (-0.4349, regression 3). This result says the higher offer size, the more negative market price response. This finding aligns with the price pressure hypothesis (Scholes, 1972; Asquith and Mullins, 1986; Masulis and Korward, 1986; and Loderer, Kooney, and Van Drunnen, 1991). The coefficient estimate of *LeadUnderwriter* is negative and significant for *overall* SEOs and for the pre-CSOX period only (-0.0142, regression 1). This suggests the market does not welcome offerings led by reputable underwriters, which is counterintuitive. The coefficient estimate of *DumOAO* is positive and highly significant for *cross-listed* offers and the pre-CSOX period only (0.0849, regression 3). This result shows investors welcome the stock offer because does not reflect overpricing (Ritter, 1998). The coefficient estimate of *ChTrades* is negative and slightly significant for *cross-listed offers* and the pre-

CSOX period only (-0.1570, regression 3). This result means trading volume has a slightly negative effect on the shares price. This is consistent with the assumption that changes in number of trades suggest unfavorable information content (Jiang and Kryzanowski, 1998). The coefficient estimate of *RetVolatility* is positive and slightly significant for *cross-listed* offers and the pre-CSOX period only (1.7864, regression 3). This result suggests markets welcome return volatility, which is counterintuitive. This result is similar to bought deals before. Other determinants, including the dummies for intended use of the offering, are not significant across different SEO categories. The signed coefficient estimates (unreported) of year dummies for marketed underwritten offers during the financial crisis years (2007 – 2009), that are at least slightly significant, are as follows. For *overall* offers, the coefficient estimate is negative and significant for 2009 (-0.1070) only. For *cross-listed* offers, the coefficient estimates are not significant for 2007, 2008 and 2009. For *non-cross-listed* offers, the coefficient estimate is slightly significant for 2009 (-0.0880) only. These results shows the financial crisis period also had a different effect on price response for *all* offers, including *cross-listed* and *non-cross-listed*, respectively.

Table 3: Regressions of CAAR on Expected Determinants for Marketed Underwritten Offers: Pre and Post-CSOX periods

	Overall SEOs		**Cross-Listed**		**Non-Cross-Listed**	
Variables	**(1) Pre-CSOX**	**(2) Post-CSOX**	**(3) Pre-CSOX**	**(4) Post-CSOX**	**(5) Pre-CSOX**	**(6) Post-CSOX**
Constant	-0.0349	-0.0349	-0.0607	-0.0607	-0.0186	-0.0186
Beta	0.0195	-0.0131	0.0234	0.0347	0.0049	-0.0304
Runup	0.0843**	0.0795	0.1485**	0.0546	0.0376	0.0412
OfferSize	-0.0646	0.0387	-0.4349***	0.0645	0.0111	0.0308
LeadUnderwriter	-0.0142**	-0.0087	0.0070	-0.0323	-0.0051	-0.0014
DumGlo	-0.0121	-0.0379	-0.0003	-0.1140	--	--
DumOAO	0.0114	-0.0216	0.0849***	0.0207	-0.0342	-0.0223
VolTO	-0.2450	-0.0038	-0.2400	-1.1570	-0.1650	0.0470
ChTrades	-0.0170	0.0130	-0.1590*	0.0270	0.0235	-0.0345
RSecondary	-1.9900	0.8890	0.6470	20.9000	-3.2700	1.7800
RetVolatility	-0.0095	0.1506	1.7864*	1.0789	-0.3938	1.1941
D1	0.0365	-0.0006	0.0133	0.0336	0.0555	-0.0750
D2	0.0235	-0.0125	0.0320	0.0806	0.0274	-0.0325
D3	-0.0403	-0.0358	-0.0499	0.0570	-0.0020	-0.0575
D4	0.0281	-0.0335	0.0469	0.0658	0.0231	-0.0857
R-square	0.274	0.274	0.519	0.519	0.378	0.378
Adjusted R-square	0.066	0.066	0.145	0.145	0.014	0.014
Number of SEOs	109	52	54	21	55	31

This table reports coefficient estimates from regressions of Cumulative Average Abnormal Returns (CAAR) for marketed underwritten offers on expected determinants. It includes overall SEOs for the pre-CSOX period (regression 1) and post-SOX period (regression 2) by Canadian issuers. Similarly, regressions (3) and (4) show coefficient estimates for the pre-and-post CSOX periods for Cross-listed issuers; and regressions (5) and (6) for non-cross-listed issuers. The model of CAAR on expected determinants is $CAR_i = a_0 + (a_1 + \delta_{Beta}DumPer2)Beta_i + (a_2 + \delta_{Runup}DumPer2)Runup_i + (a_3 + \delta_{OfferSize}DumPer2)OfferSize_i + (a_4 + \delta_{LeadUnderwriter}DumPer2)LeadUnderwriter_i + \ldots + a_t DYearCrisis_{\tau=2007} + \ldots + a_{t+n}DYearCrisi_{\tau=2009} + \varepsilon_i$. *The section Determinants of the Price Response for Bought Deals and Marketed Underwritten Offers defines CAR and expected determinants; also, it examines coefficient estimates. ***, ** and * stand for significance at the 1, 5 and 10 percent levels.*

A summary of regression results from Tables 2 and 3 is as follows. Based on results from Table 2, this study finds most determinants of bought deals are *not* the same for the pre- and post-CSOX periods. It occurs even when considering three SEO categories: *overall*, *cross-listed,* and *non-cross-listed*. The only determinant that is significant for the pre- and post-CSOX periods is trading volume (*VolTO*), mostly for *non-cross-listed* offers. This result shows trading volume relates with favorable price response by investors. This is because of reduced private information content of the offer (that is, less information asymmetry). On the other hand, from Table 3, determinants of marketed underwritten offers that show significance are for the pre-CSOX period and *overall* SEOs and *cross-listed* offers only. In short, no common determinants exist for bought deals and marketed underwritten offers when considering *all* SEOs, including *cross-listed* and *non-cross-listed*, for the pre- and post-CSOX periods. These results reveal that determinants for bought deals and marketed underwritten offers changed after CSOX across all SEO categories.

CONCLUDING COMMENTS

This research explores the effects Canadian SOX had on expected determinants of price response to equity offering announcements of Canadian bought deals and marketed underwritten offers. Canadian SOX is an essential piece of legislation equivalent to the U.S. Sarbanes-Oxley of 2002. Both laws have resulted in large changes in corporate governance, improved disclosure, and compliance costs by public corporations. From these laws companies need also to provide proper financial information to investors when announcing stock offerings. Bought deals and marketed underwritten offers are two methods of choice that Canadian publicly traded companies use when announcing equity offerings in stock markets. When a company announces a stock offering, a negative price response usually occurs immediately after. Many theories (for example, price pressure, information asymmetry, agency cost) try to explain the reasons for the adverse market reaction, which on average, is minus two percent.

The objectives of this paper are to answer the following questions. Are determinants of market reaction to announcing bought deals (and marketed underwritten offers) the same before and after Canadian SOX? What determinants are significant for each underwriting method -before and after CSOX? This study include fifteen determinants from previous research on seasoned equity offerings to answer these questions. It finds determinants for bought deals that are important differ for the pre- and CSOX periods and across different SEO categories (for example, *all* bought deals, *cross-listed*, and *non-cross-listed.* On the other hand, marketed underwritten offers do not show consistent determinants for the pre- and post-CSOX periods. Also, none of the determinants are significant during the post-CSOX period for all stock offer categories. These results show Canadian SOX had a different effect on expected determinants for bought deals and marketed underwritten offers, respectively. The key point of this study is as follows. Public companies and scholars should be aware that relevant determinants of price response to offer announcements in a period of time may not be in following periods. Mostly, when important regulatory changes -such as the Canadian SOX- occur. This is regardless of the underwriting method chosen for stock offerings examined here. Limits of this study. It does not include data on stock offerings beyond 2011 because of data constraints. For the same reason, it omits determinants that are significant from previous research studies. Future research is extending the sample of stock offerings beyond 2011. Also, finding new determinants from different data sources to get results more robust. This should provide more useful information to Canadian companies when deciding the underwriting method for stock offerings. It will mitigate the negative price response on shares price around the time of announcing the offer.

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THE MAGNET EFFECT UNDER RELAXED DAILY PRICE LIMITS: EVIDENCE FROM TAIWAN

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ABSTRACT

This study investigates the magnet effect after relaxing the daily price limits in the Taiwan Stock Exchange by using a logit model, as proposed by Hsieh, Kim, and Yang (2009). Our empirical results indicate that the magnet effect disappears after the relaxed daily price limits, especially in the down market. That is, the relaxation of the daily price limits lowers market volatility and thus facilitate market stability. Our empirical findings have important policy implications for regulators who are especially concerned about financial market stability and capital market development due to the price limit changes.

JEL: G14, G15, G18

KEYWORDS: Price Limits, Magnet Effect, Logit Model

INTRODUCTION

The famous event in financial history called "Black Monday" occurred on October 19, 1987. In the United States, the Dow Jones Industrial Average fell 508 points and the global stock market also crashed abnormally; the impact of the Lehman Brothers incident in September 2008 caused many global stock markets to fall sharply; on May 6, 2010, the Dow Jones Industrial Index fell 600 points. All of these events caused heavy losses to investors due to rapid falls in stock prices over a short time period. These events also led to the development of circuit breakers. One of the circuit breaker mechanism is the price limits, which stipulate that the daily stock price can only fluctuate within a range and have been adopted by many countries such as Taiwan, South Korea, Malaysia, Thailand, and Japan to stabilize stock prices. Although daily price limits have been adopted by many exchanges across the world for the last few years, there has been no consistent conclusion in academia about its impact on market quality.

Previous studies believe that limiting the fluctuations can reduce overreactions in the market, effectively reduce the volatility of stock prices, temporarily cool investors, and provide sufficient time to reevaluate trading strategies and avoid certain irrational trading behaviors to achieve a cooling-off effect (see Greenwald and Stein, 1991; Lee and Kim, 1995). Opponents argue that limiting fluctuations fails to reduce the market's volatility, affects the quality of the market, and produces other problems such as the magnet effect. Fama (1989) once proposed that the daily price limits would result in a magnet effect. He believed that investors may be more active in trading when a stock price is close to its up (down) limit, out of concern that individual stocks cannot be bought (sold), thus increasing irrational investment behavior. If such a phenomenon exists substantially in the market, they will cause the stock price to accelerate toward the up (down) limit and then reach the up (down) limit in a phenomenon called the magnet effect. Subrahmanyam (1994) was the first to use the theoretical model to verify whether the magnet effect exists when the stock market establishes a limit for fluctuations; their results support the existence of a magnet effect in the market.

From the opposing scholars' arguments, we found that establishing a daily price limits both negatively impacts the market's efficiency, volatility, and liquidity and encourages investors to perform irrational trading behaviors. In recent years, market participants have become more mature. To create a more efficient securities market and integrate this with the international market to enhance competitiveness, Taiwan officially relaxed the daily price limits from 7% to 10% on June 1, 2015. The Taiwan's equity market is dominated by retail investors who are easily affected by emotions. Past literature indicate that the magnet effect exists in the Taiwan's stock market (see Hsieh, Kim, and Yang, 2009; Wang, Hsiao, and Lin, 2012). Based on the above reasoning, this study intends to use the listed stocks in the Taiwan securities market as a sample and explore whether the magnet effect will be delayed when price limits are relaxed by using the logit model proposed by Hsieh, Kim, and Yang (2009).

Most past research in this area has focused on testing whether there is a magnet effect in the stock market or when it happens. However, relatively few studies have focused on the changes in the magnet effect that result from changes in price limits. Therefore, this article hopes to study through changes in Taiwan's regulation to explore whether the magnet effect in the market will change when the market's fluctuations are adjusted. Our empirical results indicate that in the up model, the magnet effect starts when the share price is four tick sizes away from the up limit both before and after the restructuring. The magnet effect did not happen either earlier or later due to the relaxation of the price limits to 10%. Moreover, we could observe that in the down model, the magnet effect started when the price was three tick sizes away from the down limit prior to restructuring. However, the magnet effect became insignificant after restructuring, whether the distance to the down limit was 2–6 tick sizes away. The empirical results support our research hypothesis, indicating that after the price limit is relaxed from 7% to 10%, the magnet effect disappears in the down market. Overall, our empirical findings indicate that the relaxation of price limits would reduce the magnet effect and lower the short-run market volatility, thereby promoting sustainable development in capital markets. Our analysis and results have important policy implications for policy makers in terms of reforming the regulation of financial markets. We first briefly review prior literature and proposes the hypotheses. Then, we introduce the background of Taiwan Stock Exchange. We also describe the data and methodology. Finally, we present the empirical results and conclude in the final section.

LITERATURE REVIEW

Price Limits

There are two schools of thought in academia regarding the effectiveness of price limits. Supporters believe that price limits can effectively reduce stock price volatility. For example, Greenwald and Stein (1991) believed that price limits can calm investors, allowing them space to rethink and collect new information and thus reduce stock price volatility. Lee and Kim (1995) tested whether price limits could effectively reduce stock price volatility. This study examined the South Korean stock market in 1980–1989 and summarized that price limits can indeed reduce volatility. In addition, Kim, Liu, and Yang (2013) studied the Chinese stock market to compare before and after the establishment of daily price limits. The research discovered that the limits of price fluctuations could reinforce the discovery of equilibrium prices, moderately suspend volatility, and alleviate abnormal trading activities. The research also pointed out that price restrictions could help a collapsed market recover. Opponents believe that price limits negatively impact the market's quality. Kim and Rhee (1997), and Bildik and Gulay (2006), studied the Tokyo Stock Exchange for 1989–1992 and the Istanbul Stock Exchange for January 5, 1998–December 9, 2002. By testing delayed price discovery, volatility spillover, and trading interference through analyzing stock prices, they wanted to analyze whether daily price limits benefited the market; they concluded that price limits do not benefit the stock market. Chang and Ma (2012) also selected the Taiwan's stock market as their research target to analyze the frequency with which individual stock prices reached their price limits by observing jumps in stock prices for 1996–2005. Then, they simulated different ranges of daily price limits relaxations (10%, 12%, and 15%) to record the frequency with which stock prices reached their price limits. The simulation results indicated that when restrictions on fluctuations are relaxed, the frequency of stock price jumps greater than the fluctuations is approximately half of the original frequency. The study also discovered that the Taiwan's stock market has delayed price discovery. Relaxing daily price limits can increase market efficiency. Kim and Limpaphayom (2000) did not discuss the effectiveness of price limits but explored the characteristics of stocks that may be more susceptible to price limits. They selected Taiwan's and Thailand's Stock Exchanges as research samples and found that stocks with high volatility, small market capitalization, and frequent trading were more likely to reach their daily limit.

Magnet Effect

In addition to the negative impact on the market, the price limits also affect investors' trading behaviors and cause the magnet effect. The term "magnet effect" was first introduced by Fama (1989); he believed that price limits alter investors' trading strategies in that when stock prices move closer to the limit up or limit down price, investors become more active in submitting orders out of fear of a potential trading halt. When such phenomena exist abundantly in the market, stock prices would move closer to the limit up or limit down price, forcing certain stocks to reach the daily price limits that would not have happened otherwise. Subrahmanyan (1994) was the first to discuss the limit of price fluctuations in a theoretical model. The research found that when the market introduced a circuit-breaking mechanism, stock prices tended to fluctuate more, the probability of a stock price reaching its limit increased substantially, and the magnet effect exists. After that, many studies started discussing whether stock markets in different countries have similar magnet effects and many articles found that this phenomenon exists. In Chen (1997), the trading volume may increase significantly when a stock price approaches its price limit. The reason for this is that investors execute their orders early in fear of a trading halt.

The study analyzed 390 public shares in the Taiwan's stock market in 1994 and the empirical results showed that as the share price approached its price limit, the trading volume increased significantly, indicating that the magnet effect exists in the Taiwan stock market. Additionally, Du, Liu, and Rhee (2006) took the Korean stock market as the research object, selecting individual stocks that reached their daily price limits in September 1998–March 1999. The study pointed out that there is a magnet effect in the Korean stock market. In addition, it found that the narrower the range of price limits, the stronger the magnet effect. Hsieh, Kim, and Yang (2009) used a Logit model to analyze changes in stock prices and selected 439 stocks listed on the Taiwan's stock market in 2000 as their research target. Their results showed that as the stock price got closer to the price limit, the probability of the stock price reaching its price limit would also increase significantly. The research proves that the magnet effect exists for both the up and down limits in the Taiwan's stock market. Moreover, the study also pointed out that the magnet effect of ascending and descending stock prices does not exist in the same positions. The magnetic effect occurs nine tick sizes away from the up limit but only four tick sizes away from the down limit. Wang, Hsiao, and Lin (2012) also analyzed the Taiwan's stock market using the sample period of January 2007–June 2008. Their research results also supported the cause of the magnet effect from daily price limits. The research discovered that price limits impacted market makers' order strategies.

The magnet effect can also occur asymmetrically, that is, only while the share price either ascends or descends. Cho, Russell, Tiao, and Tsay (2003) used the GARCH model and GMM to detect whether the magnet effect exists in the Taiwan's stock market. The study collected the stock market rate of return every five minutes on the Taiwan's stock market for March 1, 1998–March 20, 1999. The empirical results found that the magnet effect exists when the prices approached their up limits, but the effect was not significant when prices approached their down limits. Nath (2003) examined the Indian stock market for March 1993–April 2000 with the hypothesis that as share prices approached their daily price limits, investors would submit orders more actively, thus shortening the time between each order. The study found that as share prices approached their down limits, the average time between orders decreased, signaling the magnet effect. However, this effect was not significant when share prices approached their up limits. Chan, Kim, and Rhee (2005) based their study on the Malaysian stock market for 1995–1996 and inspected whether the magnet effect exists in relatively loose daily price limits. Their results showed that the magnet effect exists in the Malaysian stock market when the stock price was closer to its up limit. In addition, some literature discussed whether the magnet effects would be different for different types of investors. Wong, Chang, and Tu (2009) selected the stocks of 711 listed companies in the Taiwan's stock market for January 1, 2004–December 31, 2004 as the research object and divided the investors into institutional investors and retail investors. Compared to institutional investors, the magnet effect was stronger for retail investors. They believe that the magnet effect in the Taiwan's stock market was caused by individual investors given that individual investors have less information and trade more actively, thus accelerating the pace at which stock prices approach their price limits.

HYPOTHESIS DEVELOPMENT

Previous research mentioned that the magnet effect exists in the Taiwan's stock market; for example, Chen (1997), Cho, Russell, Tiao, and Tsay (2003), Wong, Chang, and Tu (2009), Hsieh, Kim, and Yang (2009), Wang, Hsiao, and Lin (2012). This study believes that due to the relaxation of daily price limits, reaching price limits is more difficult. Thus, investors would alleviate worries about trading halts as a result of rapidly approaching price limits, thereby reducing irrational trading behavior and delaying the magnet effect or even making the magnet effect disappear. In other words, for the delayed magnet effect, when daily price limits are relaxed to 10%, the position at which the magnet effect occurs, measured as the number of ticks would be less than before restructuring. These predictions lead to the following hypothesis:

Hypothesis: *After the price limit is relaxed from 7% to 10%, the magnet effect will be delayed or disappear.*

The Introduction of Taiwan Stock Exchange

The Taiwan Stock Exchange centralized trading market is one of the most active markets in the Asia-Pacific region. According to the Taiwan Securities Exchange Annual Report on Securities Statistics, at the end of 2015, there were 874 listed companies in total with a combined market value of approximately $24.503 trillion NTD, a total annual transaction value of approximately $20.191 trillion NTD in 511,248,018 transactions. The annual turnover rate was 74.45%. The Taiwan Stock Exchange was established on February 9, 1962. Since Taiwan's stock market is dominated by retail investors, the government initially set a limit of 5% to avoid significant losses for investors due to drastic changes in stock prices, thus stabilizing stock prices and protecting investors. To comply with investors' and public opinions' requests, the range of fluctuations was relaxed to 7% on October 11, 1989. As market participants have gradually matured in recent years, to create a more efficient securities market, for integration with the international market, and to enhance competitiveness, the government relaxed the daily stock price fluctuation limits from 7% to 10% on June 1, 2015. In addition, the government had flexibly adjusted the limits of fluctuations in response to major political and economic events at home and abroad to prevent the stock market from being affected and causing serious fluctuations. Table 1 provides further details.

Table 1: Overview of Historical Changes in Fluctuation Limits

Time	Fluctuation Limit	Note
February 09, 1962	-5%~+5%	First implementation of fluctuation limit
April 09, 1973	-3%~+3%	Only applicable to second board (TIGER Board) stocks
August 08, 1973	-5%~+5%	
February 19, 1974	-1%–+5%	Oil Crisis
March 19, 1974	-5%~+5%	
April 15, 1974	-1%~+1%	
May 21, 1974	-3%~+3%	
June 17, 1974	-5%~+5%	
December 19, 1978	-2.5%~+2.5%	The second Oil Crisis
January 05, 1979	-5%~+5%	
October 27, 1987	-3%~+3%	Global stock market crashes
November 14, 1988	-5%~+5%	
October 11, 1989–September 26, 1999	-7%~+7%	The first relaxation to 7%
September 27–October 08, 1999	-3.5%~+7%	The 921 Jiji Earthquake
March 20–March 24, 2000	-3.5%~+7%	Presidential Election, the first party alteration
October 04–October 11, 2000	-3.5%~+7%	The resignation of Tang Fei, the Premier of the Republic of China
October 20–November 07, 2000	-3.5%~+7%	Persistent languish in the stock market
November 21–end of year, 2000	-3.5%~+7%	US Dot Com Bubble Crash
September 19–September 21, 2001	-3.5%~+7%	US September 11 attacks
October 13–December 31, 2008	-3.5%~+7%	Global financial crisis
June 01, 2015–Present	-10%~+10%	First relaxation to 10%

Source: Taiwan Stock Exchange and this study

DATA AND METHODOLOGY

Sample Selection and Variable Definition

The Taiwan Mid-Cap 100 Index is an index that consists of 100 mid-cap stocks. Its constituent stocks include major industries such as electronics, finance, and traditional industries. The index sorted listed stocks based on market capitalization, free float, and liquidity and then selected the 51^{st}–150^{th} company stocks, totaling 100 companies. The index has a certain degree of correlation with the overall stock market in Taiwan, so this study uses the constituent stocks of the Taiwan Mid-Cap 100 Index in 2015 as a research sample. The relevant data sources were taken from the Taiwan Stock Exchange and Taiwan Economic Journal. We obtained the daily closing prices of individual stocks and a list of the constituent stocks of the mid-cap 100 index from the Taiwan Stock Exchange. The Taiwan Economic Journal provides trading information for individual stocks such as stock codes, daily stock prices, transaction volumes, transaction prices, and matching times. To test whether the magnet effect is delayed after changing the daily price limits, the sample period of the study was selected as three months before and after the system change, from March 1, 2015–August 31, 2015, totaling 127 trading days. The final sample includes 12,700 firm-year observations. To verify the hypothesis of this study, we follow the method of Hsieh, Kim, and Yang (2009) to detect the magnet effect by using the logit regression model to estimate the probabilities and examine the relationship between the distance from price limits and the probability of the price rising (falling). The logit model is specified as follow:

$$\ln\left(\frac{P(Y_k = 1|X_k)}{1-P(Y_k = 1|X_k)}\right) = X_k' A \tag{1}$$

The up (down) model can help us detect the magnet effect when stock prices are rising (falling). For the up (down) model, when the price of the k^{th} period is more (less) than the price of the $(k-1)^{th}$ period, $Y_k = 1$. If the magnet effect exists, the probability of the price rising (falling) would increase greatly when the stock price approaches the upper (lower) price limit. We follow previous studies to incorporate the time duration of trades, the trading volume, the distance to price limits, the position of the magnet effect, the stock index returns, the bid-ask spread, and the buyer/supplier-initiated transaction as our independent variables (X) to capture the features of the trading prices changes. According to Easley and O'Hara (1992), the longer the time duration of trades, the lower their impact on the transaction prices. To capture the effect of time duration of trades, we thus consider the variable ΔTD_k as one of our independent variable. Karpoff (1987) studied the relationship between stock price changes and trading volume and pointed out that there is a positive relationship between the two. Therefore, we add lag three periods of trading volume (Vol_{k-p}) $(p = 1,2,3)$ to capture the trading volume impact on prices. In addition, as pointed out by Hsieh, Kim, and Yang (2009) in support of the magnet effect, as share prices approach the price limits, the probability of the magnet effect occurring increases. We use the variable DT_{k-1} to represent the distance between share prices and price limits, defined as the distance between the share price and price limits in the $(k-1)^{th}$ period. Assuming that the magnet effect exists, the closer the stock price is to the price limits, the higher the probability that it reaches the price limits, indicating a negative correlation between the two. We also use the variable DT_{k-1}^{m} indicates whether the $(k-1)^{th}$ period trading price falls in the range of m tick sizes from the price limits, which is used to capture the position whether the magnet effect occurs. Then, to capture the market's effect on price changes, we follow Hsieh, Kim, and Yang (2009) to control the market-wide effects on price movements by including the Mkt_{k-p} variable, defined as the return of the Taiwan Capitalization Weighted Stock Index in the $(k-p)^{th}$ period, where $p = 1,2,3$. Referencing Brockman and Chung (1999), this study also include the $Spread_{k-1}$ variable to capture the bid–ask bounce effect and the liquidity effect. Finally, to identify whether a transaction was initiated by the buyer or the seller, the study refers to Hsieh, Kim, and Yang (2009)'s model and adds the BSI_{k-p} variable in our model. Also, the $Vol_{k-p} \times BSI_{k-p}$ $(p = 1,2,3)$ variable was added to measure the impact of a unit of trading volume when the transaction was either buyer- or supplier-initiated.

<u>Empirical Models</u>

This study deployed the Logit model, which is a non-linear regression model developed by Berkson in 1944. The dependent variables are usually binary (e.g. yes/no, success/failure) and represented by 0 and 1, which is applicable for binary classification problems. In the up (down) models in this study, 1 is assigned to the states where the stock price is higher (lower) than the previous period, and 0 otherwise. With the abovementioned variable definition and description, we represent $X_k'A$ using the following regression equation:

$$X_k'A = a_0 + a_1\Delta TD_k + a_2Vol_{k-1} + a_3Vol_{k-2} + a_4Vol_{k-3} + a_5DT_{k-1} + a_6DT_{k-1}^{m} \times DT_{k-1} + a_7Spread_{k-1} + a_8BSI_{k-1} + a_9BSI_{k-2} + a_{10}BSI_{k-3} + a_{11}Vol_{k-1} \times BSI_{k-1} + a_{12}Vol_{k-2} \times aSI_{k-2} + a_{13}V_{olk-3} \times BSI_{k-3} + a_{14}Mkt_{k-1} + a_{15}Mkt_{k-2} + a_{16}Mkt_{k-3} \quad (2)$$

ΔTD_k represents the time from the $(k-1)^{th}$ period to the k^{th} period in minutes; Vol_{k-p} represents the trading volume in the $(k-p)^{th}$ period; DT_{k-1} represents the distance between the share price and price limits in the $(k-1)^{th}$ period; DT_{k-1}^{m} is a dummy variable with 1 when the trading price in the $(k-1)^{th}$ period falls between m tick sizes from price limits, 0 otherwise; $Spread_{k-1}$ is the bid–ask spread in the $(k-1)^{th}$ period, 0 if bid or ask prices did not exist in the trading period; BSI_{k-p} is a dummy variable with 1 if the trading price in the $(k-p)^{th}$ period is greater than the average of the bid and ask prices, -1 if the trading price is less than the average of the bid and ask and 0 otherwise; Mkt_{k-p} represents the return on the Taiwan Capitalization Weighted Stock Index in the $(k-p)^{th}$ period. Since the existing literature does not clearly indicate where the magnet effect starts, past studies have usually chosen an arbitrary location. We added dummy variables to capture all possibilities for forming a threshold price (see Kim and Yang, 2004), observing where the magnet effect starts through dummy variables. To achieve the research objective, we will aggregate the coefficients a_5 and a_6 and convert it to the probability of continuing to move toward the price limits. Then, we calculated the mean and median of these probabilities to find where the magnet effect starts.

EMPIRICAL RESULTS

Estimation of the Logit Regression Model

To complete the hypothesis of this study, we separated the data period into pre-restructuring and post-restructuring and referred to the model in Hsieh, Kim, and Yang (2009)'s research to include the companies of Taiwan's Mid-Cap 100 index stocks in the up model and the down model to compare the difference between the magnet effect before and after the restructuring. Table 2 presents the regression results when the stock price is 2–6 tick sizes away from the daily price limit in the up model before and after restructuring at a 5% confidence level. The study counts the signs of the coefficients for each variable and uses the majority sign to represent the most possible sign for that coefficient. The coefficient is represented by 0 if not significant. From Table 2 we can observe that in the up model, the coefficient changes are not much different before and after the restructuring. Table 2 shows that the signs of coefficient a_2 of Vol_{k-1} are positive, indicating that if the trading volume increases significantly in the current period, share prices will more likely rise in the next period. Additionally, the coefficient of DT_{k-1}, a_5 is negative, signaling that as a share price approaches its up limit, it becomes more likely that the share price will increase, a negative correlation between the distance from the limit and the probability of price increases. We also discovered that the coefficient of Mkt_{k-1}, a_{14} is positive both before and after restructuring, meaning that as the market trends upward, the more likely the share prices will increase, signaling that share price increases correlate positively with market trends.

Table 2: Estimations Results of Logit Regression Model in the Up Model

Pre-restructuring																	
	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
2	-	0	+	0	0	-	0	+	-	+	+	+	+	0	+	0	0
3	-	0	+	0	0	-	0	+	-	+	+	+	+	0	+	0	0
4	-	0	+	0	0	-	0	+	-	+	+	+	+	0	+	0	0
5	-	0	+	0	0	-	0	+	-	+	+	+	+	0	+	0	0
6	-	0	+	0	0	-	0	+	-	+	+	+	+	0	+	0	0
Post-restructuring																	
	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
2	-	0	+	0	0	-	0	+	-	+	+	+	0	0	+	0	+
3	-	0	+	0	0	-	0	+	-	+	+	+	0	0	+	0	+
4	-	0	+	0	0	-	0	+	-	+	+	+	0	0	+	0	0
5	-	0	+	0	0	-	0	+	-	+	+	+	0	0	+	0	+
6	-	0	+	0	0	-	0	+	-	+	+	+	0	0	+	0	+

Note 1. $X_k'A = a_0 + a_1\Delta TD_k + a_2Vol_{k-1} + a_3Vol_{k-2} + a_4Vol_{k-3} + a_5DT_{k-1} + a_6DT_{k-1}^m \times DT_{k-1} + a_7Spread_{k-1} + a_8BSI_{k-1} + a_9BSI_{k-2} + a_{10}BSI_{k-3} + a_{11}Vol_{k-1} \times BSI_{k-1} + a_{12}Vol_{k-2} \times BSI_{k-2} + a_{13}Vol_{k-3} \times BSI_{k-3} + a_{14}kt + a_{15}Mkt_{k-2} + a_{16}Mkt_{k-3}$。 *2. At the 5% confidence level, when the distance of the stock price from the up limit is 2–6 tick sizes, these are the possible signs of each coefficient. If the p-value > 0.05, it is represented by 0.*

Table 3 shows the possible signs of the coefficients for each variable when the stock price is 2–6 tick sizes from the down limit under the 5% confidence level before and after restructuring. Insignificant coefficients are indicated by 0. Table 3 shows that the signs of coefficients changed insignificantly before and after the restructuring. Next, we find that the coefficients of Vol_{k-1}, a_2 are positive, meaning that if the trading volume in the previous period increases significantly, the stock price for this period will fall more easily. In addition, although a_5—the coefficient of DT_{k-1}—is less significant than in the up model, they are mostly negative, indicating that that the closer the stock price is to the down limit, the more likely the stock price will fall. The coefficients of Mkt_{k-1}, a_{14} are both negative before and after the restructuring. When the market trend decreases, the stock price will more likely fall, which indicates that the stock price decline is negatively correlated with the market trend.

Table 3: Estimations Results of Logit Regression Model in the Down Model

Pre-restructuring																	
	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
2	-	+	+	0	0	-	0	+	+	-	-	-	-	0	-	0	0
3	-	+	+	0	0	-	0	+	+	-	-	-	-	0	-	0	0
4	-	+	+	0	0	-	0	+	+	-	-	-	-	0	-	0	0
5	-	+	+	0	0	0	0	+	+	-	-	-	-	0	-	0	0
6	-	+	+	0	0	0	0	+	+	-	-	-	-	0	-	0	0
Post-restructuring																	
	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
2	-	+	+	0	0	-	0	+	+	-	-	-	0	0	-	0	-
3	-	+	+	0	0	0	0	+	+	-	-	-	0	0	-	0	-
4	-	+	+	0	0	-	0	+	+	-	-	-	0	0	-	0	-
5	-	+	+	0	0	0	0	+	+	-	-	-	0	0	-	0	-
6	-	+	+	0	0	-	0	+	+	-	-	-	0	0	-	0	-

Note ： 1. $X_k'A = a_0 + a_1\Delta TD_k + a_2Vol_{k-1} + a_3Vol_{k-2} + a_4Vol_{k-3} + a_5DT_{k-1} + a_6DT_{k-1}^m \times DT_{k-1} + a_7Spread_{k-1} + a_8BSI_{k-1} + a_9BSI_{k-2} + a_{10}BSI_{k-3} + a_{11}Vol_{k-1} \times BSI_{k-1} + a_{12}Vol_{k-2} \times BSI_{k-2} + a_{13}Vol_{k-3} \times BSI_{k-3} + a_{14}kt + a_{15}Mkt_{k-2} + a_{16}Mkt_{k-3}$。 *2. At the 5% confidence level, when the distance of the stock price from the up limit is 2–6 tick sizes, these are the possible signs of each coefficient. If the p-value > 0.05, it is represented by 0.*

Analysis of the Magnet Effect

To examine the location of the magnet effect, we first estimated the coefficients of DT_{k-1} and $DT_{k-1}^m \times DT_{k-1}$—$a_5$ and a_6—for the constituent companies in the Taiwan Mid-Cap 100 Index and then found the average and median from these estimates. We then aggregated the a_5 and a_6 of these 100 companies, converted them into the probability of the continuing rise/fall movement, and calculated the average and median from these probability values. The formula with which to calculate probabilities was $e^{-(a_5+a_6)} - 1$. According to Hsieh, Kim, and Yang (2009), when the conditional probability of the average was <2%, it can be regarded as the location where the magnet effect starts to occur. Table 4 shows the average and median values of a_5, a_6, and $a_5 + a_6$ in the up model when the stock price is 2–6 tick sizes away from the up limit before and after the restructuring. The table also shows the probability of the stock price continuing to ascend to the up limit given the distance to the up limit in tick size. From Table 4, we can see that before the restructuring, when the stock price is four tick sizes away from the up limit, the probability that the stock price will continue to move toward the up limit is 1.31%, i.e. <2%.

This indicates that the magnet effect starts when the distance is four tick sizes away. Next, we observe that after the restructuring, when the stock price is four tick sizes away from the up limit, the probability that the stock price will continue to move to the up limit is 0.65%, which is <2%, indicating that the magnet effect starts when the distance is four tick sizes away.

From the above table, no matter before or after the restructuring, the location of the magnet effect is four tick sizes away from the up limit with no advance or delay. Similar to Table 4, Table 5 shows the average and median values of a_5, a_6, and $a_5 + a_6$ in the down model when the stock price is 2–6 tick sizes away from the down limit before and after the restructuring. In addition, the table shows the probability of the stock price continuing to descend to the down limit given the distance to the down limit in tick size. From Table 5, we can see that before the restructuring, when the stock price was three tick sizes away from the down limit, the probability that the stock price would continue to move toward the down limit is 0.72%, which is <2%; this indicates that the magnet effect starts when the distance is three tick sizes away. Additionally, we can observe that after restructuring, the probabilities that the stock price will continue to descend toward the down limit are >2% when the share price is 2–6 tick sizes away from the down limit. As a result, where the magnet effect starts to occur is inconclusive after restructuring and the magnet effect is less significant. Overall, our empirical results for the down model confirm our hypothesis.

Table 4: Conditional Probability of the Regression Results in the UP Model

Pre-restructuring								
m	a_5		a_6		$a_5 + a_6$		**Average probability of $a_5 + a_6$ (%)**	**Median probability of $a_5 + a_6$ (%)**
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**		
2	-0.0036	-0.0023	0.0609	0.0000	0.0574	-0.0023	7.07	0.60
3	-0.0032	0.0000	0.1322	0.0000	0.1290	0.0000	3.43	0.67
4	-0.0032	0.0000	0.0960	0.0000	0.0928	0.0000	1.31	0.64
5	-0.0032	0.0000	0.0497	0.0000	0.0465	0.0000	0.78	0.61
6	-0.0028	0.0000	0.0175	0.0000	0.0148	0.0000	5.47	0.74
Post-restructuring								
m	a_5		a_6		a_5		**Average probability of $a_5 + a_6$ (%)**	**Median probability of $a_5 + a_6$ (%)**
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Mean**		
2	-0.0017	0.0000	0.0893	0.0000	0.0876	0.0000	6.40	0.57
3	-0.0017	0.0000	0.1026	0.0000	0.1009	0.0000	2.82	0.57
4	-0.0017	0.0000	0.0949	0.0000	0.0932	0.0012	0.65	0.56
5	-0.0017	0.0000	0.0730	0.0000	0.0713	0.0013	0.66	0.59
6	-0.0020	0.0000	0.0299	0.0000	0.0279	0.0000	0.65	0.60

Note:1. Results from the logit model estimation. a_5 *and* a_6 *are the coefficients of* DT_{k-1} *and* $DT_{k-1}^{m} \times DT_{k-1}$*, respectively. 2. The probabilities of share prices continuing to move toward price limits are calculated with* $e^{-(a_5+a_6)} - 1$*. 3. m represents the distance from the price limits in tick sizes.*

Table 5: Conditional Probability of the Regression Results in the Down Model

Pre-restructuring								
m	a_5		a_6		$a_5 + a_6$		**Average probability of $a_5 + a_6$ (%)**	**Median probability of $a_5 + a_6$ (%)**
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**		
2	-0.0035	-0.0025	0.0084	0.0000	0.0049	-0.0025	4.99	0.60
3	-0.0030	0.0000	0.0331	0.0000	0.0301	0.0000	0.72	0.55
4	-0.0030	0.0000	0.0174	0.0000	0.0144	0.0000	4.40	0.75
5	-0.0030	0.0000	0.0116	0.0000	0.0087	0.0000	4.39	0.80
6	-0.0041	0.0000	-0.0047	0.0000	-0.0088	-0.0038	3.52	0.81
Post-restructuring								
m	a_5		a_6		a_5		**Average probability of $a_5 + a_6$ (%)**	**Median probability of $a_5 + a_6$ (%)**
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Mean**		
2	-0.0019	0.0000	-0.0715	0.0000	-0.0734	0.0000	27.40	0.61
3	-0.0018	0.0000	0.0054	0.0000	0.0037	0.0000	11.19	0.51
4	-0.0017	0.0000	0.0182	0.0000	0.0165	0.0000	9.66	0.60
5	-0.0017	0.0000	0.0129	0.0000	0.0112	0.0000	4.60	0.49
6	-0.0016	0.0000	0.0163	0.0000	0.0146	0.0000	5.01	0.52

Note:1. Results from the logit model estimation. a_5 *and* a_6 *are the coefficients of* DT_{k-1} *and* $DT_{k-1}^{m} \times DT_{k-1}$, *respectively. 2. The probabilities of share prices continuing to move toward price limits are calculated with* $e^{-(a_5+a_6)} - 1$. *3. m represents the distance from the price limits in tick sizes.*

CONCLUSIONS

The magnet effect was first proposed by Fama (1989); Subrahmanyam (1994) was the first to verify this phenomenon with a theoretical model, discovering that the magnet effect occurs when markets establish price limits. Subsequent research focused on whether the magnet effect exists in each country's stock market and many studies have found such phenomena. Whether the magnet effect exists in the Taiwan's stock market has also been repeatedly discussed and proved (Chen, 1997; Cho, Russell, Tiao, and Tsay, 2003; Wong, Chang and Tu, 2009; Hsieh, Kim, and Yang, 2009; Wang, Hsiao, and Lin, 2012). In addition, as market participants gradually mature and to create a more efficient securities market, Taiwan officially relaxed its daily price limits from 7% to 10% fluctuations on June 1, 2015. In this study, to analyze whether the magnet effect would be delayed after restructuring, we refer to the approach of Hsieh, Kim, and Yang (2009) and detect the difference between the magnetic effects before and after the restructuring with the data of the Taiwan Mid-Cap 100 Index component stocks for March 1–August 31, 2015. We found that for the up model whether before or after the restructuring, the magnet effect began to occur when it was four tick sizes away from the daily limit. The magnet effect did not delay or occur early because of the relaxation to 10%. On the other hand, for the down model, we found that before the restructuring, the magnetic effect began to occur when the price was three tick sizes away from the down limit, but the magnet effect was less obvious after the restructuring, whether it was 2–6 tick sizes. The empirical results of the down model confirm the research hypothesis.

Overall, our empirical results provide substantial evidence of an insignificant magnet effect after the relaxed daily price limits, especially in the down market. To the extent that the magnet effect disappears, the relaxation of price limits may reduce the short-run market volatility. The policy implication of our empirical findings for policy makers is that the relation of price limits could help reduce the impact of magnet effect and thus lower the market volatility, leading to a more stable capital market. The paper has a limitation in the sample selection. This study selected the constituent stocks of the Taiwan Mid-Cap

100 Index. As a result, the sample size in this study is relatively small, which may impact the empirical results. Future research can expand the research sample to the entire stock market. Another interesting extension of this paper would be a more detailed examination of the impact of trading activity by trader types on the changes in the magnet effect. The magnet effects may differ between different types of investors when institutional investors have more information and are more rational than individual investors.

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FINANCIAL EXPERTS ON THE AUDIT COMMITTEE: WOLVES IN SHEEP'S CLOTHING?

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ABSTRACT

Research literature in accounting has assumed, and supported, the idea that financial expertise on the audit committee of firms is a positive influence on the quality of earnings reports, as measured by various proxies for earnings quality. In this paper I attempt to model and demonstrate empirically that financial expertise on the audit committee may in fact serve to merely obscure any earnings manipulation performed by managers, rather than prevent or mitigate it. The results provide support for the idea that financial expertise, when put together with certain adverse incentive factors (share ownership, being a current executive in another firm), actually increases the probability of just meeting or beating analyst consensus estimates, a measure of earnings manipulation. This presents an important contribution to the literature on the topic, elucidating the idea that financial expertise on the audit committee is not necessarily a beneficial factor.

JEL: G30, G38

KEYWORDS: Financial Experts, Audit Committee, Earnings Management, Sarbanes-Oxley

INTRODUCTION

In 1999 the BRC (Blue Ribbon Committee, 1999) has issued recommendations for audit committee composition, proposing that audit committee independence and audit committee financial expertise are desirable properties of the audit committee. This has prompted a number of studies on the relationship between audit committee composition and earnings quality. One of the provisions of the Sarbanes-Oxley Act (SOX) requires public companies to disclose the presence or absence of financial experts on the audit committee. The initial SEC proposal (U.S. Securities and Exchange Commission, 2002) only recognized persons with explicit accounting financial expertise as financial experts. However, the final rule (U.S. Securities and Exchange Commission, 2003) relaxed the definition to include persons with supervisory experience of accounting functions as allowed financial experts (see DeFond, Hann, and Hu, 2005, for a more detailed discussion of this background).

To understand the relevance of financial expertise in the context of the audit, we need to look at the actual mechanics of the audit process and the sequence of events surrounding the audit. Prior literature (Antle and Nalebuff, 1991; Gibbins, Salterio, and Webb, 2001; Ng and Tan, 2003; Sanchez, Agoglia, and Hatfield, 2007), as well as direct discussion with a former auditor, suggests that the final audited statements are a result of extensive auditor-client negotiation. The auditor performs the actual work of going through the financial statements in the light of information provided by the management, looking for any inconsistencies with the GAAP. The auditor then takes its findings and suggested adjustments for discussion with the audit committee and management, which may accept some of them, and argue and try to reject some others. At the end of this possibly drawn-out give-and-take negotiation process, the report can be finalized. The key point here is that the audit committee does not actually perform any auditing, but merely reviews the findings of the auditor. While in theory the audit committee should be aligned with the auditor and against the managers, it is not unreasonable to suspect that it can be more aligned with the management in arguing against whatever adjustments the management doesn't like.

With this understanding, it is clear the proposition that audit committee financial expertise has a "positive" impact on the quality of financial reporting is not to be easily assumed true. It is possible that an audit committee with greater financial expertise will simply be more effective in offering arguments to the auditor against whatever adjustments it wants to reject. Financial expertise would also increase the ability of the committee to pick those items that will maximize the probability of meeting earnings targets, while not raising any "suspicious" discretionary accruals, and thereby minimizing any negative impact those may have on various market-based measures of earnings quality. Audit committee members with financial expertise may also have an impact beyond the audit process by suggesting certain accounting practices to the company that would improve the general appearance of financial statements.

The net effect of financial expertise on the quality of financial statements is thus not an assumption to be made, but a question to investigate empirically. Using financial and board of director data from 2005/2006, which gives several years for companies to start reporting audit committee financial expertise and adjust board membership according to these new incentives, this research analyzes the relationship between audit committee financial expertise and earnings management. While there is prior literature analyzing this question, as detailed in the next section, this paper contributes to the literature in several important ways. First, I use a novel data set of director financial expertise, classifying directors as financial experts based on information extracted directly from proxy statements and auxiliary director biographical data. Second, I focus my analysis only on what I argue is the cleanest metric of earnings management, company earnings relative to analyst forecast consensus. Finally, I introduce a number of controls and interactions dealing specifically with adverse director incentives. The remainder of this paper is organized as follows: The next section examines the related literature and sets the stage for this study. Following, I detail the theoretical model, data sample and methodology, and then discuss the empirical results. I close with concluding comments and suggestions for future research.

LITERATURE REVIEW

A number of measures for earnings quality have been used in the literature, including discretionary accruals based on variations of Jones (Jones, 1991) model residuals (Dechow and Sloan, 1995, Ashbaugh, LaFond, and Mayhew, 2003, Frankel, Johnson, and Nelson, 2002, Chung and Kallapur, 2003), meet or beat previous earnings (Ashbaugh, LaFond, and Mayhew, 2003, Frankel, Johnson, and Nelson, 2002, Vafeas, 2005), meet or beat analyst consensus forecast estimates (Davis, Soo, and Trompeter, 2006, Ashbaugh, LaFond, and Mayhew, 2003, Frankel, Johnson, and Nelson, 2002, Vafeas, 2005). There have also been a number of market-based measures, such as bid-ask spreads (Affleck-Graves, Callahan, and Chipalkatti, 2002, Coller and Yohn, 1997; for a review of the bid-ask spread literature, see Callahan, Lee, and Yahn, 1997), cost of debt (Anderson, Mansi, and Reeb, 2004, Mansi, Maxwell, and Miller, 2004, Sengupta, 1998), and CAR around director appointments (DeFond, Hann, and Hu, 2005). Of these measures, for a number of reasons I think that meeting or beating prior earnings or analyst forecasts is the least noisy and the most direct way to determine the incidence of earnings management or manipulation. Discretionary accruals measures are sensitive to Jones model specification details (Ashbaugh et al., 2003), and market-based measures are dependent on the market's ability to discern earnings management and react accordingly, which, as numerous SEC investigations show, is not necessarily the case. A notable example would be the W.R. Grace case of earnings smoothing that the market did not detect: between 1991 and 1995, W.R. Grace reported stable growth rates, even though actual growth fluctuated from -8% to +61% (U.S. Securities and Exchange Commission, 1998, CNN, 1999).

Prior literature has also attempted to investigate the impact of the audit committee on various metrics of earnings management. Vafeas (2005) uses "other committee membership" as a proxy for financial expertise, and following Ashbaugh, LaFond, and Mayhew (2003) and Frankel, Johnson, and Nelson (2002) uses ”meeting or beating prior year’s earnings” and ”meeting or beating analyst forecasts” as measures of earnings quality (the argument being that just meeting or beating these benchmarks is likely due to earnings management). He finds no significant relationship between other committee membership and earnings quality (although the coefficients are negative). His other proxy for financial expertise, being an executive of another company, actually show a positive relationship between his two proxies for earnings management, which he argues is due to executives being sympathetic to management. In the current reporting environment, we do not have to settle for such indirect proxies, since audit committee financial expertise and director backgrounds are reported directly, and we hope that this will provide more conclusive results. DeFond, Hann, and Hu (2005) look at the effect of director’s financial expertise on cumulative abnormal returns around director appointments. Their results indicate that firms with no prior accounting or non-accounting financial expertise on the committee that appoint an accounting financial expert experience a negative CAR relative to those who appoint a non-expert.

The effect is somewhat reduced, but is still negative, if the firm has prior accounting financial expertise, prior non-accounting financial expertise, or above-median governance quality (as measured by the Gompers, Ishii, and Metrick (2003) g-index). While the CAR measure is more noisy than the measures used in this study, due to possibility of confounding events and stochastic market behavior, this result is supportive of the hypothesis of the present study. Also telling is that Anderson, Mansi, and Reeb (2004) find no significant relationship between audit committee financial expertise and cost of debt (while they do find such a relationship for board independence). Karamanou and Vafeas (2005) look at a very different, although related, issue of managerial earnings forecasts (forecasts issued by management). The event structure can be described as the opposite of that of the analyst forecast consensus. While analyst forecast is made exogenously, and the manager then has the opportunity to manipulate earnings to try to meet it, in the case of management forecast, the manager has some knowledge of the earnings, and can manipulate the forecast. One might expect that the incentive for issuing an overly optimistic management forecast, one which the manager knows he cannot meet, is rather slim [the truth will come out in short order anyway, plus there is the legal liability issue.] It is more likely that the manager would be expected to undershoot a bit, so that then he can ”beat” his own forecast. So, while the problem is different, one of the results of this research is that the presence of financial expertise on the audit committee is significantly associated with a decreased accuracy of managerial earnings forecasts. This is yet another piece of evidence that financial expertise does not necessarily improve the quality of information in the market.

In contrast to the results of DeFond, Hann, and Hu (2005), Davidson, Xie, and Xu (2004) find a positive market reaction to the appointment of audit committee members who have accounting financial expertise. This discrepancy is likely due to the latter group using a simpler econometric model, without interaction terms. Some more evidence in favor of the traditional view is provided by Xie et al. (2003), who find that board and audit committees with higher meeting frequencies and more financial expertise reduce the firm’s level of discretionary accruals. However, these studies use earnings management metrics that are fraught with difficulties, as has been noted above. A fairly large body of literature helps me motivate the emphasis on “meet or beat analyst forecast” as the relevant measure of earnings management. Brown and Caylor (2005) find that since the mid-1990s managers have shifted emphasis to beating analysts, rather than beating prior earnings. Thus, if there is any “earnings management” going on, it is going to be targeted at analyst forecasts. Further evidence of the importance of analyst forecasts comes from Bartov, Givoly, and Hayn (2002), who show that meeting/beating earnings estimates results in better stock performance, regardless of how it was achieved. Thus, it is in the personal interest of those who are compensated with equity-based remuneration, which includes managers, executives, as well as the board of directors, to meet or beat analyst earnings estimates. Cohen, Dey, and Lys (2008) have a good summary of literature related to overall patterns in earnings management, where they say “Research documenting the trend in earnings management over time indicates that the tendency to manage earnings has increased over time (Brown, 2001; Bartov et. al., 2002; Lopez and Rees, 2001). This literature also provides evidence that managerial propensity to avoid negative earnings surprises has increased significantly over time (Brown, 2001; Bartov et. al, 2002;

Matsumoto, 2002), although no significant increase has been observed in the tendency to avoid losses or earnings decreases (Burgstahler and Eames, 2003)".

Thus, I feel comfortable stating that beating analyst forecasts can be taken as the primary target of managerial efforts. Other metrics are merely intermediate steps that may or may not be needed to achieve their goal (such as discretionary accruals), or side effects (bid-ask spread, cost of debt or equity capital), and are not directly relevant to managerial motivation.

<u>Theoretical Model</u>

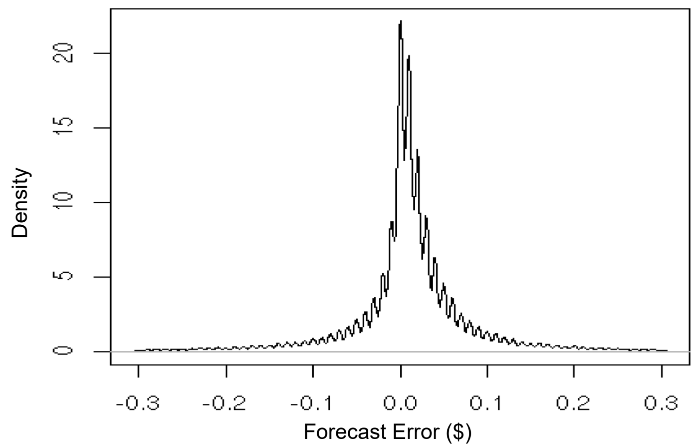
Under the hypothesis of efficient markets and rational expectations, and with analyst forecast consensus serving as a measure of those expectations, one would expect the forecast consensus to be on average correct - we would see no systematic upward or downward bias in the forecasts, and the probability of a firm's earnings falling above or below the forecast consensus should be equal. However, if managers deliberately target their earnings toward meeting or beating analyst estimates through the application of creative accounting, we should see the distribution of forecast errors that is skewed to the right (where error is the difference between actual reported earnings and analyst consensus). A preliminary analysis suggests that this may indeed be the case. Using IBES quarterly forecast data from year 2000 to 2006, discarding items with unavailable data, items with less than 3 analysts following the company, and items with forecast errors (in absolute value) greater than 30 cents (to exclude the extremely attenuated tails of the distribution which are irrelevant for the purposes), I end up with 202437 forecast-actual pairs. Further excluding all but the most recent pre-announcement forecasts, I have 71079 forecast-actual pairs, on 5635 companies (as identified by the IBES Official Ticker). The resulting density plot of errors is shown in Figure 1.

The forecast error of 0 cents is the peak of the distribution. However, the forecast error of 1, 2, and even 3 cents are all more probable than a forecast error of -1 cent. This is precisely the effect we would have expected from managerial earnings adjustment to meet or beat analyst forecast consensus. Overall, the degree of this adjustment can be measured by the skewness of the distribution, or, by the cumulative probability of meeting or beating the forecast consensus. It is also of note that the "skewness" is not concentrated at 1-3 cents, but persists in a sizable degree all the way out to 10 cents and beyond (e.g., the probability of beating forecast by 10 c. is larger than the symmetric probability of missing the forecast at -10 c.) Thus, one might suspect that the appropriate measure for this accounting manipulation is not to measure just the probability of forecast error falling between 0 and 2-3 cents, as has been used in prior literature, but the cumulative probability of forecast error being positive (or non-negative). I plan on using both the "traditional" measure of "just meet or beat" from prior literature, as well as the cumulative measure I propose here. The jagged shape of the distribution is due to the fact that earnings reports as well as forecast consensus are generally measured in whole cents, so the error also ends up measured in whole cents, resulting in an error distribution with peaks on whole-cent values. The adjustment that is being done is certainly not expected to be homogeneous across companies, but rather dependent on a number of factors. The basic model is the following:

$$\Pr\,(forescast\ error\ postive = f(vector\ of\ variables) \tag{1}$$

The question of particular interest in this study is how the level of financial expertise of the Audit Committee members affects the managerial earnings adjustment. This would depend on whether these directors use their financial expertise to help the auditor make adjustments to managerial earnings statements, or to help the managers state earnings in such a way as to satisfy the auditor while still putting the "best foot forward", and help managers argue/bargain with the auditors to minimize "undesirable" adjustments.

Figure 1: Forecast Error Density



This figure shows the density of forecast error (actual EPS – forecast EPS), using IBES quarterly forecast data for 2000-2006.

I propose a general model of director utility from earnings management to be the following:

$$U() = f1(directwealthimpact) + f2(indirectwealthimpact) + f3(psychologicalfactors) \quad (2)$$

Direct wealth impact can be roughly measured by the number of shares beneficially owned by the director. The more shares he owns, the more incentive he has to make the earnings appear as good as possible, since that would drive up the share price. Ideally, the direct wealth impact would be measured as a percentage of total director net worth, but that data is unavailable. Indirect wealth impact represents reputational effects. If the firms at which one is a director are doing well, we would expect one's reputation would rise, thus bringing with it more directorships, or other lucrative positions. On the other hand, if it is discovered that there were accounting irregularities in one of the director's firms, especially one at which he was on the audit committee, the reputation could fall rather precipitously. It is my hypothesis that the negative reputational effects are the stronger driver here. Thus, I would propose that as the number of other directorships increases, we would see less earnings management. The psychological factors are those that increase the director's emotional affiliation with the firm's management and the firm overall. The relevant measures of this that I propose are director's tenure on the board, which is the usual "entrenchment" factor, as well as director being a current executive at another firm, which might increase his sympathy for the management.

DATA AND METHODOLOGY

There are several ways to define "financial expertise". The current SEC rules allow a broader definition of the term, where someone who has served in a supervisory capacity counts as a financial expert. According to Carcello, Hollingsworth, and Neal (2006), firm designations of audit committee financial experts differ dramatically from the "manual" designations as made by researchers in this area. There is both a tendency to designate financial experts who do not have direct accounting financial expertise, as well as a tendency to not designate as experts those who would have been tagged in a manual search. Given the nature of the hypothesis of this paper, where the financial expert must have very thorough knowledge of accounting practice in order to be able to effectively "tweak" the statements, my primary method will use the strictest definition of the term, and count as experts only those who have direct and extensive experience in the accounting discipline. The data is collected manually from early-2006 proxy filings for firms from the main S&P 500 index, and from S&P 500 Small Cap Index. I also use quarterly earnings and analyst forecasts from 2005 from IBES, as well as some firm metrics from Compustat. The time period of 2005/2006 gives several years for companies to start reporting audit committee financial expertise and adjust board membership according to these new incentives, while still leaving plenty of variation in audit committee composition with regard to financial expertise. The S&P 500 firm sample was chosen as follows. Compustat data on all S&P 500 companies (CPSPIN=1) that have fiscal year end in December (FYR=12) and that are not financial institutions (DNUM<6000 | DNUM > 6999) was retrieved for 2005. Table 1 lists the Compustat and IBES data items extracted from the databases, as well as some constructed variables used for the analysis.

Table 1: Compustat and IBES Variables

Variable Code	**Description**
Panel 1: Compustat Variables	
TA	Total Assets
OI	Operating Income Before Depreciation
CSHO	Common Shares Outstanding
TE	Total Common Equity
PRC	Price Fiscal Year Close
CSHO	Common shares outstanding
Mktcap	Market cap, in billions [CSHO * PRC / 1000]
MKBK	Market to book ratio, [PRC*CSHO/TE]
ROA	Return on assets, [OI/TA]
Panel 2: IBES Variables	
NUMEST	Number of analyst EPS estimates
MEDEST	Median analyst EPS estimate
MEANEST	Mean analyst EPS estimate
STDEV.EST	Standard deviation of analyst EPS estimates
EPS	Actual reported EPS
ForecastError	Analyst forecast error, [EPS – MEANEST]
ForecastErrorBinary	Binary forecast error variable, 1 if ForecastError is 0 - 3 cents, 0 otherwise

This table lists the Compustat and IBES data items that are used in this analysis. All items are in millions, except for per-share items.

Firms with missing Compustat data and missing proxy statements were eliminated. The selection procedure for the small-firm sample was identical, except that firms that were selected from Compustat were matched on CPSPIN=3 (for S&P 500 Small Cap) instead of CPSPIN=1 for S&P 500 main index. In all, 261 firms were selected from the S&P 500 Small Caps, and 270 firms were selected from the S&P 500, making for a total sample of 531 firms. Once this was done, I extracted analyst forecast data from IBES, using the CUSIP number as the search item. This reduced the sample further to 471 firms. I used quarterly analyst forecasts and actual earnings, using the latest analyst consensus forecast for each quarter. Finally, I eliminated all data items where just one analyst issued a forecast, which further shrunk the sample to 464 firms. Following this, data on the selected companies was manually collected into a data table from proxy statements. The proxy statements selected were ones filed in 2006, such that they reflect information on the status of the company Audit Committees during 2005. The data items collected at the individual director level are detailed in Table 2.

Table 2: Data for Individual Directors Collected from Company Proxy Statements

Item	Details
Year director joined the board (which, subtracted from 2005, is director tenure)	When director has served two non-consecutive terms, the first year of the earliest term was selected, as that is more representative of the director's familiarity with the firm, the board, and his possible "entrenchment".
Financial expertise	**0** for no financial expertise (Professor (other than finance or accounting), Consultant (other than financial), Chairman, Vice Chairman, Lawyer, Private Investor, COO, University President, etc.) **1** for non-accounting financial expertise (CEO, President, Partner of Venture Firm or Investment Firm, Investment Banking Director, Finance Professor, Accounting Professor, Financial Consultant, etc.) **2** for direct accounting financial expertise (CPA, CMA, Chief Auditor, CFO, Controller, Chief Accounting Officer, VP-Finance, Treasurer, Audit firm partner, etc.)
Stock ownership of directors	This item includes common stock ownership, stock equivalent units, restricted stock units, phantom shares, and options exercisable within 60 days of proxy filing date. Ideally, I would have liked to include all options owned, not just those exercisable within 60 days, but that information was not available in the proxy statements. Also, it would have been ideal to have this as percentage of total director net worth, but again, that information is not available.
Director age	Age as of the proxy filing date.
Current executive at another firm	Binary variable, set to 1 if director is a current executive at another firm.
Number of other current public company directorships for each director	
Number of directors on the board	
Number of independent (non-insider) directors on the board.	The proxy statements usually contain a discussion of director independence, with a listing of those directors considered independent. When it was not explicitly discussed, the number of outside directors was used.
Number of directors on the Audit Committee	

This table lists the data items collected from company proxy statements, at the level of the individual director, and the associated methodology and designations.

Frequently the proxy statement contained very abridged information about one or more directors' backgrounds. In those cases, I have supplemented that information with three other sources of information, namely http://investing.businessweek.com, which contains more extensive background information for firm directors, http://www.nndb.com, which shows lists of prior positions for directors, and general web searches. Very frequently, these supplementary sources of information have pushed a director up one or two points in the ranking of his financial expertise. Since prior literature has not made any mention of this phenomenon, I am left to presume that they have relied exclusively on proxy statement contents, and thus have misclassified a significant fraction of directors in terms of their level of financial expertise. While I have not kept record of these occurrences, and thus do not provide specific statistics, they are far from rare. From the above, the individual-director-level data were subsequently aggregated to firm-level, as detailed in Table 3.

Table 3: Firm Level Data Collected from Company Proxy Statements

Item	Details
Number of directors on the board	
Number of Audit Committee meetings in 2005.	Separate data items were collected for in-person and telephonic meetings. However, less than 5% of proxy statements separated telephonic and in-person meetings (11 out of 261 S&P 500 Small Cap firms, and 9 out of 270 S&P 500 firms), instead just stating the total number of meetings. So the final data item for audit committee meetings contains the sum of all meetings held.
Number of independent (non-insider) directors on the board.	The proxy statements usually contain a discussion of director independence, with a listing of those directors considered independent. When it was not explicitly discussed, the number of outside directors was used.
Number of directors on the Audit Committee	
Average Tenure	Average for Audit Committee directors
Average Age	Average for Audit Committee directors
Average Stock Ownership	Average for Audit Committee directors, in millions of shares
Financial experts	Number of directors on the Audit Committee designated as "financial expert" (as described in Table 1)
Current executives	Number of directors on the Audit Committee that currently hold executive positions at other firms
Accounting financial experts	Number of directors on the Audit Committee having direct accounting financial expertise (as described in Table 1)
Public company directorships	Average for Audit Committee directors

This table lists the data items collected from company proxy statements, on the firm level, and the associated methodology and designations.

Tables 4, 5 and 6 present summary statistics for the final sample of 464 firms, as well as for the sub-samples of small caps and the main index firms, of 224 and 240 firms, respectively. The large cap firms have mean total assets of $24 billion, $3.2 billion in operating income, and a market cap of $23 billion. The small cap sample has mean total assets of $888 million, $127 million operating income, and market cap of $1 billion. As far as board composition goes, small cap firms on average have a smaller board relative to large caps (8 vs 10.7 directors on average), but about the same number of audit committee meetings (9 vs 9.5), and a larger number of accounting financial experts (1.175 vs 0.92). Large caps have more analysts following them (14.6 vs 6.9), but also a larger average forecast error (2.35 cents vs 1.74 cents).

Table 4: Summary Statistics, Full Sample

Variable Name	Min	Q1	Median	Q3	Max	Mean
TA	73.708	680.62	2,618.2	10,621	673,342	13,292
OI	-106.70	97.488	370.9	1,504.9	59,255	1,733.1
CSHO	5.628	32.048	85.653	278	10,484	331.69
TE	-3,217	328.87	914.27	4,194.2	111,186	4270.4
PRC	2.51	20.86	33.715	50.22	702	39.414
Mktcap	0.0825	0.9536	3.065	11.413	367.47	12.712
MKBK	-61.197	1.837	2.609	3.669	88.388	3.421
ROA	-0.268	0.0951	0.1346	0.1916	0.8719	0.1518
Num.indep.dirs	2	6	8	9	17	7.818
Inperson.meetings	2	7	9	11	30	9.111
Phone.meetings	0	0	0	0	9	0.1880
Directors.total	5	8	9	11	18	9.437
Committee.meetings	2	7	9	11	30	9.299
Committee.financial.experts	0	1	1	3	7	1.877
Accounting.financial.experts	0	0	1	2	4	1.039
Other.exec	0	1	1	2	5	1.453
Dir.age	45.5	57.75	61	64	74.667	60.728
Dir.multiple	0	1.5	2.2	3	8.333	2.313
Dir.shares.reported	0.0007	0.0179	0.0388	0.0847	50.039	0.2630
Dir.tenure	0.6667	4.75	6.75	9.333	25.333	7.506
Dir.audit.total	2	3	4	5	9	4.116
NUMEST	2	6	10	15	39	10.963
MEDEST	-1.5	0.2	0.38	0.65	28.29	0.5219
MEANEST	-1.49	0.2	0.38	0.64	28.19	0.5224
STDEV.EST	0	0.01	0.02	0.03	2.43	0.0353
Forecast.error	-2.23	0	0.015	0.05	3.12	0.0206
Forecast.error.binary	0	0	0	1	1	0.3927

This table shows the summary statistics for the full data sample, of 464 firms, including both the S&P500 and S&P Small Cap Index.

Table 5: Summary Statistics, S&P 500 Small Cap Firms

Variable Name	Min	Q1	Median	Q3	Max	Mean
TA	73.708	400.01	643.40	1,101.0	5,836.8	887.91
OI	-106.70	51.674	97.014	158.96	1,170.7	126.97
CSHO	5.628	24.779	31.08	43.468	111.48	36.165
TE	45.738	217.84	331.07	536.12	2,595.5	412.81
PRC	2.55	17.34	26.555	36.81	702	32.130
Mktcap	0.0825	0.5458	0.9361	1.308	3.951	0.9999
MKBK	0.7326	1.665	2.415	3.223	15.384	2.903
ROA	-0.2677	0.0912	0.1308	0.1965	0.8719	0.1490
Num.indep.dirs	2	5	6	8	13	6.568
Inperson.meetings	2	6	8	11	30	8.794
Phone.meetings	0	0	0	0	9	0.2565
Directors.total	5	7	8	9	15	8.021
Committee.meetings	4	7	9	11	30	9.051
Committee.financial.experts	0	1	1	2	5	1.544
Accounting.financial.experts	0	0	1	2	4	1.175
Other.exec	0	1	1	2	4	1.393
Dir.age	46.667	56.5	60	63.667	74.667	59.855
Dir.multiple	1	1.75	2.333	3.25	8.333	2.552
Dir.shares.reported	0.0007	0.0170	0.0391	0.0807	1.692	0.0874
Dir.tenure	2	5	7	9.75	25.333	7.756
Dir.audit.total	2	3	4	4	7	3.755
NUMEST	2	4	6	9	28	6.922
MEDEST	-0.69	0.15	0.27	0.44	28.29	0.4351
MEANEST	-0.65	0.15	0.26	0.44	28.19	0.4367
STDEV.EST	0	0.01	0.01	0.03	2.43	0.0345
Forecast.error	-2.23	-0.01	0.01	0.04	3.12	0.0174
Forecast.error.binary	0	0	0	1	1	0.3871

This table shows the summary statistics for the small cap data sample, of 224 firms, from the S&P Small Cap Index.

Table 6: Summary Statistics, S and P 500 Main Index

Variable Name	Min	Q1	Median	Q3	Max	Mean
TA	732.95	4,577.0	10,218	24,232	673,342	24,414
OI	-41.7	663.28	1,446.2	2,729.8	59,255	3,173.2
CSHO	44.18	147.43	259.26	461.5	10,484	596.66
TE	-3,217	1,745	3,901.1	7,954	111,186	7,729.2
PRC	2.51	25.92	42.895	59.08	414.86	45.945
Mktcap	0.9367	5.229	10.933	20.880	367.47	23.214
MKBK	-61.197	1.973	2.812	4.045	88.388	3.886
ROA	-0.0104	0.0981	0.1389	0.1864	0.6780	0.1543
Num.indep.dirs	3	8	9	10	17	8.939
Inperson.meetings	2	7	9	11	19	9.396
Phone.meetings	0	0	0	0	6	0.1266
Directors.total	5	9	11	12	18	10.706
Committee.meetings	2	8	9	11	19	9.522
Committee.financial.experts	0	1	2	3	7	2.176
Accounting.financial.experts	0	0	1	1	4	0.9167
Other.exec	0	1	1	2	5	1.507
Dir.age	45.5	59.2	61.5	64.333	74.333	61.511
Dir.multiple	0	1.333	2	2.667	7	2.099
Dir.shares.reported	0.0014	0.0182	0.0386	0.0881	50.039	0.4205
Dir.tenure	0.6667	4.75	6.633	9.25	22	7.282
Dir.audit.total	2	4	4	5	9	4.439
NUMEST	2	10	14	18	39	14.587
MEDEST	-1.5	0.3	0.51	0.8	3.1	0.5997
MEANEST	-1.49	0.3075	0.51	0.8	3.11	0.5991
STDEV.EST	0	0.01	0.02	0.04	0.69	0.0360
Forecast.error	-1.94	0	0.02	0.05	0.72	0.0235
Forecast.error.binary	0	0	0	1	1	0.3977

This table shows the summary statistics for the large cap data sample, of 240 firms, from the S&P Main Index.

RESULTS

As per discussion above, the main target of this investigation is to examine the relationship of financial expertise and the probability of just meeting or beating the EPS forecast. The main model specification is

$$Forecast.error.binary = Accounting.financial.experts + Dir.shares.reported + \\ +Dir.tenure + Committee.meetings + Other.exec + Mktcap + ROA + MKBK + \\ Num.indep.dirs + Directors.total + Dir.age + Dir.multiple + Dir.audit.total + error \quad (3)$$

where the dependent binary variable is coded as '1' if the actual earnings met or beat the forecast consensus by no more than 3 cents, and '0' otherwise, and the main independent variable is the number of direct accounting financial experts on the audit committee, as defined in the previous section. In addition to the main model specification, several different alternatives with various interactions were attempted, with the results shown in Table 7.

Table 7: Probit Regression Results

Variable Name	Model 1	Model 2	Model 3	Model 4
(Intercept)	0.9265	0.8896	0.9455	1.129
	(0.0404) **	(0.0548) *	(0.0526) *	(0.0893) *
Accounting.financial.experts	-0.0713	-0.0554	-0.1513	-0.1101
	(0.0526) *	(0.5889)	(0.4385)	(0.5127)
Dir.shares.reported	-0.0054	-0.101	-0.1012	0.1317
	(0.6691)	(0.0584) *	(0.0583) *	(0.7997)
Dir.tenure	0.0084	0.0196	0.0181	0.0035
	(0.3378)	(0.1024)	(0.1368)	(0.8452)
Committee.meetings	-0.0064	-0.0065	-0.0203	-0.0065
	(0.4976)	(0.4985)	(0.193)	(0.6311)
Other.exec	0.0227	-0.0387	-0.0418	-0.0825
	(0.4713)	(0.4270)	(0.3934)	(0.3342)
Mktcap	0.0024	0.0024	0.0023	-0.0128
	(0.02345) **	(0.025) **	(0.0261) **	(0.86963)
ROA	0.4129	0.5067	0.5023	0.73
	(0.2452)	(0.1560)	(0.1599)	(0.1848)
MKBK	0.0049	0.0043	0.0044	-0.0009
	(0.2915)	(0.3687)	(0.35)	(0.9729)
Num.indep.dirs	-0.1206	-0.1215	-0.1169	-0.1511
	(0.0012) ***	(0.0011) ***	(0.003) ***	(0.0364) **
Directors.total	0.0717	0.0755	0.0758	0.1
	(0.0449) **	(0.0358) **	(0.0354) **	(0.1590)
Dir.age	-0.0164	-0.0157	-0.0148	-0.0155
	(0.0258) **	(0.0334) **	(0.0473) **	(0.1262)
Dir.multiple	0.06702	0.07039	0.074	0.1349
	(0.0196) **	(0.0145) **	(0.0109) **	(0.0021) ***
Dir.audit.total	-0.0405	-0.0517	-0.057	-0.1332
	(0.2357)	(0.1337)	(0.1014)	(0.0377) **
Accounting.financial.experts:Dir.shares.reported		0.0904	0.0901	-0.6336
		(0.0666) *	(0.0677) *	(0.1312)
Accounting.financial.experts:Dir.tenure		-0.0141	-0.0126	-0.0075
		(0.1526)	(0.2106)	(0.6018)
Accounting.financial.experts:			0.0114	
			(0.2613)	
Accounting.financial.experts:Other.exec		0.0501	0.0576	0.0419
		(0.1365)	(0.0972) *	(0.4602)
Accounting.financial.experts:Num.indep.dirs			-0.0042	
			(0.7931)	
Accounting.financial.experts:Dir.shares.reported				0.0582
				(0.0687) *
Number of observations	464	464	464	224
AIC	2386.4	2382.4	2385	1123
R2	0.0280	0.0335	0.0341	0.0540
Adjusted R2	0.0209	0.0248	0.0243	0.0347

*This table shows the regression results for several model specifications. Model 1 is the base model specification as defined in Equation 3 without interaction terms: Forecast.error.binary ~ Accounting.financial.experts + controls + error Model 2 adds interaction terms between financial experts and a number of variables which may affect the director's emotional affiliation, namely: tenure, being an executive at another firm, and share ownership. Model 3 adds interactions with number of meetings and number of independent directors. Model 4 includes the combined interaction term between financial expertise, being a current executive at another firm, director tenure, and beneficial share ownership. Two-tailed p-values in parentheses. Significance codes: '***' 0.01 '**' 0.05 '*' 0.1.*

The first column of Table 7 (Model 1) shows the base model results with no interaction terms. The main coefficient of interest, that on *Accounting.financial.experts,* is actually negative and significant (p=0.052), suggesting that more accounting financial experts on the audit committee reduces the likelihood of meeting or just beating the analyst earnings forecast. Other significant coefficients in the model suggest that the probability of meeting or just beating analyst earnings forecast goes up with firm market cap (*Mktcap*), directors serving on multiple boards (*Dir.multiple*), and total number of directors (*Directors.total*), and goes down with director age (*Dir.age*) and number of independent directors (*Num.indep.dirs*). In the second column of Table 7 (Model 2), financial expertise is interacted with a number of variables which may affect the director's emotional affiliation, namely: tenure, being an executive at another firm, and share ownership. The results show that while the number of accounting financial experts by itself is not significant (p = 0.59), the interaction term with share ownership (*Dir.shares.reported*) is significant and positive (p = 0.066), indicating that at the average number of shares owned by the audit committee members (263,000), an increase in accounting financial experts by one increases the probability of meeting or just beating the analyst estimate by 0.9%. When I include other logical interactions (Model 3), with number of meetings (the more meetings, the more active the committee may be in interacting with the auditor), and number of independent directors (the more independent directors there are, the less likely the board overall is to have incentive to manipulate earnings), the *Other.exec* interaction term also breaks into significance at p = 0.09. This shows that at the average number of directors with current executive positions in other companies (1.45), an increase in the number of accounting financial experts by 1 increases the probability of meeting or just beating analyst forecast consensus by 3.2%.

Running these models separately for the two sub-samples (SP500 and SP500 Small Cap) produced no significance for the variables of interest, which I ascribe to the resulting much smaller sample size for the individual regressions. It was also instructive to run some regressions with higher-order interaction terms. Specifically, one might suspect that it is the combined effect of having financial expertise (ability), being a current executive (emotional affiliation), having long tenure (comfort/entrenchment), and having beneficial ownership of a lot of shares (monetary incentive), that would be expected to push our financial experts to tweak the accounting statements. The result for the Small Caps (Model 4) showed that at the average, this fourth-order interaction term shows that an extra accounting financial expert results in an increase of 1.9% in the probability of meeting or just beating analyst estimates. (These results are insignificant for the large firms and for the combined sample).

CONCLUSIONS

Though current regulations encourage the inclusion of financial experts on a company's audit committee, it is not a foregone conclusion that these financial experts improve earnings quality. It is possible that an audit committee with greater financial expertise will be more effective in offering arguments to the auditor against whatever adjustments it wants to reject. Financial expertise would also increase the ability of the committee to pick those items that will maximize the probability of meeting earnings targets, while not raising any "suspicious" discretionary accruals, and thereby minimizing any negative impact those may have on various market-based measures of earnings quality. Audit committee members with financial expertise may also have an impact beyond the audit process by suggesting certain accounting practices to the company that would improve the general appearance of financial statements. This paper analyzes this question empirically by collecting and analyzing detailed firm-level data on company board composition and director financial expertise, analyst EPS forecasts and actual earnings reports, as well as general company financials. Using the incidence of a company meeting or just beating analyst earnings forecasts as a metric of earnings management, I examine the relationship between that and measures of director financial expertise and director incentives. The empirical results of this paper suggest that financial expertise on the audit committee is not unequivocally a good thing. When combined with certain factors that can affect director incentives in a detrimental (for the shareholders) way, financial expertise may actually enable the director to manipulate the firm's earnings more effectively than a non-financial expert would be able to. If that is, indeed, the case, one might question the efficacy of the post-SOX requirement to disclose the presence of financial experts on the audit committee, which effectively encourages firms to get financial experts on their audit committee. The results indicate that if such encouragement takes place, it might be prudent to also discourage the presence of current executives on the audit committee, and reduce the amount of beneficial ownership of company stock by the audit committee members. A number of questions remain for future research. A larger sample, over several years, might give better insight into these relationships. Some data on director net worth would prove beneficial in teasing out the monetary incentive problem with share ownership. A longitudinal study, looking at what happens within a firm as it acquires more financial experts on its audit committee, might produce stronger results as it avoids the large amount of cross-firm variation.

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A MODEL OF MICROPOLITAN AREA SENSITIVITY TO THE BUSINESS CYCLE: EVIDENCE FROM THE PLAINS REGION

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ABSTRACT

Past literature has examined the responsiveness of various economies (region, state, and metropolitan area) to changes in the U.S. business cycle. The objective of this study is to determine if spatial disaggregation to the small core city provides further insights to the co-movement of local area conditions to national business swings. Earlier studies have underscored the importance of examining the role of small cities and the factors which influence their sensitivity to the national cycle. This study focuses on another spatially disaggregated level: the micropolitan statistical area which consists of one or more counties with at least one city with more than 10,000 but less than 50,000 people. It focuses on 87 micropolitan statistical areas located in the seven states (Kansas, Iowa, Missouri, Minnesota, Nebraska, North Dakota, and South Dakota) of the Plains region. The study estimates and analyzes the correlations of annual percentage changes in various micropolitan area economic measures (total employment, nonfarm employment, Gross Regional Product, and personal income) with respect to changes in US real GDP over the 1969-2017 period. There are wide variations in business cycle sensitivity of micropolitan areas across-states, within-states, and depending on the specific economic measure used.

JEL: R11, R12

KEYWORDS: Micropolitan, Business Cycle, Sensitivity

INTRODUCTION

Past empirical studies of economic development have traditionally focused on larger areas such as nations, regions, states, and metropolitan areas or large cities, primarily due to data constraints. As more demographic and economic data are gathered for small towns and rural areas, more analyses have been conducted to provide insights on rural-urban differences, local indicators, current trends, and policy targets. The focus of this paper is to examine the dependence of small communities on the overall macroeconomy. The co-movement of local area conditions to national business swings is analyzed for the case of another spatially disaggregated level: the micropolitan statistical area. By definition, a micropolitan area consists of one or more counties with at least one city with more than 10,000 but less than 50,000 people. This study focuses on 87 micropolitan statistical areas located in the seven states (Kansas, Iowa, Missouri, Minnesota, Nebraska, North Dakota, and South Dakota) of the Plains region. It estimates and analyzes the correlations of annual percentage changes in various micropolitan area economic measures (i.e., total employment, nonfarm employment, real Gross Regional Product, and real per capita personal income) with respect to changes in US real GDP over the 1969-2017 period.

A major finding of this study is that there are wide variations in business cycle sensitivity of micropolitan areas across-states, within-states, and depending on the specific economic measure used. Of the seven Plains states, North Dakota's micropolitan areas are the least sensitive to national business swings followed by Kansas. With the exception of a few cases, the micropolitan areas of the other five states follow closely the ups and downs of the national business cycle. Given that the differences in local area sensitivity to national business cycle are highly dependent on the industry mix of the local area, this study further examines the responsiveness of micropolitan area employment in each of 23 two-digit NAICS industries to changes in US real GDP for 1969-2017. The goal is to determine the specific industry or industries whose employment changes are correlated with the national business cycle for identifying competitive advantages and local policy implications. The remainder of the paper is organized as follows. The next section presents some related past literature, followed by a discussion of the historical correlations of micropolitan area indicators with respect to the national business cycle. Analysis of this micropolitan area-business cycle co-movement is extended to the various industry levels. A simple theoretical model showing micropolitan responsiveness to changes in US GDP as a function of industry mix is then tested. Finally, a summary and conclusions are discussed.

LITERATURE REVIEW

The relationship between the growth of local economies and the national economy has been a subject of interest for a long time. The determination of this local conditions-national business cycle linkage as a co-movement or co-dependence or even as no relationship at all has been difficult given the realities of geography, differences in resource base or industrial composition, as well as policy targets and solutions. Earlier studies (Bell and Jayne (2009) and Peterson and Manson (1982)) have underscored the importance of examining the role of small cities and the factors which influence their sensitivity to the national cycle. As Peterson and Manson (1982) put it: "Understanding the reasons for recent changes in local cyclical sensitivity make for one of the most policy-relevant avenues of research." Past studies on the linkage between regional economies and the national economic cycle focus on states (Carlino and DeFina, 2003; Owyang, Rapach, and Wall, 2009, Gascon and Haas, 2019), metropolitan areas (Carlino, DeFina, and Sill, 2001; Arais, Gascon, and Rapach, 2016), and counties (Han and Goetz, 2015; Gascon and Reinbold, 2019). In particular, these studies underscore the relevance of industry mix as a major determinant of the responsiveness or sensitivity of local economies to changes in the national economy.

Although the U.S. national economy is an amalgam of its individual state economies, there is a good degree of heterogeneity in the responsiveness of state economies to the national business cycle. In an earlier state-level study, Carlino and DeFina (2003) find that the co-movement or "cohesion" of cycles for a specific industry across states is greater than that across various industries within a particular state. Thus, they assert that the effect of national shocks on industries within a state lessens over time. Owyang *et al* (2009) show that the "closeness" of states to the national economic cycle is related to differences in industrial composition, average establishment size, agglomeration economies, as well as the characteristics of a neighboring states. More recently, Gascon and Haas (2019) estimated correlations of the change in state employment and the change in US real GDP from 1990-2019; they find that differences in responsiveness of states to the business cycle can be explained by the mix of high and low-sensitive state industries as well as by other state-level attributes such as education, establishment size, housing supply, and urban density. This line of research has been extended to more disaggregated economic units such as metropolitan cities and counties. For example, in their 2016 study of metropolitan areas, Arias, Gascon, and Rapach state that national recessions in the 1990s and 2000s adversely affected some MSAs more severely than others; they also identify several large city-level factors which explain this differential impact including education level, housing supply, and spillover effects. More recently, at the county-level, Gascon and Reinbold (2019) conclude that rural area growth from 2012-15 is slower than urban areas due to the rural areas' "greater exposure to the government sector and lower exposure to private service-providing sector."

Given the extant literature, this current study further examines the line of inquiry by looking at a more disaggregated economic area: small cities called "micropolitan statistical areas." By definition, a micropolitan area consists of one or more counties with at least one city with more than 10,000 but less than 50,000 people. Research on micropolitan areas have been conducted by Davidsson and Rickman

(2011), Cortes, Davidsson, and McKinnis (2015), Cortes and Ooi (2017), and Davidsson and Cortes (2017), among others. The significant role of micropolitan areas in local economic development has recently been emphasized by Liu, Qian, and Haynes (2020). Thus, the objectives of this current study are twofold:

To analyze the sensitivity or correlation of micropolitan economic activity relative to national business cycles;

To identify and measure the effects of industry mix and other local area factors on differences in micropolitan areas' sensitivity to the business cycle.

DATA AND METHODOLOGY

This study focuses on 87 micropolitan statistical areas located in the seven states (Kansas, Iowa, Missouri, Minnesota, Nebraska, North Dakota, and South Dakota) of the Plains region. It estimates and analyzes the correlations of annual percentage changes in various micropolitan area economic measures (i.e., total employment, nonfarm employment, real Gross Regional Product, and real per capita personal income) with respect to changes in US real GDP over the 1969-2017 period. Annual data for 1969-2017 for 87 Plains Region micropolitan areas and their 23 respective industries are gathered from the Woods and Poole Economics database for all U.S. counties and micropolitan areas (see https://www.woodsandpoole.com/). For the seven Plains states, the number of micropolitan areas studied are Kansas (15), Iowa (13), Minnesota (17), Missouri (19), Nebraska (9), North Dakota (5), and South Dakota (9), for a total of 87 micropolitan statistical areas. To identify which micropolitan areas and their industries are affected by the national business cycle, a similar procedure following earlier studies by Bernan and Pfeeger (1997) and Gascon and Haas (2019) is applied. Historical correlations of annual percentage changes in various micropolitan area economic measures with respect to changes in US real GDP over the 1969-2017 period were first calculated. The four economic variables tested are total employment, total nonfarm employment, real Gross Regional Product (in 2012 \$), and real per capita personal income (in 2012 \$). Summary statistics for these four micropolitan area variables (panel data for 87 micropolitan areas and for 1969-2017) are presented in the Appendix A. The time-series correlations of each micropolitan area variable relative to national cyclical swings are evaluated for the magnitude (percentage change in response to a 1% change in US real GDP) as well as the statistical significance of the correlation (up to 10% level of significance). The objective is to see if there is consistency in the responsiveness or sensitivity of micropolitan areas and their various sectors to the national business cycle. The correlation coefficients are calculated using EViews software.

RESULTS

Table 1 shows the results of regressing each of the four micropolitan area economic variables on changes in real US GDP. The estimated correlation coefficients are tested for significance at the 10 percent level. Each micropolitan area is then checked for consistency in significant/insignificant coefficients. The asterisk (*) in Table 1 indicates that the estimated correlation is not statistically different from zero. Of the 87 Plains micropolitan areas: (a) 61 micropolitan areas (or 70%) had significant correlations with the national business cycle, and; (b) of the remaining micropolitan areas, eight had insignificant correlations for all four variables while 18 indicated mixed results. The overall mean responses of the four micropolitan economic variables to the national business cycle range from a high of 1.0147 for Gross Regional Product to a low of 0.4007 for total employment. These results indicate that checking the co-movement of a local economy with the national business conditions depends on what economic variable or indicator is used.More importantly, Table 1 indicates that there are wide variations in business cycle sensitivity of micropolitan areas across-states, within-states, and depending on the specific economic measure used. Of the micropolitan areas in each state, some showed no significant correlations; this means that the local area is not sensitive to or does not follow national cycles. Of the seven Plains states, North Dakota's micropolitan areas are the least sensitive to national business swings followed by Kansas. On the other hand, with the exception of a very few cases, the micropolitan areas of the other five states follow closely the ups and downs of the national business cycle. For example, only one micropolitan area in Iowa and in South Dakota exhibited no sensitivity or correlation to the business cycle during the time period under study.

Table 1: Correlation Coefficients of Micropolitan Area Variables with Respect to National Cycle

State	Micropolitan Area	Total Employment	Nonfarm Employment	Gross Regional Product	Personal Income Per Capita
Kansas	Atchison	0.7142	0.7942	0.8428	0.6805
	Coffeyville	0.6085	0.6470	1.0012	0.5750
	Dodge City	0.1853*	0.2203*	0.4149*	0.3608*
	Emporia	0.3804	0.4181	0.5923	0.3062*
	Garden City	-0.0113*	0.0318*	0.1479*	0.3353*
	Great Bend	0.1849*	0.1954*	0.1933*	0.3452*
	Hays	0.0892*	0.1238*	0.0638*	0.7181
	Hutchinson	0.2790	0.3066	0.6140	0.3886
	Liberal	0.0488*	0.0783*	0.2024*	0.4622*
	McPherson	0.5477	0.6340	0.8168	0.8037
	Ottawa	0.3730	0.4625	0.7814	0.3322*
	Parsons	0.6658	0.7273	0.7103	0.1837*
	Pittsburg	0.2660	0.2790	0.4760	0.3237
	Salina	0.2426	0.2661	0.3402*	0.4108
	Winfield	0.4027	0.4480	0.8551	0.6792
Iowa	Carroll	0.3183	0.3955	1.7148	1.6412
	Clinton	0.3813	0.3955	0.9186	0.8164
	Fairfield	0.9690	1.0762	2.5137	1.7719
	Ft. Dodge	0.3845	0.4137	1.1420	0.8655
	Marshalltown	0.2312	0.2558	0.5431	0.5590
	Mason City	0.3825	0.4157	1.0000	1.0401
	Muscatine	0.2678	0.2803	0.7952	0.6982
	Oskaloosa	0.7404	0.8841	1.8418	1.2559
	Ottumwa	0.5377	0.5598	1.0916	0.4485
	Pella	0.7111	0.7769	1.9724	0.9113
	Spencer	0.1892*	0.2135*	1.1221	1.4485
	Spirit Lake	0.4341	0.4849	2.0294	1.5853
	Storm Lake	0.4425	0.5454	1.7710	1.3166
Minnesota	Albert Lea	0.5396	0.6513	1.1405	1.0289
	Alexandria	0.5661	0.6772	1.5397	0.6527
	Austin	0.0413*	0.0709*	0.4827*	0.2725*
	Bemidji	0.5660	0.5924	1.0530	0.5730
	Brainard	0.5729	0.6105	1.1763	0.4727
	Fairmont	0.4632	0.6472	1.5730	1.5697
	Faribault-Northfield	0.3488	0.4062	0.9930	0.6308
	Fergus Falls	0.2825	0.4042	1.4534	0.6482
	Grand Rapids	0.6489	0.6705	0.9569	0.2735*
	Hutchinson	0.5197	0.6478	1.5875	0.9797
	Marshall	0.4027	0.5051	1.4450	1.3163
	New Ulm	0.3398	0.4154	1.3179	0.9896
	Owatonna	0.5810	0.6484	1.2016	0.7510
	Red Wing	0.4227	0.5352	1.2956	0.8419

Table 1: Correlation Coefficients (continued)

State	Micropolitan Area	Total Employment	Nonfarm Employment	Gross Regional Product	Personal Income Per Capita
Minnesota	Willmar	0.4619	0.5701	1.2853	0.9612
	Winona	0.6080	0.7033	1.4475	0.7737
	Worthington	0.2276	0.3554	0.9947	1.1969
Missouri	Branson	1.0247	1.0980	1.8421	0.1518*
	Farmington	0.5561	0.5813	0.7334	0.1832*
	Ft. Leonard Wood	-0.1695*	-0.1692*	-0.4431*	0.4142*
	Ft. Madison-Keokuk	0.6489	0.7338	1.3596	0.9074
	Hannibal	0.3861	0.4657	1.0133	0.7417
	Kennett	0.4541	0.5581	1.3377	0.6614
	Kirksville	0.2501	0.2937	0.8581	0.4553
	Lebanon	0.8614	0.9821	1.6441	0.1890*
	Marshall	0.4270	0.4892	1.0574	0.9357
	Maryville	0.5473	0.7026	1.3907	1.4636
	Mexico	0.6557	0.7460	1.4938	1.2259
	Moberly	0.7839	0.8360	1.1732	0.5329
	Poplar Bluff	0.6915	0.7572	1.1453	0.4374
	Quincy, IL-MO	0.3958	0.4295	0.7921	0.6063
	Rolla	0.5446	0.5727	0.7495	0.1725*
	Sedalia	0.7589	0.8418	1.3070	0.6370
	Sikeston	0.5331	0.6027	0.9818	0.8491
	Warrensburg	0.8374	0.9399	1.3076	0.5750
	West Plains	0.7124	0.8017	1.8183	0.5641
Nebraska	Beatrice	0.4301	0.4871	0.7328	0.2193*
	Columbus	0.5002	0.5590	1.1671	0.9290
	Fremont	0.4241	0.4615	0.5557	0.5703
	Hastings	0.3971	0.4305	0.7471	0.5309
	Kearney	0.5094	0.6117	1.0505	0.9361
	Lexington	-0.0767*	-0.0484*	0.7174*	0.8389
	Norfolk	0.3317	0.4032	1.0453	1.0997
	North Platte	0.5028	0.5558	1.2591	0.9761
	Scottsbluff	0.0850*	0.1248*	0.7230	0.4816*
North Dakota	Dickinson	-0.4147*	-0.4382*	-0.2081*	0.5603*
	Jamestown	0.1975	0.2430	1.1715	0.8298*
	Minot	-0.1098*	-0.1145*	0.2447*	0.6425*
	Wahpeton	0.1081*	0.1653*	1.8167	3.3031
	Williston	-0.8095*	-0.8666*	-1.0052*	0.6714*
South Dakota	Aberdeen	0.4071	0.4537	1.0231	1.0863
	Brookings	0.5336	0.5929	1.3517	0.7510
	Huron	0.2785	0.3160	0.9739	1.2799
	Mitchell	0.3011	0.3233	1.0453	0.9237
	Pierre	0.2608	0.2774	0.6973	0.6348
	Spearfish	0.1583*	0.1542*	0.5282*	0.8351
	Vermillion	0.5994	0.6750	1.4348	1.5994
	Watertown	0.4176	0.4533	1.2319	0.9605
	Yankton	0.3690	0.3967	0.9574	1.0095

Note: Data are the correlations of the change in micropolitan economic variable and the change in real U.S. GDP for 1969-2017.
**Indicates that the estimated correlation is not statistically different from zero.*

As discussed earlier, a major factor causing the differences in local area sensitivity to national business cycle is the "type of jobs" or the industry mix of the local area. For each of the 87 micropolitan areas, the author estimated the responsiveness of employment in each of 23 two-digit NAICS industries to changes in US real GDP for the 1969-2017 period. Employment data by 2-digit NAICS industry are gathered from Woods & Poole Economics. The objective is to determine the specific industry or industries whose employment changes are correlated with the national business cycle. To this end, the estimated regression coefficients are tested for significance at the 10 percent level; the sign of each statistically significant coefficient indicates whether a particular sector is procyclical or countercyclical. A total of 2001 micropolitan industry regressions were calculated (using EViews); estimated coefficients are available from the author. Table 2 shows the number of significant business cycle-industry correlations for each state in the Plains region.

Table 2: Responsiveness of Micropolitan Area Industry to Changes in US GDP (Number of Statistically Significant Correlations)

Industry	Kansas	Iowa	Minnesota	Missouri	Nebraska	N. Dakota	S. Dakota	Total # of Significant Correlations by Sector
Farming	0	0	1	1	0	0	0	2
Forestry, etc.	3	0	4	6	0	1	2	16
Mining	1	0	2	5	0	1	0	9
Utilities	1	2	1	2	2	0	0	8
Construction	5	5	10	15	4	0	6	45
Manufacturing	8	10	12	16	5	1	5	57
Wholesale Trade	3	1	6	3	0	1	0	14
Retail Trade	4	10	13	11	3	0	5	46
Transportation	3	4	3	4	5	0	1	20
Information	5	9	9	11	6	1	7	48
Finance & Ins.	2	2	2	3	1	0	1	11
Real Estate	5	2	4	7	1	0	0	19
Professional	1	2	8	5	5	1	2	24
Management of companies	3	0	1	0	0	1	0	5
Administrative & support	2	4	4	5	4	0	3	22
Educational	1	1	2	1	1	1	1	8
Health Care	1	4	5	6	2	1	6	25
Arts & entertainment	1	7	11	5	1	1	4	30
Accommodation & food	3	9	11	10	5	1	5	44
Other services	5	4	10	13	6	2	6	46
Federal civilian	6	1	3	1	0	0	2	13
Federal military	0	3	0	1	0	1	1	6
State & local government	1	2	3	5	3	0	0	14
Total # of significant correlations by state	64	82	125	136	54	14	57	

Note: Data are the number of significant (at the 10% level) correlations of industry employment with respect to the national business cycle for 1969-2017, calculated for 23 industries of each of the 87 micropolitan areas of the Plains region.

Several results are notable from Table 2. First, based on total significant correlations by state, the micropolitan areas of Missouri and Minnesota are the most responsive to changes in the US GDP, followed by Iowa micropolitan areas, and then by the group comprising Kansas, South Dakota, and Nebraska. The least sensitive are the micropolitan areas in North Dakota. Although North Dakota has the least number of micropolitan areas in the Plains region, the economies of three of the five micropolitan areas (Dickinson, Minot, and Williston) grew dramatically during the oil exploration, drilling, and extraction boom of the early 2000s. The oil industry's rapid growth lead to an influx of new investment, infrastructure development, related industries, and, of course, jobs. The resulting local economic growth and development was strong and sustainable, even during the 2007-09 Great Recession. Second, in terms of specific industry, manufacturing has the greatest number of significant correlations between micropolitan area employment changes and changes in the national economy. Manufacturing is followed by information services, retail trade, other services, construction, and accommodation & food services. This finding mirrors the responsiveness of US industries at the national level. Examining industries at the 2-digit level not only indicates the co-movement of micropolitan areas to national business swings but also shows the growing importance of different service sectors such as information and other services as well as highlights the traditional role of small cities or micropolitan area cores as local retail trade centers for food, lodging, and also arts and entertainment. The least responsive private sectors for micropolitan areas are farming, management of companies, educational services, utilities, and mining. Thus, there is significant sectoral heterogeneity among the micropolitan areas within a state and across states. The next step of the analysis is based on the findings from Table 2. For the five most sensitive industries (manufacturing, information, retail trade, other services, construction) and for the least responsive sectors (farming, management of companies, educational services, utilities, and mining) identified in Table 2, the percentage shares of total micropolitan area employment for 2017 are estimated and presented in Table 3 and Table 4, respectively. Table 3 below shows the percentage of micropolitan area employment accounted for by the five most sensitive sectors: manufacturing, information, retail trade, other services, construction. On average, manufacturing accounts for 10-16% of micropolitan employment for all Plains states' micropolitan areas except for North Dakota where manufacturing makes up for just over 6% of all employees. The retail trade sector accounts for the largest employment share in micropolitan areas located in Missouri and the Dakotas. Construction is found to be correlated with business cycle movements at the disaggregated level of the micropolitan area, similar to state-level and metropolitan areas. An interesting finding is the growing importance of the service sector, primarily information services and other services.

Table 3: Employment Shares (%) of Micropolitan Area Industries Most Responsive to the Business Cycle

State	Micropolitan Area	Manufacturing	Information	Retail Trade	Other Services	Construction
Kansas	Atchison	12.96	0.71	8.33	5.43	5.36
	Coffeyville	15.14	0.54	9.43	4.46	4.32
	Dodge City	27.83	2.42	9.56	4.62	3.65
	Emporia	15.22	1.51	10.49	4.6	3.12
	Garden City	15.48	0.54	12.2	4.72	4.89
	Great Bend	5.66	0.49	10.13	4.55	4.85
	Hays	3.78	1.63	10.71	5.01	4.11
	Hutchinson	8.81	1.29	10.11	5.34	4.84
	Liberal	23.25	0.66	10.82	4.9	3.49
	McPherson	20.79	0.64	8.24	5.08	5.49
	Ottawa	6.17	0.38	11.52	5.65	5.49
	Parsons	15.03	0.74	8.37	4.48	2.48
	Pittsburg	11.62	1.23	10.01	4.33	3.9
	Salina	12.4	0.53	11.59	5.21	4.46
	Winfield	19.56	0.7	9.15	4.87	3.3
	Average	14.25	0.93	10.04	4.88	4.25
Iowa	Carroll	8.49	1.15	11.77	5.3	5.29
	Clinton	16.42	1.85	11.55	4.9	4.81
	Fairfield	8.33	1.42	10.18	5.8	4.43
	Ft. Dodge	10.54	1.79	12.51	4.94	7.13

Table 3: Employment Shares (%) of Most Responsive Industries (continued)

State	Micropolitan Area	Manufacturing	Information	Retail Trade	Other Services	Construction
Iowa	Marshalltown	20.76	0.91	11.38	5.89	4.73
	Mason City	9.32	1.39	12.71	5.25	5.19
	Muscatine	27.71	0.48	9.02	4.99	4.38
	Oskaloosa	14.49	1.11	12.4	6.65	5.4
	Ottumwa	17.39	0.84	12.71	6.34	4.37
	Pella	29.02	0.66	9.03	4.18	4.81
	Spencer	5.65	2.06	14.24	4.88	5.6
	Spirit Lake	14.48	0.73	13.1	5.03	7.02
	Storm Lake	25.04	0.55	9.81	3.9	3.6
	Average	15.97	1.15	11.57	5.23	5.14
Minnesota	Albert Lea	15.65	0.84	13.57	6	4.68
	Alexandria	13.04	1.01	12.72	6.43	6.57
	Austin	17.48	1.13	10.34	5.95	4.02
	Bemidji	4.61	1.6	12.99	5.53	6.37
	Brainard	6.4	0.99	13.01	5.83	7.41
	Fairmont	9.68	0.79	13.06	5.74	4.84
	Faribault-Northfield	13.6	1.06	9.8	5.92	5.57
	Fergus Falls	12.7	1.15	10.56	6.05	6.89
	Grand Rapids	5.11	0.88	13.18	6.86	5.71
	Hutchinson	22.75	1.01	11.44	5.44	4.94
	Marshall	10.65	0.82	11	5.15	3.99
	New Ulm	15.82	1.64	10.82	4.92	6.03
	Owatonna	22.33	0.89	12.59	4.7	3.56
	Red Wing	15.18	0.76	9.78	5.73	4.85
	Willmar	13.52	0.85	11.32	5.27	6.02
	Winona	18.74	2.06	9.8	4.51	3.44
	Worthington	21.96	0.77	11.54	5.79	3.86
	Average	14.07	1.07	11.62	5.64	5.22
Missouri	Branson	1.8	1.23	14.8	5.71	4.12
	Farmington	6.29	0.73	12.78	5.83	5.71
	Ft. Leonard Wood	0.84	0.49	7.83	3.84	2.95
	Ft. Madison-Keokuk	15.77	0.55	11.05	6.11	6.27
	Hannibal	13.08	0.58	13.86	4.56	6.02
	Kennett	2.77	0.45	12.05	5.2	2.92
	Kirksville	6.96	0.95	12.2	6.05	4.29
	Lebanon	27.29	0.84	12.51	5.79	4.45
	Marshall	16.44	1.25	10.1	5.05	3.58
	Maryville	10.48	0.82	11.33	4.93	4.1

Table 3: Employment Shares (%) of Most Responsive Industries (continued)

State	Micropolitan Area	Manufacturing	Information	Retail Trade	Other Services	Construction
Missouri	Mexico	16.05	0.87	10.86	6.61	4.11
	Moberly	8.22	0.92	11.65	5.03	4.34
	Poplar Bluff	9.57	0.71	12.65	5.87	4.86
	Quincy, IL-MO	10.09	1.44	12.98	6.28	4.64
	Rolla	4.92	0.81	11.68	5.1	4.02
	Sedalia	17.74	1.51	11.23	6.29	3.87
	Sikeston	11.56	1.1	8.46	6.09	5.53
	Warrensburg	5.74	0.49	8.22	4.65	4.54
	West Plains	11.25	1.14	12.05	5.94	4.1
	Average	10.36	0.89	11.49	5.52	4.44
Nebraska	Beatrice	11.89	0.72	11.09	5.9	5.1
	Columbus	23.22	0.58	11.2	5.2	6.23
	Fremont	16.07	0.84	12.47	5.76	4.95
	Hastings	11.86	0.78	10.77	6.06	6.19
	Kearney	9.29	1.13	12.11	6.07	5.79
	Lexington	22.75	0.67	9.55	5.29	4.25
	Norfolk	11.4	0.97	11.52	5.62	5.91
	North Platte	1.64	0.99	11.76	5.85	5.42
	Scottsbluff	4.37	1.43	11.6	5.63	6.03
	Average	12.5	0.9	11.34	5.71	5.54
North Dakota	Dickinson	5.7	0.84	10.19	5.08	7.23
	Jamestown	8.29	0.96	11.57	5.22	4.68
	Minot	1.45	1	11.85	5.15	5.39
	Wahpeton	14	0.9	8.15	5.31	5.62
	Williston	1.48	0.55	7.94	3.52	9.5
	Average	6.18	0.85	9.94	4.86	6.48
South Dakota	Aberdeen	11.12	1.07	12.27	5.04	5.22
	Brookings	17.68	0.69	9.72	4.14	4.33
	Huron	16.16	0.83	9.76	5.25	4.88
	Mitchell	12.03	1.61	13.48	4.84	6.58
	Pierre	0.86	1.32	11.88	5.93	6.07
	Spearfish	3.27	1.06	10.7	5.13	6.79
	Vermillion	2.72	0.4	9.84	4.99	3.3
	Watertown	13.98	0.96	14.43	5.43	6.48
	Yankton	19.18	1.1	11.58	4.34	4.57
	Average	10.78	1	11.52	5.01	5.36

Note: Data are the percentage shares of micropolitan area employment accounted for by the five most business cycle-sensitive sectors in each of the 87 micropolitan areas.

Regarding the five low-sensitive industries of the micropolitan areas (see Table 4 below), a good deal of heterogeneity exists across the seven Plains states. For North Dakota, mining is the most dominant in terms of employment shares ranging from over 28% in Williston to approximately 4% in Minot. For the other states on average, the largest employment share is in the farm sector followed by educational service; however, farming averages only 4-6% of micropolitan employment and education accounts for 1-3%. Some micropolitan areas have a relatively high employment share in agriculture such as Beatrice (NE) and Fergus Falls (MN) at 9%, while a few have minimal employment shares (only 1%) in farming such as Branson (MO) and Spearfish (SD). The percentage of micropolitan area employment in education ranges from a low of 0.34% in Lebanon (MO) to a high of almost 10% in Faribault-Northfield (MN).

Table 4: Employment Shares (%) of Micropolitan Area Industries Least Responsive to the Business Cycle

State	Micropolitan Area	Farming	Management	Education	Utilities	Mining
Kansas	Atchison	7.48	0.7	2.6	1.06	0.86
	Coffeyville	5.01	0.07	1.04	0.36	2.63
	Dodge City	3.36	0.45	1.31	0.55	0.42
	Emporia	5.34	0.08	0.77	0.75	1.7
	Garden City	4.58	0.36	0.55	1.45	3.21
	Great Bend	3.78	0.48	0.74	0.54	19.26
	Hays	2.38	1.35	1	0.05	17.19
	Hutchinson	4.25	2.17	0.7	0.96	2.62
	Liberal	3.16	0.2	0.38	0.61	5.14
	McPherson	5.14	1.2	2.98	0.23	5.28
	Ottawa	7.14	0.48	1.98	0.03	2.51
	Parsons	6.47	0.65	0.4	0.62	0.55
	Pittsburg	3.5	1.58	0.85	0.52	0.54
	Salina	2.78	1.44	1.53	0.57	2.16
	Winfield	4.77	0.18	3.33	0.71	4.37
	Average	4.61	0.76	1.34	0.6	4.56
Iowa	Carroll	6.65	0.33	4.29	0.37	0.56
	Clinton	4.26	0.25	2.06	0.38	0.24
	Fairfield	5.24	1.01	10.1	0.19	0.41
	Ft. Dodge	4.18	0.81	1.31	0.31	0.51
	Marshalltown	4.06	0.18	0.54	0.66	0.45
	Mason City	3.62	0.68	1.04	0.33	0.27
	Muscatine	2.5	2.54	0.17	0.63	0.23
	Oskaloosa	8.52	0.53	4.3	0.43	0.01
	Ottumwa	3.22	0.32	1.4	0.88	0.13
	Pella	4.41	0.35	5.03	0.23	0.27
	Spencer	5.91	0.84	0.74	0.47	0.64
	Spirit Lake	3.07	0.45	0.75	0.18	0.38
	Storm Lake	6.12	0.06	3.46	0.48	0.01
	Average	4.75	0.64	2.71	0.43	0.32

Table 4: Employment Shares (%) of Least Responsive Industries (continued)

State	Micropolitan Area	Farming	Management	Education	Utilities	Mining
Minnesota	Albert Lea	6.83	0.16	0.54	0.58	0.16
	Alexandria	3.83	0.28	0.87	0.29	0.24
	Austin	5.26	2.74	1.14	0.09	0.19
	Bemidji	2.04	0.12	1.4	0.58	0.52
	Brainard	1.81	0.33	1.81	0.35	0.17
	Fairmont	7.44	0.4	1.11	0.51	0.23
	Faribault-Northfield	3.7	0.76	9.99	0.22	0.23
	Fergus Falls	8.85	0.52	0.91	0.41	0.35
	Grand Rapids	1.77	0.09	0.76	1.77	1.97
	Hutchinson	4.37	0.54	1.04	0.35	0.35
	Marshall	4.79	2.83	1.18	0.1	0.27
	New Ulm	5.87	1.56	2.37	0.22	0.16
	Owatonna	3.28	0.12	0.55	0.41	0.12
	Red Wing	5.63	1.04	1.02	2.31	0.14
	Willmar	4.78	0.69	0.9	0.26	0.45
	Winona	4.13	2.8	5.62	0.18	0.2
	Worthington	7.36	0.19	1.64	0.19	0.3
	Average	4.81	0.89	1.93	0.52	0.36
Missouri	Branson	1.01	0.29	2.09	0.4	0.57
	Farmington	2	0.49	0.71	0.28	0.41
	Ft. Leonard Wood	1.73	0.04	1.07	0.26	0.28
	Ft. Madison-Keokuk	8.38	0.17	1.99	0.37	0.26
	Hannibal	6	0.19	2.76	0.66	0.59
	Kennett	3.31	0.42	0.48	0.16	0
	Kirksville	7.94	0.52	3.24	0.58	0.01
	Lebanon	6.81	0.25	0.34	0.49	0.29
	Marshall	7.69	1.21	2.67	0.46	0.18
	Maryville	9.47	0.46	1.04	0.88	0.62
	Mexico	7.27	0.37	1.38	0.71	0.34
	Moberly	5.88	2.81	0.67	0.67	0.66
	Poplar Bluff	3.24	0.1	0.52	0.51	0.25
	Quincy, IL-MO	4.05	0.31	2.04	0.41	0.67
	Rolla	2.86	0.11	0.99	0.16	0.21
	Sedalia	4.9	0.57	0.86	0.31	0.27
	Sikeston	2.45	0.9	0.78	0.53	0.29
	Warrensburg	5.81	0.08	1.22	0.3	0.29
	West Plains	6.8	1.53	0.47	0.56	0.39
	Average	5.14	0.57	1.33	0.46	0.35

Table 4: Employment Shares (%) of Least Responsive Industries (continued)

State	Micropolitan Area	Farming	Management	Education	Utilities	Mining
Nebraska	Beatrice	9.13	0.51	0.67	0.05	0.56
	Columbus	4.42	0.26	1.15	0.7	0.17
	Fremont	3.49	0.18	3.21	0.24	0.2
	Hastings	2.83	0.9	3.33	0.03	0.19
	Kearney	3.96	2.19	0.74	0.16	0.22
	Lexington	8.14	0.61	0.59	0.13	0.5
	Norfolk	5.99	0.46	1.15	0.11	0.29
	North Platte	6.53	0.31	0.75	0.16	0.44
	Scottsbluff	6.6	0.51	0.63	0.26	0.29
	Average	5.68	0.66	1.36	0.2	0.32
North Dakota	Dickinson	3.6	0.45	1.15	0.34	14.65
	Jamestown	7.31	0.55	4.83	0.63	0.36
	Minot	3.93	0.24	0.69	0.32	3.76
	Wahpeton	9.8	0.43	0.55	0.47	2.12
	Williston	2.14	0.17	0.36	0.76	28.46
	Average	5.36	0.37	1.52	0.50	9.87
South Dakota	Aberdeen	4.86	0.95	2.2	0.48	0.16
	Brookings	4.31	1	1.1	0.29	0.64
	Huron	7.37	1.22	1.45	0.65	0.94
	Mitchell	4.27	0.5	2.72	0.37	0.23
	Pierre	3.39	0.21	1.08	0.31	0.27
	Spearfish	1.6	0.62	0.67	0.26	2.07
	Vermillion	4.68	0.19	1.14	0.33	0.24
	Watertown	5.09	0.75	1.25	0.24	0.17
	Yankton	3.72	0.36	2.87	0.3	0.49
	Average	4.37	0.64	1.61	0.36	0.58

Note: Data are the percentage shares of micropolitan area employment accounted for by the five least business cycle-sensitive sectors in each of the 87 micropolitan areas.

A Model of Micropolitan Area Sensitivity

After examining the responsiveness of micropolitan areas and their respective industries to changes in the macroeconomy, the next question is: what factors determine this linkage? To measure the effects of industry mix and other local area factors on differences in micropolitan areas' sensitivity to the business cycle, a simple economic model is estimated, following Gascon and Haas (2019):

$$MCORR = \alpha + \beta_1(HIGHS) + \beta_2(LOWS) + \varepsilon \quad (1)$$

where the dependent variable (MCORR) is the historical correlation between the annualized change in various economic measures (total employment, nonfarm employment, GRP, and personal income) of a micropolitan area with respect to changes in US real GDP over the 1969-2017 period. The independent variables indicate the initial or beginning industry mix for a micropolitan area: 1969 total employment shares of the five most-sensitive micropolitan sectors (HIGHS) and the 1969 combined employment shares of the five least-sensitive micropolitan sectors (LOWS); ε is the error term. There are 87 micropolitan areas in the sample. Ordinary least squares method was applied to the cross-sectional data set using EViews. The results are presented in Table 5. Consistent with past studies, the results in Table 5 indicate that a micropolitan area's industry mix generally has a positive and significant influence on how closely a micropolitan area's economy follows changes in the national economy. However, depending on the economic indicator, the combined differential impact of the employment shares of high- and low-sensitive micropolitan industries only explains 10-33% of the responsiveness of micropolitan economies to the national business cycle, as shown by the values of the adjusted R-squared. As such, other characteristics of, and across, micropolitan areas may be more important.

Table 5: Micropolitan Area Responsiveness as a Function of Industry Mix

	Total Employment	Nonfarm Employment	Gross Regional Product	Personal Income Per Capita
Constant	0.1529	0.1041	-0.1722	-0.0888
High-sensitive sectors share	0.0091 (2.8256)***	0.0103 (2.9114)***	0.0182 (2.9208)***	0.0013 (0.2861)
Low-sensitive sectors share	-0.0049 (-0.9215)	-0.0012 (-0.2057)	0.0313 (3.0294)***	0.0494 (6.4757)***
R-squared	0.1166	0.1022	0.1420	0.3454
Adjusted R-squared	0.0956	0.0808	0.1216	0.3298
F-statistic Prob(F-statistic)	5.5455 (0.0055)	4.7819 (0.0108)	6.9523 (0.0016)	22.1635 (0.0000)
No. of observations	87	87	87	87

Note: This table shows the OLS regression estimates for the model, with micropolitan-business cycle correlations as dependent variable and employment shares of the most-sensitive and least-sensitive micropolitan industries as explanatory variables. ***Significant at the 1% level.

To account for other micropolitan area economic attributes, an aggregate variable or index is added to the model. This variable is taken from POLICOM Corporation's Micropolitan Economic Strength Index (2020). The micropolitan strength index is a weighted composite of the growth of different economic variables such as wages, earnings, welfare payments, and medical aid to the poor. According to Fruth (2020): "The economic strength rankings are created so POLICOM can study the characteristics of strong and weak economies. The highest ranked areas have had rapid, consistent growth in both size and quality for an extended period. The lowest ranked areas have been in decline for an extended period." p. 3 The 2011 micropolitan rankings are added as an explanatory variable; this initial ranking represents the state of the micropolitan economy at the early part of the time period under study. Based on the Table 6 results, the initial micropolitan ranking has a negative and significant impact on the sensitivity of micropolitan performance, after accounting for industry mix. Thus, the higher the ranking number (i.e., the less prosperous the local area) of the micropolitan area, the less sensitive the area is to changes in the national business cycle. To check for robustness in the results, an alternative ranking variable was used: the difference in micropolitan ranking from 2011-2017.The empirical results indicated that the improvement in the ranking of a micropolitan area does not affect the responsiveness of the local area to national cyclical changes. This begs the question as to whether the vitality of a micropolitan area is more dependent on localized business cycles and inherent competitive advantages than on national business conditions.

Table 6: Micropolitan Area Responsiveness as a Function of Industry Mix and 2011 Ranking

	Total Employment	Nonfarm Employment	Gross Regional Product	Personal Income Per Capita
Constant	0.1801	0.1342	-0.1390	-0.0906
High-sensitive sectors share	0.0059 (1.9123)*	0.0069 (2.0006)**	0.0144 (2.2733)**	0.0015 (0.3174)
Low-sensitive sectors share	-0.0116 (-2.2121)**	-0.0086 (-1.4888)	0.0231 (2.1543)**	0.0499 (6.1123)***
2011 Ranking	-0.0007 (-3.7768)***	-0.0008 (-3.7808)***	-0.0009 (-2.2583)**	-0.0001 (-0.1615)
R-squared	0.2442	0.2329	0.1903	0.3459
Adjusted R-squared	0.2189	0.2064	0.1625	0.3220
F-statistic Prob(F-statistic)	9.0355 (0.0000)	8.4572 (0.0000)	6.5610 (0.0005)	14.6130 (0.0000)
No. of observations	87	87	87	87

*Note: This table shows the OLS regression estimates for the model, with micropolitan-business cycle correlations as dependent variable and employment shares of the most-sensitive and least-sensitive micropolitan industries and the 2011 micropolitan ranking as explanatory variables. *, **, ***Significant at the 10%, 5%,1% level respectively.*

CONCLUSIONS

There has recently been much interest in exploring the co-movement or sensitivity of local economic activity to the national business cycle. However, Peterson and Manson (1982) caution that: "These results suggest that there is little policy insight to be gained from simple time series analysis of city cycles in relation to national economic cycles. An extrapolation of past cyclical behavior into the future presumes a stability of city response that is unlikely to be observed. More valuable is the testing of hypotheses regarding the effect of industry mix, labor market characteristics, and age of capital on differences across cities in cyclical sensitivity and on changes over time in individual cities' cyclical exposure." p. 31 The current study extends this line of research by examining the case of the micropolitan statistical area. Its objectives are twofold: (1) to determine the degree of co-movement or "coupling" between business conditions at the micropolitan area level and the national business cycle, and; (2) to analyze the role of local industrial composition on the micropolitan area-business cycle relationship. The study focuses on the 87 micropolitan areas located in the seven Plains states of Kansas, Iowa, Missouri, Minnesota, Nebraska, North Dakota, and South Dakota. Using annual data for the 1969-2017 period, historical correlations of changes in U.S. real GDP and changes in four economic indicators (total employment, nonfarm employment, Gross Regional Product, and personal income) for each micropolitan area are calculated.

The findings show that around 70% of the micropolitan areas have significant correlations with the national business cycle. There is a great deal of heterogeneity across states, however, with Missouri and Minnesota more sensitive to the business cycle and North Dakota the least responsive. This heterogeneity is further evidenced across the various industries of the seven Plains states. The mix of industries has been a critical determinant of how connected a local economy is to the national economic activity. Although as with previous research, this study finds the industrial composition of micropolitan areas to be a significant factor in explaining the link between micropolitan economic performance and the national business cycle, this "closeness" tends to be diminishing as the geographical unit of study becomes smaller, consistent with Carlino and DeFina (2003). Thus, the smaller cities, towns or micropolitan statistical areas may not be as tied to national business swings. Their "resilience," competitive strengths, and other attributes (ex., natural amenities, location, entrepreneurship, and social capital) may be more inherent; for example, see the "Most Dynamic Micropolitans" report by DeVol and Crews (2019). The relevant issue for local economic development policymakers in micropolitan areas is not how co-dependent their area economy is with the macroeconomy, but what incentives, policies, and strategies do they have to support existing firms, attract new investment, and promote overall quality of life. Directions for further research include a more detailed look at the natural and acquired competitive advantages and amenities of micropolitan areas and to extend the empirical approach to other regions of the U.S.

APPENDIX

Appendix A. Summary Statistics of Micropolitan Area Economic Variables

Variable	Mean	Standard Deviation	Minimum	Maximum	Number of Observations
Total Employment	19562	8367.38	5066	57761	4263
Nonfarm Employment	18121	8174.30	4193	56696	4263
Gross Regional Product (in 2012 $)	1.06E+09	6.38E+08	1.37E+08	1.01E+10	4263
Per Capita Personal Income (in 2012 $)	28055.65	8497.31	10953	100969	4263

Note: The table presents descriptive statistics of the four main economic variables (total employment, nonfarm employment, Gross Regional Product, and per capita personal income) used in estimating correlations with the national business cycle. The panel data consists of 87 Plains micropolitan areas and annual data for the 1969-2017 period, for a total of 4,263 observations.

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EXCHANGE RATE VOLATILITY AND FOREIGN DIRECT INVESTMENT IN SELECTED WEST AFRICAN COUNTRIES

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ABSTRACT

This paper empirically investigates the exchange rate volatility-FDI nexus in selected Economic Community of West African Sates (ECOWAS) countries using time series data from 1986-2017. Using Autoregressive Distributed Lag (ARDL) model and Toda-Yamamoto (1995) causality techniques, the effects of exchange rate volatility on FDI and causality relationship between the two are examined. The empirical results show that the estimated coefficient of nominal exchange rate volatility is negative in all the selected countries but significant only in Ghana, Sierra Leone, and Nigeria. Conversely, the effect of real exchange rate volatility is negatively significant as expected, in Nigeria, Togo, Sierra Leone, and Cote d'lvore. However, the effect is positive but statistically insignificant in Ghana and Gambia. Furthermore, the causality test results show unidirectional causality from exchange rate volatility to FDI in all selected countries except in Ghana when the nominal exchange rate is employed. On the other hand, when real exchange rate volatility is employed, there is evidence of bidirectional causality between the two variables only in Nigeria and Sierra Leone.

JEL: F21, F31, F39

KEYWORDS: Exchange Rates Volatility, Foreign Direct Investment, Autoregressive Distributed Lag Model, Economic Community of West African States

INTRODUCTION

Over the past few decades, foreign direct investment (FDI) is widely recognized as the principal engine of economic growth for both developed and developing countries. FDI has proved to be of great benefit to many countries, especially developing countries that are experiencing capital deficiencies and technological backwardness. Kiyota and Urata (2004) opine that FDI not only transfers financial resources but also introduce technology and managerial know-how from investing countries to the recipient or host countries. However, there has been sudden upsurge and uneven distribution of FDI inflows to developed countries compared to developing countries particularly, African countries. To corroborate this assertion, United Nations Conference on Trade and Development (UNCTAD, 2018) reports show that FDI flows to African countries continued to slide, reaching $42 billion in 2017, about 21% decline from 2016 and the slump in FDI flows to Africa was attributed to weak oil prices and lingering effects from the commodity bust, as flows contracted in commodity-exporting economies such as Egypt, Mozambique, Congo, Nigeria and Angola.

African countries are marginalized in the area of financial globalization (Ndikumana and Verick, 2008), and are experiencing volatile and dwindling FDI inflows. The decline and fluctuation in FDI inflows to these countries have been attributed explicitly to specific determinants, including economic growth, institutional quality, trade openness, political instability, infrastructural availability, economic freedom, labour productivity, and domestic investment. However, theoretical and empirical literature has shown that among the commonly investigated macroeconomic determinants of FDI, exchange rate volatility is identified as the primary deleterious variable determining FDI flows (Bénassy-Quéré, Fontagné and Lahréche-Revil, 2001; Kiyota and Urata, 2004; and Ogunleye, 2009).

Several studies have investigated the effect of exchange rate volatility on FDI flows based on cross-country or country-specific, and their empirical findings have produced mixed results. This suggests that the empirical issue remains open for further investigation. For instance, a group of studies provide empirical evidence that the effect of exchange rate volatility on FDI is positive and argued further that exchange rate volatility increase FDI flows to the host countries (see Cushman, 1989; Froot and Stein, 1991; Campa, 1993; Golberg and Kolstad, 1995; Chowdury and Wheeler, 2008; and Dhakal et al. 2010). In contrast, studies conducted by Gorg and Wakelin (2002); Kiyota and Urata (2004); Kyereboah-Kwame (2008); Ogunleye (2009); Bahmani-Oskoee and Hajilee (2013) and Odili (2015) among others suggest a negative relationship between exchange rate volatility and FDI flows. Yet, few studies report no significant relationship among the variables.

Apart from the dynamic relationship between exchange rate volatility and FDI flows, the direction of causality between these variables has also remained a subject of controversy to date in the literature with lack of consensus among the researchers (see, for instance, Benassy-Querre et al., 2001; Kiyota and Urata, 2004; Ruiz, 2005; Ogunleye, 2009 and Zakaria, 2013). Most extant studies argued that the direction of causality runs from exchange rate volatility to FDI inflows. Nevertheless, there is a possibility of feedback or bi-directional causality between FDI and exchange rate volatility, which address the issues of endogeneity bias. Given the dichotomies that exist among the researchers on volatility-FDI nexus, we provide further evidence to the burgeoning debate on the relationship between exchange rate volatility and FDI in the experience of selected Economic Community of West African States (ECOWAS) countries.

In this work, we thus examine the nexus of relationship between exchange rate volatility, and FDI flows using both Autoregressive Distributed Lag (ARDL) model proposed by Pesaran et al. (2001) and Toda-Yamamoto (1995) causality test techniques for selected ECOWAS countries. The study employs both nominal and real exchange rates data to generate exchange rates volatility from Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model proposed by Bollerslev (1986).

The remainder of the paper is set out as follows. Section 2 presents a brief literature review related to exchange rate volatility and FDI flows. Section 3 provides the data and methodology. Empirical results are given in section 4, and section 5 presents the concluding remarks.

LITERATURE REVIEW

Considerable numbers of studies have examined the effect of exchange rate volatility on foreign direct investment (FDI) flows across the globe. Despite the continuum of studies investigating the volatility-FDI nexus based on country-specific or cross country studies, they have generally provided mixed evidence due to different econometric techniques, choice of time, measures of exchange rate volatility, model misspecification and countries considered among others. Among these studies, Elsharif-Suliman (2006) investigated the effect of exchange rate volatility on foreign direct investment (FDI) for low-income countries of sub-Saharan African countries using two-Stage Least Squares (2SLS) technique over the period 1990-2013. The empirical findings indicate that depreciation of the real exchange rate attracts more FDI to the countries under consideration, but an increase in exchange rate volatility discourages FDI flows to these countries. The author thus concluded that the US dollar peg system is an attractive exchange rate regime for foreign investors in sub-Saharan African countries due to the volatility of the exchange rate.

Kyereboah-Coleman and Agyire (2008) focused on the same issue by examining the effect of real exchange rate volatility on FDI inflow in the case of Ghana. The authors employ both Autoregressive Conditional Heteroskedasticity (ARCH) and Generalized Autoregressive Conditional Heteroskedacticity (GARCH) models as a measure of exchange rate volatility. They found that real exchange rate volatility has a significant negative effect on FDI flows and concluded that the political factors and market size of a country is one of the primary determinants of FDI flows to a particular country. Similarly, Ogunleye (2009) explored the relationship between exchange rate volatility and FDI flows in sub-Saharan African (SSA) countries with a specific focus on Nigeria and South Africa covering the period 1970-2005. The empirical findings revealed that exchange rate volatility has a significant negative effect on FDI in the case of Nigeria, but a weak and insignificant result in the case of South Africa. The weak impact of exchange rate volatility on FDI flows in South Africa could be attributed to the sound capital flows management policies implemented by the policymakers.

Nyarko, Nketiah-Amponsah, and Barnor (2011) also investigated the effect of the exchange rate regime on FDI inflows in Ghana for the period 1970-2008 using Ordinary Least Square (OLS) and Error Correction Model (ECM) techniques. They found that real exchange rate volatility has no significant effect on FDI flow and therefore suggest that the country's quest to attract FDI should go hand in hand with the sustainability of the democratic regime in the country.

Taking account of endogeneity issues, Ogunleye et al. (2012) examined the effect of real exchange rate volatility on FDI flow in selected sub-Saharan African countries using simultaneous equation and Granger Causality techniques. The results showed that FDI has a significant effect on the exchange rate only in Nigeria, South Africa, and Botswana. The significant impact of exchange rate volatility on FDI is reported in Botswana, Cameroon, Nigeria, and South Africa only. They suggest the need for policy coordination between monetary and fiscal authorities to ensure that fiscal policy does not undermine the efforts of monetary authorities at managing the exchange rate effectively.

Furthermore, an empirical study conducted by Omokunwa and Ikponmwosa (2014) investigated the dynamic relationship between exchange rate volatility and FDI in Nigeria using the Error Correction Model (ECM) technique over the period 1980-2011. They found a weak effect of exchange rate volatility on FDI flow in both short-run and long-run periods. Osei-Fosu et al. (2015) also examined the impact of exchange rate volatility on FDI flows in Ghana using the Two-Stage Least Square estimation technique. They found that the responsiveness of FDI to exchange rate volatility is negative and statistically significant.

Recently, Asmae and Ahmad (2019) examined the effect of price and real exchange rate volatility on FDI flows in Morocco and Turkey over the period 1990-2017. The empirical findings indicate that, in the case of Morocco, real exchange rate volatility has a significant effect on FDI flow in both time horizons. Although, most studies have empirically investigated the impact of the real exchange rate volatility on FDI flow across the countries with little or no consideration on the effect of nominal exchange rate volatility on FDI flows in the case of sub-Saharan African countries, particularly West African countries. As noted by Haile and Pugh (2013) that the impact of both nominal and real exchange rate volatility on trade only differ a long period of time. In essence, both nominal and real exchange rates have no distinct effect on trade in the short run except in the long run period. This study attempts to investigates the differential impact of both nominal and real exchange rate volatility on FDI flow in Selected ECOWAS countries.

DATA AND METHODOLOGY

We used annual data spanning from 1986 to 2017. The choice of the time frame is informed by the fact that all the selected countries have switched from a fixed system to a flexible exchange rate regimes. Aside from this, these countries implemented comprehensive economic reform policies such as liberalization and privatization reforms. Six Economic Community of West African States (ECOWAS) countries, namely Nigeria, Ghana, and Cote d'lvore, Sierra Leone, Gambia, and Togo, are selected for this study based on data availability on real and nominal exchange rates. All variables employed in this study are sourced from World Development Indicators Database (2017). The Definition and the measurement of the variables used in this paper are presented in an Appendix.

Model

Taking a cue from previous studies including Kiyota and Urata (2004); Kyereboah-Coleman and Agyire-Tettey (2008) and Oyelami (2012), the estimated model to examine the effect of exchange rate volatility on FDI flows is specified as follows:

$$In\, FDI_t = \alpha_0 + \beta_1 In\, PGDP_t + \beta_2 In\, INFR_t + \beta_3 VOL_t + \beta_4 In\, OPEN_t + \varepsilon_t \qquad (1)$$

where FDI is the total inflow of foreign direct investment as a percentage of GDP; PGDP is real per Capita Income which measures the market size and growth; INFR is infrastructural availability proxy as the number of telephone subscribers per 100 people; OPEN is trade openness; VOL is the exchange rates volatility decomposed into nominal exchange rate (NVOL) and real exchange rate (RVOL); ε_t is the error term and In denotes as the natural logarithmic form. The a priori expectations of the coefficients are expected to be positive except the coefficient associated with the exchange rates volatility that is indeterminate.

RESULTS

Before we conduct an empirical investigation of the study, it is conventional to determine the stationary properties of the variables to be used to avoid inconsistent and spurious results because time series data are often characterized to be non-stationary which prompted the need to subject the variables to stationary scrutiny using Augmented Dickey- Fuller (ADF) and Phillips-Perron (PP) tests. Due to space conservation, the results of the unit root tests are not present in this study. The unit root test results indicate that most variables are non-stationary at level but become stationary at the first difference, confirming that the variables are integrated of I(0) and I(1).

Given that the variables are integrated of a different order of integration, employing Autoregressive Distributed Lag (ARDL) model proposed by Pesaran et al. (2001) is appropriate for this investigation since it is generally established that ARDL is applicable irrespective of the order of integration of variables. Thus, this study proceeds to estimate the long-run cointegration relationship among the variables using the ARDL Bound test approach. Table 1 reports the results of the ARDL bound test. The results indicate that the computed F-statistic is greater than the upper critical bounds generated by Pesaran et al. (2001) in all the selected Economic Community of West African States (ECOWAS) countries at 5% and 10% significant levels when both nominal and real exchange rates are chosen as one of the explanatory variables separately. The findings validate the existence of long-run relationship between Foreign Direct Investment (FDI) and its determinants.

Table 1: ARDL Bound Test Results

Country	F-statistics	Critical Value (5%)	Critical Value (10%)	Volatility Measure
Cote d'lvore	5.70**	2.86-4.01	2.45-3.42	Nominal exchange rate
Gambia	4.09**	2.86-4.01	2.45-3.42	Nominal exchange rate
Ghana	3.65***	2.86-4.01	2.45-3.42	Nominal exchange rate
Nigeria	6.93**	2.86-4.01	2.45-3.42	Nominal exchange rate
Sierra Leone	4.68**	2.86-4.01	2.45-3.42	Nominal exchange rate
Togo	3.89***	2.86-4.01	2.45-3.42	Nominal exchange rate
Cote d'ivore	4.12**	2.17-3.21	1.92-2.59	Real exchange rate
Gambia	3.77***	2.17-3.21	1.92-2.59	Real exchange rate
Ghana	3.82***	2.17-3.21	1.92-2.59	Real exchange rate
Nigeria	4.14**	2.17-3.21	1.92-2.59	Real exchange rate
Sierra Leone	4.68**	2.17-3.21	1.92-2.59	Real exchange rate
Togo	3.89***	2.17-3.21	1.92-2.59	Real exchange rate

*Note: *(**) and *** represents significant at 1(5) % and 10% levels respectively.*

Having established that long-run relationship exists between the variables. We estimate our error correction model, i.e., ARDL, which embodies both the long-run and the short-run dynamics. The estimated long-run results of the relationship between exchange rate volatility and FDI in the selected ECOWAS countries are presented in Table 2 using nominal and real exchange rates volatility variable separately for each model. The results show that GDP per Capita is positive and statistically significant in the case of Nigeria, Cote d'lvore, Sierra Leone, and Gambia for both nominal and real models and these findings are consistent with our expectations and previous studies. In Ghana and Togo, the effect of GDP per Capita on FDI flows is negative and insignificant in each model, respectively.

The coefficient estimate of trade openness is positive and statistically significant in all the selected countries for both models. This positive finding suggests that countries with a high degree of openness and good business climate attract more foreign investors into their countries, and it is evident that these selected countries have liberalized their trade regime, which creates conducive environment and more competition among the foreign investors.

The effect of infrastructural availability is positively significant on FDI flows in Cote d'lvore, Ghana, Gambia, and Nigeria, respectively for the model with real exchange rate volatility. At the same time, Cote d'lvore, Ghana, and Nigeria are reported to be positive and significant only for model with nominal exchange rate volatility. This result implies that an increase in infrastructural availability attracts more FDI flows. However, the coefficient estimate of infrastructural availability is negative in the case of Sierra Leone and Togo only for the nominal model, and these negative findings could be attributed to the prevalence of inadequate infrastructural facilities in these countries. Based on these results, infrastructural availability plays a vital role in attracting foreign investors into the country. It also provides foundation and confidence for foreign investors to invest in a particular country.

Furthermore, the findings also show that the coefficient of nominal exchange rate volatility is negative in all the selected countries but significant only in Ghana, Sierra Leone, and Nigeria. In Nigeria, Togo, Sierra Leone, and Cote d'ivore, the coefficients of real exchange rate volatility are significant and negative, but positive findings are reported in the remaining countries. The significance of negative exchange rates volatility supports the theoretical literature, especially risk aversion argument that exchange rate volatility increases risks or uncertainties for the risk-averse foreign investors, which affects their profits or relative asset and consequently reduces FDI. Overall, the findings show that real exchange rate volatility exerts much effect on FDI than the nominal exchange rate volatility in terms of magnitude and significance.

Table 2: Long Run Estimates Results

Countries	Constant	GDP	OPEN	INFR	VOL
Panel A: Nominal Exchange Rate Volatility (NVOL)					
Cote d'ivore	38.4(1.26)*	1.39(0.57)***	0.71(2.58)*	1.73(2.62)*	-3.52(-1.85)
Gambia	12.7(1.41)	2.20(5.63)**	4.60(1.57)***	3.42(2.58)	-1.93(-2.57)
Ghana	0.64(1.55)**	-1.04(-3.59)	0.71(2.46)**	1.73(1.29)**	-3.52(-1.66)**
Nigeria	9.88(1.47)	1.58(2.40)***	0.91(0.79)***	7.61(0.69)***	-2.57(-3.99)*
Sierra Leone	9.31(4.32)	1.27(3.46)**	9.71(2.48)**	-12.7(-1.63)	-1.47(-1.27)**
Togo	7.10(1.13)	5.06(2.50)*	1.30(1.59)**	-3.18(-1.50)	-2.37(0.26)
Panel B: Real Exchange Rate Volatility (RVOL)					
Cote d'ivore	5.36(1.49)	2.01(0.73)*	1.82(2.69)*	2.47(1.50)*	-4.55(-1.33)**
Gambia	4.86(1.93)	0.42(1.52)**	6.50(1.21)**	4.28(0.68)**	4.20(1.64)
Ghana	9.30(3.95)***	1.25(2.06)***	1.90(3.46)**	0.74(1.85)**	2.01(0.58)
Nigeria	4.63(1.10)*	1.16(0.89)**	4.30(1.56)***	2.21(0.38)**	-0.51(-1.26)***
Sierra Leone	3.18(2.05)	1.54(0.23)**	3.84(5.47)*	3.74(1.41)	-1.49(-2.08)**
Togo	1.78(3.34)**	-4.98(-2.02)	0.92(3.41)	0.32(2.87)	-3.35(-1.48)*

*This table shows the long- run estimates results for both exchange rates. Panel A shows the results for the nominal exchange rate model. Panel B shows the results for the real exchange rate model. Where GDP represents economic growth, OPEN is the trade openness, INFR denotes as infrastructure availability and VOL is the exchange rates, including both nominal real exchange rate and real exchange rate. The values in parenthesis are t-statistic. ***,**, and * indicate significance at the 1,5 and 10 percent levels, respectively.*

Given that the long run is estimated, it is essential to examine the short-run dynamics among the variables in selected ECOWAS countries and see how the short run deviations from the long run relationships are corrected for in each selected countries. Table 3 contains the results of the short-run dynamics, along with the diagnostics tests. The results show that the estimated coefficient of GDP per Capita is positive and significant in all the selected countries for both models. Similarly, the coefficient estimate of trade openness is positive and statistically in all the selected countries for the model with real exchange rate volatility, but Nigeria, Ghana, Sierra Leone, and Gambia only are reported to be positively significant in model with nominal exchange rate volatility. In Cote d'lvore and Togo, the effect of trade openness is negative and insignificant for the model with nominal exchange rate volatility. The significance of trade openness in these countries suggest that liberalization program and policies put in place by these government is achieving the expected results i.e., attracting more FDI into these countries, and this will further help to create conducive environment for foreign investors.

Also, for both the nominal and real models, the estimated coefficient of infrastructural availability is positively significant in all the selected countries, but negative findings are report in the case of Ghana and Sierra Leone only for the real model. The estimated short-run coefficient of nominal exchange rate volatility is statistically significant and negative in all the countries considered except Gambia that reported positive insignificant findings. Conversely, the coefficient estimate of real exchange rate volatility is negative in all the countries considered but statistically significant only in Ghana, Togo, Nigeria, and Gambia. The error correction term(ECM_{t-1}) obtained in all the selected countries is negatively significant, as expected, at a different levels of significance, which indicates a stable convergence to long-run equilibrium level from short-run equilibrium deviations. The magnitudes of the adjustment coefficient vary differently for each country.

Table 3: Short-run Estimates Results along Diagnostic Tests

Countries	GDP	OPEN	INFR	VOL	ECM	LM	Rest	Norm	Heter
Panel A: Nominal Exchange Rate Volatility (NVOL)									
Cote d'ivore	3.71(1.59)***	-2.49(-1.89)	0.96(2.05)***	-2.51(-1.83)**	-0.81(-1.58)*	0.77	0.82	0.48	1.59
Gambia	5.07(0.94)**	2.78(1.40)*	0.22(1.17)**	-1.40(-2.93)*	-0.69(-1.84)**	0.63	2.86	0.81	0.25
Ghana	0.97(1.53)***	0.71(1.30)**	1.93(2.50)**	-1.83(-1.05)**	-0.54(-1.38)*	0.81	0.58	0.69	0.34
Nigeria	8.32(1.94)***	2.48(5.21)***	5.02(1.40)***	-1.94(-1.81)**	-0.58(-1.94)**	1.68	0.47	0.88	0.63
Sierra Leone	4.79(1.38)**	5.57(2.96)**	1.85(1.77)*	-6.59(-2.71)**	-0.43(-2.50)**	0.89	1.66	0.79	0.81
Togo	1.33(3.19)*	-0.74(-2.85)	3.54(2.02)***	-7.40(-2.68)**	-0.62(-1.32)*	0.43	0.51	0.47	0.38
Panel B: Real Exchange Rate Volatility (RVOL)									
Cote d'ivore	1.15(2.68)***	0.78(1.89)**	0.16(2.91)**	-3.39(-1.54)	-0.54(-1.93)**	0.41	0.72	0.47	0.63
Gambia	0.22(1.51)**	3.57(2.70)***	3.98(1.40)**	-4.31(-1.20)**	-0.55(-1.68)**	0.39	0.57	0.68	0.32
Ghana	1.11(2.50)**	0.97(4.32)**	-0.65(-1.48)	-1.79(-2.44)*	-0.81(-2.82)**	0.36	0.92	0.81	0.44
Nigeria	1.27(3.05)*	0.30(1.89)**	0.54(2.40)***	-0.12(-2.59)**	-0.42(-4.71)**	0.48	0.35	0.29	0.85
Sierra Leone	3.07(2.81)**	1.68(2.06)***	-5.35(-1.48)	-2.44(-1.91)	-0.79(-2..58)*	0.23	0.49	0.60	0.28
Togo	0.48(2.53)**	3.39(1.05)**	3.50(1.89)**	-4.21(-1.48)**	-0.67(-2.18)**	0.89	0.63	0.94	0.52

*This table shows the long-run estimates results for both exchange rates. Panel A shows the results for the nominal exchange rate model. Panel B shows the results for the real exchange rate model. Where GDP represents economic growth, OPEN is the trade openness, INFR denotes as infrastructure availability, and VOL is the exchange rates, including both nominal real exchange rate and real exchange rate. The values in parenthesis are t-statistic. ***,** ,and * indicate significance at the 1,5 and 10 percent levels, respectively. LM test denotes as the Lagrange Multiplier test of residual serial correlation; Ramsey Reset test is the test for functional form and omitted variable; Normality test denotes test for normality in the model and ARCH test is the conditional heteroskedasticity*

Now, we examine the direction of causality between exchange rate volatility and FDI inflows using the Toda-Yamamoto (1995) causality test approach. Table 4 presents the results of the bivariate causal relationship between exchange rate volatility and FDI in the selected ECOWAS countries. Due to space conservation, the study presents only the results of the variable of interest, namely exchange rate volatility and FDI. The results show that there is evidence of unidirectional causality from nominal exchange rate volatility to FDI flows in four countries namely, Nigeria, Togo, Cote d'lvore, and Gambia. While, a unidirectional causal relationship between real exchange rate volatility and FDI is found only in Togo, Nigeria, and Sierra Leone. These findings suggest that there is evidence of unidirectional causality for both exchange rates volatility and FDI flows in Nigeria and Togo only.

Interestingly, evidence of unidirectional causality running from FDI flows to real exchange rate volatility is found in Sierra Leone and Nigeria. This finding suggests that FDI inflows cause exchange rate volatility as long as FDI inflows lead to a potential appreciation of domestic currency while FDI outflow can cause possible depreciation of the domestic currency which consequently increases FDI flows (see Kosteletou and Liargovas, 2000; Ogunleye et al. 2012 and Wang, 2013). Thus, we can conclude from these findings that there is evidence of bidirectional causality or feedback effect between real exchange rate volatility and FDI flows in the case of Nigeria and Sierra Leone, which suggest that any foreign direct investment policies implemented by policymakers to attract more FDI flows into a country can spur exchange rate volatility.

Table 4: Bivariate Causality Test Results

Country	Null Hypothesis	Chi Squ	Probability
Cote d'lvore	NVOL $\neq$ FDI	6.05	0.04**
	FDI $\neq$ NVOL	2.77	0.32
	RVOL $\neq$ FDI	1.68	0.63
	FDI $\neq$ RVOL	4.44	0.14
Gambia	NVOL $\neq$ FDI	2.58	0.01***
	FDI $\neq$ NVOL	0.10	0.38
	RVOL $\neq$ FDI	4.21	0.02**
	FDI $\neq$ RVOL	1.04	0.59
Ghana	NVOL $\neq$ FDI	5.04	0.11
	FDI $\neq$ NVOL	0.69	0.94
	RVOL $\neq$ FDI	1.32	0.73
	FDI $\neq$ RVOL	6.39	0.13
Nigeria	NVOL $\neq$ FDI	0.60	0.03**
	FDI $\neq$ NVOL	2.39	0.31
	RVOL $\neq$ FDI	3.60	0.06*
	FDI $\neq$ RVOL	0.12	0.03**
Sierra Leone	NVOL $\neq$ FDI	0.14	0.11
	FDI $\neq$ NVOL	2.84	0.24
	RVOL $\neq$ FDI	7.30	0.02**
	FDI $\neq$ RVOL	2.66	0.01***
Togo	NVOL $\neq$ FDI	4.48	0.05**
	FDI $\neq$ NVOL	9.04	0.41
	RVOL $\neq$ FDI	0.26	0.02**
	FDI $\neq$ RVOL	4.12	0.19

*This table shows the bivariate causality test results. NVOL denotes nominal exchange rate volatility, RVOL represents the real exchange rate volatility, and FDI is the foreign direct investment. ***, **, and * indicate significance at the 1,5 and 10 percent levels respectively.*

CONCLUDING COMMENTS

This paper empirically investigates the effect of exchange rate volatility on Foreign Direct Investment (FDI) in selected Economic Community of West African States (ECOWAS) countries using time series data over the period 1986-2017. Different estimation techniques are employed for this paper. First, we applied both nominal and real exchange rates volatility using the GARCH model to generate exchange rate volatility. Then, Autoregressive Distributed Lag (ARDL) model and Toda-Yamamoto (1995) causality techniques are employed to estimate the dynamic relationship and direction of causality between the variables. The empirical results show that the estimated coefficient of the nominal real exchange rate is negative in all the selected countries but significant only in Ghana, Sierra Leone and Nigeria. Conversely, the effect of real exchange rate volatility is negatively significant as expected, in Nigeria, Togo, Sierra Leone, and Cot d'lvore but the result is positive and statistically insignificant in Ghana and Gambia only.

Furthermore, causality test results show that there is evidence of unidirectional causality from nominal exchange rate volatility to FDI flows in four countries namely Nigeria, Togo, Cote d'lvore and Gambia respectively. In contrast, the causal relationship between real exchange rate volatility and FDI is found only in Togo, Nigeria, and Sierra Leone. Interestingly, evidence of unidirectional causality running from FDI flow to real exchange rate volatility is reported in Sierra Leone and Nigeria. This suggests that there is evidence of bidirectional or feedback effect between real exchange rate volatility and FDI flows in the case of Nigeria and Sierra Leone only.

Given the above findings, the question is what are the policy inferences? Firstly, the empirical results of this paper provide policymakers a better picture of the factors that cause dwindling and unsteady flows of FDI to these selected ECOWAS countries. It is therefore suggest that policymakers should formulate sound and stable macroeconomic policies that will stabilize the foreign exchange rate, which is one of the critical determinants of FDI flows and avoid overvaluation of their domestic currency, which could hamper the inflows of FDI to these selected countries.

Trade openness also plays a crucial role in the determination of FDI flows in these countries. This suggests that conscious efforts should be made by the appropriate authority to institute measures such as financial integration, economic liberalization, reduction of tariff and non-tariff barriers, revisiting their privatization decree and institutional frameworks that would enhance the credibility of the reform process. The results equally suggest the need to increase the per capita GDP for higher FDI inflows. Thus, policymakers must take drastic measures that could increase the efficiency of their market size and thus open up these economies for increased FDI inflows, ensure optimal utilization of their endowed resources, with less stringent taxation policies.

Finally, in countries where evidence shows unidirectional causality running from FDI to exchange rate volatility, policymakers must intensify their efforts to ensure that policies implemented to attract more FDI inflows do not spur fluctuation in the exchange rate. In this paper, six ECOWAS countries are only considered for this investigation due to the availability of data for both nominal and real exchange rates of these countries. Nevertheless, future research might examine the nexus between exchange rates volatility and FDI in the case of the whole ECOWAS countries or some selected sub-Saharan African countries.

APPENDIX

Appendix 1: Table Description of Variables

Variable	Definition and Measurement of the Variable	Source
FDI	Foreign direct investment is the total inflow of FDI as a percentage of GDP	WDI (2017)
RVOL	Real exchange rate volatility is the unpredictable fluctuation in the exchange rate that measures the worth of a domestic currency in terms of another country.	Generated via GARCH model
OPEN	Trade openness is the sum of export and import as a percentage of GDP	WDI (2017)
PGDP	Gross domestic product is used as a proxy of domestic market potential and growth	WDI (2017)
NVOL	Nominal real exchange rate volatility is the unpredictable fluctuation in the exchange rate that measures the amount of domestic currency required to purchase a given amount of foreign currency	Generated via GARCH model
INFR	Infrastructural availability measures the number of telephone subscriber per 100 people	WDI (2017)

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THE INFORMATION CONTENT OF OPTION TRADING AND LIQUIDITY RISK

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ABSTRACT

This paper presents strong evidence to show that stock liquidity and option liquidity play important roles in explaining the information content of options trading for future stock returns. Using implied volatility skew to capture the option trading activity of informed traders, we provide a clear and negatively predictive linkage between option trading and stock returns. The negatively predictive relation between options trading activity and stock returns is particularly accentuated for stocks with lower liquidity. This shows that lower levels of stock liquidity increase the amount of informed trading activity in the option market, and stock is slow to incorporate information embedded in option trading activities. In addition, the predictive ability of option trading activity tends to increase with option liquidity, for each level of stock liquidity. The empirical results are sufficiently robust for different liquidity measures.

JEL: G12, G14, G17

KEYWORDS: Stock Liquidity, Option Liquidity, Information Content, Option Trading

INTRODUCTION

Private information gives investors a significant trading advantage. Options offer several advantages over stocks, including high leverage and built-in downside protection, making them particularly attractive to informed traders. If informed traders indeed use the option market as a venue for trading based on private information, option trading will convey private information to market participants, which may be useful for predicting underlying stock price movements. Many empirical studies have clearly documented the predictive characteristics of information from option trading activities for stock returns (e.g., Chakravarty et al., 2004; Cremers and Weinbaum, 2010; Lin and Lu, 2015).

Liquidity level impacts trading speed and transaction costs, and thus affects trading profits and trading strategy (e.g., Pastor and Stambaugh, 2003). This raises the issue that when informed traders seek to maximize profits by exploiting private information, the underlying stock with a lower liquidity level might increase the amount of informed trading activity in the option market. We expect that increased informed trading in the options market may lead to higher predictability for stock returns if prices adjust more slowly. However, this may also cause market makers to aggressively update their beliefs and quickly adjust prices, resulting in a faster incorporation of information to stock prices and a reduction in the option trading predictability. (e.g., Pan and Poteshman, 2006). Thus, it is necessary to further examine the effect of underlying stock liquidity on the informational linkage between option trading activities and future stock returns. In addition, option liquidity may potentially impact informed trader activities. This paper considers option liquidity based on the argument that the informational advantage of some traders might lead to a higher demand for certain options (e.g., Xing et al., 2010). For option liquidity with observable risk, it is particularly important to understand the interactive effect of stock and option liquidity on the informed trader behavior. However, such studies on the role of option liquidity are important but still rare. This paper fills this gap by concentrating on the predictive link between option trading activities and future stock returns and the impact of stock liquidity and option liquidity.

This paper contributes to the literature that examines the information relation between options markets and stock markets. It extends and differs from previous studies in two important aspects. First, we provide a more comprehensive empirical study to test the predictive ability of option trading activities for future stock returns, along with the role of stock liquidity and option liquidity. Although we expect that lower levels of underlying stock liquidity and higher option liquidity may increase informed trading activity in the options market, there are two possible scenarios. One is that increased informed trading in the options market will lead to higher predictability for stock returns if prices adjust at a slower rate. On the other hand, options trading conveying more information for future stock price movements may cause stock markets to efficiently incorporate new information from the options market, thus reducing the lead-lag predictability from option trading to stock returns. Thus, this paper further investigates the interaction effect of stock and option liquidity on the behavior of informed traders. Second, we adopt several liquidity measures, such as trading volume and price impact measures, as proxies for the levels of stock liquidity and option liquidity. Aitken and Comerton-Forde (2003) show that studies using different liquidity measures are likely to reach very different conclusions. This motivates us to adopt different liquidity measures and enables us to test whether the liquidity effect is sufficiently robust for different liquidity measures.

We use the implied volatility skew (IVSKEW) proposed by Xing et al. (2010) to capture informed option trading. Implied volatility skew is defined as the difference between the implied volatility of out-of-the-money (OTM) put options and at-the-money (ATM) call options. Xing et al. (2010) show that the price-based implied volatility skew is driven by informed trades and that its value can represent the strength of a trader's convictions. Intuitively, investors tend to choose OTM puts to express worries about possible future negative jumps. Consequently, OTM puts become more expensive before large negative jumps, resulting in an increase in the implied volatility skew. The high pressure for puts and steep volatility skew suggest future negative stock returns.

Data sources include daily records of options and stock trades for the component stocks of the S&P 1500 indexes from the beginning of January 2013 through the end of December 2017. Three liquidity measures are investigated: dollar trading volume, absolute stock return over dollar trading volume, and absolute change in daily stock price over dollar trading volume. Our paper presents several results that are new to the literature. First, the empirical results clearly show that there is a lead-lag predictive linkage from option trading activity to future stock returns, indicating a gradual process through which stock prices adjust to information from option trading. As the underlying stock liquidity decreases in the stock market, the predictability of IVSKEW is stronger, regardless of which liquidity measure is used. The results suggest that stock is slow to incorporate information embedded in option trading activities. Second, both stock liquidity and option liquidity affect the information content of option trading activity for future stock returns. The empirical results indicate that the underlying stock liquidity plays more important role than the option liquidity in explaining the information transmission between option and stock markets. Third, our analysis show that the negative predictive relation between option trading and stock returns is particularly remarkable for stocks with lower liquidity and options with higher liquidity. In addition, the predictive ability of option trading activity tends to increase with option liquidity for each level of stock liquidity.

The remainder of this paper is organized as follows. We first present the literature review, and then describe the empirical data, proxies for informed option trading and measures for stock and option liquidity. Finally, we present the empirical results and provide conclusions.

LITERATURE REVIEW

Black (1975), Diamond and Verrecchia (1987), and Mayhew et al. (1995) argue that the options market provides informed traders with incremental advantages over stock markets. Thus, options may play an important informational role in predicting future stock returns (e.g., Easley et al., 1998). Many empirical studies have documented the ability of option trading activities' information to predict stock returns. A recent stream of empirical papers has documented several factors that can help explain the informational linkage between option trading activities and future stock price movements. Pan and Poteshman (2006) adopt a measure of the probability of information-based trading proposed by Easley et al. (2002) to show that a higher prevalence of informed traders lead to a higher predictability level of stock returns. Lin and Lu (2015) investigate the role of analysts and option traders in the informational linkage between options and the stock market. They show that a significant proportion of option predictability on stock returns comes from informed option traders' information about upcoming analyst-related news.

Liquidity level is defined as the ability to quickly trade large quantities of stock shares at low costs without changing stock prices. Thus, liquidity impacts trading speed, transaction costs, and trading profits (e.g., Chordia et al., 2000; Pastor and Stambaugh, 2003; Cetin et al., 2006). Informed traders exploit private information to maximize trading profits and minimize transaction costs. Therefore, it is reasonable to assume that underlying stock liquidity and option liquidity may be potential impact factors on the activities of informed traders.

Previous studies have offered a wide variety of measures for liquidity (e.g., Amihud, 2002; Acharya and Pedersen, 2005; Cao and Wei, 2010; Hu et al., 2013). Amihud (2002) adopt the stocks of the daily ratio of absolute stock return to dollar volume to measure the stock illiquidity. Chordia et al. (2000) use several different liquidity measures—the quoted and effective bid–ask spread, the proportional quoted and effective spreads, and the quoted depth—to study the commonality in liquidity. Cao and Wei (2010) employe various measures based on the bid–ask spread, trading volumes, and price impact to study liquidity commonality in the option market. Aitken and Comerton-Forde (2003) discover that different studies using a variety of liquidity measures were likely to reach very different conclusions. This motivates us to adopt and test the robustness of different liquidity measures.

DATA AND METHODOLOGY

Data

The data used for this study consists of daily option and stock records for the component stocks of the S&P 1500 index from the beginning of January 2013 through the end of December 2017. Market prices for options and stocks are obtained from CBOE, Compustat and Yahoo Finance. The exclusion filters used to construct our empirical data are as follows: (i) Stock price is lower than $5 or its daily volume is zero. (ii) Options with price quotes are lower than $0.125. (iii) Option contracts have zero open interests. (iv) The implied volatility of the options is lower than 0.03 or higher than 2. (v) Options have maturities are less than 10 days or greater than 360 days.

Measures for Option Trading Activities of Informed Traders

This paper uses the implied volatility skew (IVSKEW) proposed by Xing et al. (2010) to examine the information content of option trading activities for predicting stock returns. Xing et al. (2010) showed that IVSKEW is driven by informed traders and the value can present the strength of a trader's convictions. The IVSKEW for firm i at day t is defined as the difference between the implied volatility of OTM puts, and ATM calls. A put option is defined as OTM when the moneyness is lower than 0.95 and higher than 0.8, while a call option is defined as ATM when the moneyness is between 0.95 and 1.05. The moneyness is defined as the ratio of strike price to the stock price. We compute a volume-weighted volatility skew measure, and the weekly IVSKEW is calculated by averaging the daily IVSKEW over a week.

Intuitively, investors tend to choose OTM puts to express their concerns about possible future negative jumps. Consequently, OTM puts become more expensive before large negative jumps. That is, a higher implied volatility skew in individual options would reflect a greater risk of negative price jumps. The high pressure for puts shows that the information advantage of some options traders might be the reason for the observed predictability and induce an increased IVSKEW. Therefore, if informed traders indeed prioritize the options market as a venue for information-based trading, we expect that the IVSKEW will be negatively associated with future stock returns.

Measures for Stock Liquidity and Option Liquidity

In this paper, we follow Cao and Wei (2010) in using three proxies for firm-specific stock liquidity and option liquidity. The first and second proxies are the price-impact illiquidity measures (AILLIQ and PILLIQ), and the third proxy. For stocks, S_t denotes the stock prices at time t, VOL_t denotes the trading volume at time t, $DVOL_t$ denotes the dollar trading volume at time t, AILLIQ is the ratio of absolute change in asset price on dollar trading volume and PILLIQ is the percentage change in daily stock prices divided by the dollar trading volume. For options, the dollar trading volume is the midpoint of the bid and ask quotes times the trading volume summed over all the options in a day, and AILLIQ (PILLIQ) is calculated similarly as the stock's AILLIQ (PILLIQ), but the absolute (percentage) change in option prices is adjusted by the option's delta times the change in the stock prices, using the trading volume for each option to calculate a volume-weighted average measure. Intuitively, low liquidity can be interpreted as a big price response with a modest trading volume, compared to a perfectly liquid market. Thus, an asset with a lower liquidity level will have higher values of AILLIQ and PILLIQ.

Table 1: Definitions of Stock Liquidity and Option Liquidity Measures

Definitions of Liquidity Measures	Option	Stock
AILLIQ	$\dfrac{\sum_{j=1}^{N} VOL_j \times \dfrac{\lvert (P_t^j - P_{t-1}^j) - \Delta_{t-1}^j (S_t - S_{t-1}) \rvert}{DVOL_t^j}}{\sum_{j=1}^{N} VOL_j}$	$\dfrac{\lvert S_t - S_{t-1} \rvert}{DVOL_t}$
PILLIQ	$\dfrac{\sum_{j=1}^{N} VOL_j \times \dfrac{\lvert (P_t^j - P_{t-1}^j) - \Delta_{t-1}^j (S_t - S_{t-1}) \rvert / P_{t-1}^j}{DVOL_t^j}}{\sum_{j=1}^{N} VOL_j}$	$\dfrac{\lvert S_t - S_{t-1} \rvert / S_{t-1}}{DVOL_t}$
DVOL	$\sum_{j=1}^{N} VOL_j \times (ask_j + bid_j)/2$	$VOL_t \times (ask + bid)/2$

This table presents the definitions of stock liquidity and option liquidity measures.

Table 2 reports the descriptive statistics for three stock and option liquidity portfolios for each liquidity measure. For each measure, we first compute the daily liquidity measure and then average it over a week to compute the weekly liquidity measure. The stocks (options) are sorted by the level of stock (option) liquidity at the end of each week and assigned into three liquidity portfolios. Portfolio 1 (Portfolio 3) had the lowest (highest) level of stock and option liquidity. We first calculate the cross-sectional average liquidity for each liquidity group and then calculate the time-series means and standard deviations.

Table 2: Summary Statistics of The Stock and Option Liquidity Measures

Measures	Stock Liquidity				Option Liquidity			
	All	Portfolio 1	Portfolio 2	Portfolio 3	All	Portfolio 1	Portfolio 2	Portfolio 3
Panel A: AILLIQ ($x10^{-7}$)					**AILLIQ ($x10^{-2}$)**			
Mean	0.26	0.63	0.12	0.03	1.86	4.50	0.88	0.22
Std. Dev.	0.03	0.08	0.02	0.01	0.25	0.55	0.17	0.06
Panel B: PILLIQ ($x10^{-7}$)					**PILLIQ ($x10^{-2}$)**			
Mean	0.76	2.00	0.24	0.05	1.41	3.28	0.74	0.22
Std. Dev.	0.11	0.30	0.05	0.01	0.17	0.39	0.12	0.04
Panel C: DVOL($x10^{7}$)					**DVOL($x10^{3}$)**			
Mean	10.76	1.22	5.52	25.69	3.46	0.05	0.58	9.84
Std. Dev.	1.51	0.22	0.89	3.53	0.46	0.01	0.12	1.27

This table reports the summary statistics of stock and option liquidity measure. Portfolio 1 (Portfolio 3) had the lowest (highest) level of liquidity. The mean and standard deviation of each liquidity measure are reported for all samples and for three portfolios.

EMPIRICAL RESULTS

Relationship Between Informed Option Trading and Stock Returns

We begin by investigating whether informed traders indeed prioritize the options market as a venue for information-based trading. Our basic model follows the methodology proposed by Xing et al. (2010) to conduct a Fama-MacBeth (1973) regression:

$$R_{i,t} = \alpha_t + \beta_t IVSKEW_{i,t-1} + \delta_t Controls_{i,t-1} + \varepsilon_{i,t} \qquad (1)$$

where $R_{i,t}$ is the return on firm i for week t, $IVSKEW_{i,t-1}$ is the implied volatility skew for firm i in week t-1, and $Controls_{i,t-1}$ are the control variables for firm i observed at week t-1 including log firm market capitalization, the previous 1-month stock return, and the underlying return volatility calculated using the previous month's daily return.

We adopt the Fama-MacBeth (1973) regression and the t-statistics is estimates based on Newey-West (1987). Table 3 presents the results. The estimated coefficient of the IVSKEW is negative and significant at the 5% level. The empirical evidence is consistent with previous findings that option transactions could convey private information to market participants for predicting underlying stock price movement (e.g., Xing et al., 2010; Pan and Poteshman, 2006; Hu, 2014).

Table 3: Predictive Relations Between Option Trading Activity and Stock Returns

Independence Variables	Basic Model	
	Coeff.	*t*-stat.
Intercept	0.208	3.538
IVSKEW	-0.086	-4.273**
Controls	Yes	
Adj R^2	20.07%	

*This table provides the predictability of option trading activity on the stock returns. We use the Fama-MacBeth (1973) regression and the t-statistics are estimated based on the Newey-West (1987) estimation. * and ** respectively indicate significance at 10% and 5% levels.*

Effect of Stock Liquidity and Option Liquidity

This subsection first investigates the role of stock liquidity level on the predictive ability of option trading activity on stock returns. Informed traders exploit private information seeking to maximize trading profits and minimize transaction costs. We may expect that stocks with lower stock liquidity might prompt increased informed trading in the options market.

We adopt the Fama-MacBeth (1973) regression and add interaction terms of the stock liquidity measures with informed option trading measures to test whether the information content of option trading activities for future stock price movements are related to the level of stock liquidity. In addition, we also test whether the effect of liquidity level on the predictive information of option trading activities for stock returns is sensitive to the measure of illiquidity being used. Our theoretical model provides specific predictions as follows:

$$R_{i,t} = \alpha_t + \left(\beta_{1t} + \beta_{2t}\, LIQ_{i,t-1}^{Stock}\right) \times IVSKEW_{i,t-1} + \delta_t Controls_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

where $R_{i,t}$ is the return on firm i for week t, $LIQ_{i,t-1}^{Stock}$ is the level of stock liquidity measure for firm i in week t-1 (AILLIQ, PILLIQ, and DVOL), $IVSKEW_{i,t-1}$ is the implied volatility skew for firm i in week t-1, and $Control_{i,t-1}$ is the control variables for firm i observed at week t-1 including option liquidity, log firm market capitalization, the previous 1-month stock return, and the underlying return volatility calculated using the previous month's daily return.

Given stocks with different liquidity levels, the predictive coefficient of option trading activity for stock returns becomes $\beta_{1t} + \beta_{2t} LIQ_{i,t-1}^{Stock}$. If lower liquidity levels for the underlying stock can improve the predictive ability of option trading activities for stock returns, β_{2t} should be negative and statistically significant. On the contrary, if the liquidity of the underlying stock is not a determinant for the presence of informed trading in the options market, we may not find any statistical significance in β_{2t}.Table 4 documents the results for the effect of stock liquidity on the predictive ability of IVSKEW for stock returns. Looking at the estimated coefficients on the $IVSKEW_{i,t-1}$ and the interaction terms $LIQ_{i,t-1}^{Stock} \times IVSKEW_{i,t-1}$, the coefficients all carry a negative sign and coefficients are significant for AILLIQ and PILLIQ. The coefficient β_{2t} is positive and significant for DVOL. This finding of interaction between IVSKEW and stock liquidity indicates that as the underlying stock liquidity decreases in the stock market, the predictability of IVSKEW is stronger, regardless of which liquidity measure is used.

Table 4: The Effect of Stock Liquidity

Independence Variables	Models	
	Coeff.	***t*-stat.**
Panel A: AILLIQ		
Intercept	0.203	3.416**
IVSKEW	-0.046	-1.912*
$LIQ^{Stock} \times IVSKEW$	-0.081	-2.064**
Controls	Yes	
Adj R^2	22.49%	
Panel B: PILLIQ		
Intercept	0.208	3.539**
IVSKEW	-0.046	-1.902*
$LIQ^{Stock} \times IVSKEW$	-0.019	-1.968**
Controls	Yes	
Adj R^2	20.54%	
Panel C: DVOL		
Intercept	0.222	3.466**
IVSKEW	-0.114	-4.805**
$LIQ^{Stock} \times IVSKEW$	0.011	3.471**
Controls	Yes	
Adj R^2	20.26%	

*This table reports the results of the Fama-MacBeth (1973) regression. The t-statistics are estimated based on the Newey-West (1987) estimation. * and ** respectively indicate significance at the 10% and 5% levels.*

This paper further investigates the impact of option liquidity on the predictive ability of option trading activity on stock returns. Similar to the analysis of stock liquidity, we adopt the Fama-MacBeth (1973) regression and add interaction terms of the option liquidity measures with informed option trading measures to test whether the information content of option trading activities for future stock price movements are related to the level of option liquidity. Our theoretical model provides specific predictions as follows:

$$R_{i,t} = \alpha_t + \left(\gamma_{1t} + \gamma_{2t}\, LIQ^{Option}_{i,t-1}\right) \times IVSKEW_{i,t-1} + \delta_t Controls_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

where $R_{i,t}$ is the return on firm i for week t, $LIQ^{Option}_{i,t-1}$ is the level of option liquidity measure for firm i in week t-1 (AILLIQ, PILLIQ, and DVOL), $IVSKEW_{i,t-1}$ is the implied volatility skew for firm i in week t-1, and $Control_{i,t-1}$ is the control variables for firm i observed at week t-1 including stock liquidity, log firm market capitalization, the previous 1-month stock return, and the underlying return volatility calculated using the previous month's daily return.

Table 5 documents the results for the effect of option liquidity on the predictive ability of IVSKEW for future stock returns. The estimated coefficients on the $IVSKEW_{i,t-1}$ all carry a negative sign and statistical significance, regardless of which liquidity measure is used. The estimated coefficients of the interaction terms $LIQ^{Option}_{i,t-1} \times IVSKEW_{i,t-1}$ have positive and negative signs, and are not significant in the PILLIQ and AILLIQ cases. The estimated coefficient of interaction terms for DVOL is positive and significant. Compared with the impact of stock liquidity on the informational predictability, the empirical results indicate that the underlying stock liquidity plays more important role than the option liquidity in explaining the information transmission between option and stock markets.

Table 5: The Effect of Option Liquidity

Independence Variables	**Models**	
	Coeff.	***t*-stat.**
Panel A: AILLIQ		
Intercept	0.117	1.962**
IVSKEW	-0.077	-3.442**
$LIQ^{Option} \times IVSKEW$	-0.003	-0.616
Controls	Yes	
Adj R^2	20.60%	
Panel B: PILLIQ		
Intercept	0.062	1.072
IVSKEW	-0.092	-3.965**
$LIQ^{Option} \times IVSKEW$	0.005	-0.773
Controls	Yes	
Adj R^2	20.72%	
Panel C: DVOL		
Intercept	0.246	3.725**
IVSKEW	-0.094	-4.473**
$LIQ^{Option} \times IVSKEW$	0.012	1.874*
Controls	Yes	
Adj R^2	20.23%	

*This table reports the results of the Fama-MacBeth (1973) regression. The t-statistics are estimated based on the Newey-West (1987) estimation. * and ** respectively indicate significance at the 10% and 5% levels.*

Portfolios Sorted on Stock Liquidity and Option Liquidity

In this section, we further examine the interaction effect of stock liquidity level and option liquidity level on informational predictability. For each liquidity measure (AILLIQ, PILLIQ, and DVOL), we constructed a two-way sequential-sort analysis of stock liquidity and option liquidity to examine the option liquidity effect on the predictive ability of options trading for stock returns, controlling for different stock liquidity levels. We first sort all stocks into two portfolios based on the stock liquidity level at the end of each week, and then into two portfolios with different option liquidity level at the end of each week. For each portfolio, we run the Fama-MacBeth (1973) regression to regress the stock returns on IVSKEW and control variables. Table 6 documents the estimated coefficients on the IVSKEW for each portfolio.

The empirical results show that most of the estimated coefficients of IVSKEW are all negative and significant, especially for the low stock liquidity and high option liquidity groups. For each level of option liquidity groups, the absolute estimated coefficients of IVSKEW are greater for low stock liquidity groups, regardless of which liquidity measure is used. For each stock liquidity portfolio, the absolute estimated coefficients of IVSKEW tend to increase with option liquidity. The empirical results show that negatively predictive relation between option trading activity and stock returns is particular remarkable for stocks with lower liquidity and options with higher liquidity. These results indicate that stock liquidity and its corresponding option liquidity play an important role in explaining the information content of option trading activities for informed traders.

Table 6 Portfolio Sorted on Stock Liquidity and Option Liquidity

	Group 1 (High Option Liquidity)		**Group 2 (Low Option Liquidity)**	
	Coeff.	***t*-stat.**	**Coeff.**	***t*-stat.**
Panel A: AILLIQ				
Portfolio 1 (High Stock Liquidity)	-0.027	-0.80	-0.082	-2.02**
Portfolio 2 (Low Stock Liquidity)	-0.090	-3.10**	-0.157	-3.65**
Panel B: PILLIQ				
Portfolio 1 (High Stock Liquidity)	-0.073	-2.31**	-0.066	-1.58
Portfolio 2 (Low Stock Liquidity)	-0.088	-3.18**	-0.086	-1.92*
Panel C: DVOL				
Portfolio 1 (High Stock Liquidity)	-0.009	-0.24	-0.096	-2.71**
Portfolio 2 (Low Stock Liquidity)	-0.085	-2.80**	-0.061	-1.71*

*This table reports the results of portfolio sorted on the stock liquidity and option liquidity. For each portfolio, we run the Fama-MacBeth (1973) regression to regress the stock returns on IVSKEW and control variables and report the estimated coefficients of IVSKEW. The t-statistics are estimated based on the Newey-West (1987) estimation. * and ** respectively indicate significance at the 10% and 5% levels.*

CONCLUSION

This paper empirically tests whether the information content of option trading activity for future stock price movement is related to stock liquidity level and option liquidity level. The data used for this study consists of daily option and stock records for the component stocks of the S&P 1500 index from the beginning of January 2013 through the end of December 2017. We use the IVSKEW proposed by Xing et al. (2010) to capture informed option trading. An informed trader with positive private information on stock i will take information advantage by buying call options, while buying put options on negative private information about future stock prices. Thus, a higher IVSKEW in individual options would reflect a greater risk of negative price jumps. Three stock and option liquidity measures are investigated: AILLIQ, PILLIQ, and DVOL. This enables us to test the robustness of different liquidity measures.

The empirical results show that there is a negative predictive relationship between option trading activities and future stock returns. The predictability of IVSKEW is particular notable for stocks with lower liquidity, regardless of which liquidity measure is used. The results suggest that stock is slow to incorporate information embedded in option trading activities. In addition, our analysis shows that the predictive ability of option trading activity tends to increase with option liquidity, for each level of stock liquidity. On the whole, the empirical results show that stock liquidity and option liquidity all are the determinants of the predictive ability of option trading activity for stock returns, regardless of which liquidity measure is used.

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IMPACT OF CORPORATE GOVERNANCE AND OWNERSHIP STRUCTURE ON SURVIVAL OF INITIAL PUBLIC OFFERINGS: EVIDENCE FROM THE PHILIPPINES

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ABSTRACT

This paper examines the impact of corporate governance and ownership structure variables on the survival of initial public offerings in the Philippine Stock Exchange. Using a sample of 141 firms that went public from 1989-2011 and a seven-year observation period, the paper finds that 93.62% of IPOs survive. Employing the Cox proportional hazards model, the paper finds a negative significant relationship between survival and the ownership ratio between top five and non-top five owners. In addition, there is a negative significant relationship between survival and manufacturing industry sector and firm size. Furthermore, there is a positive significant relationship between survival and ownership retained by original owners. Moreover, there is an insignificant relationship between survival and percentage of independent directors, number of underwriters, age of the IPO firm, type of offering, and return on assets.

JEL: G3, G32, G34

KEYWORDS: Corporate Governance, Ownership Structure, Initial Public Offering, Survival, Delisting, Philippines

INTRODUCTION

Finance literature contains substantial studies on Initial Public Offerings (IPOs). One stream of studies focused on explaining the phenomenon of underpricing of IPOs (Ibbotson, 1975, Leland & Pyle, 1977, Beatty, 1989, Carter & Manaster, 1990, Loughran, Ritter & Rydqvist, 1994, Sullivan & Unite, 1999, Gumanti, Lestari & Manan, 2016). Another stream of studies focused on explaining the under-performance of IPOs in the aftermarket (Ritter J.R., 1991, Sullivan, M.J. & Unite, A.A., 2001). Researchers examined the performance at different times after the IPO event -- after six months, a year, and after three years. Studies related to underpricing of Philippine IPOs are scarce. The study conducted by Ybañez (1993) regarding Initial Public offering in the Philippines revealed that 32 IPOs that went public from 1989-1993 had an excess return of 40.0%. Interestingly, Sullivan and Unite (2001) found that IPOs affiliated with family business groups had greater underpricing especially if the affiliated firms used foreign lead underwriters. Just as underpricing is a worldwide phenomenon, delisting or non-survival of firms from stock exchanges is also a global phenomenon. Delisting is the removal of a publicly listed firm from trading in an exchange after a defined period. The reasons for removal can be voluntary, involuntary, or mergers. This paper uses seven-year observation period. Removal of a listed firm on or before the seven-year period means delisting of the firm. Otherwise, the IPO firm is a survivor. Studies from western countries dominate the delisting literature compared to that in emerging markets. To the knowledge of the author, there is none in the Philippines. The purpose of this paper is to investigate the possible factors that affect the survival of IPOs in the aftermarket in Philippines based on the information available in the prospectus during the time of the offering. Majority of studies on the survival of IPOs in the aftermarket investigate the effect of age of the firm prior to the IPO, firm size, and the industry sector to which the IPOs belong (Audretsch, 1991, Audretsch & Mahmood, 1995, Hensler, Rutherford & Springer, 1997, Kim, Park, Wang & Joung, 2002). This paper differs from these previous studies by examining the effect of corporate governance and ownership structure on the survival of IPOs in the aftermarket. Specifically, the paper uses the percentage of independent directors and the number of underwriters as proxies for corporate governance. In addition, the paper uses ownership retention and ownership concentration as proxies for ownership structure. Furthermore, the study examines the effect of age of IPO firm, type of offering, industry sector, return on asset (ROA), and firm size on survival of IPO firms in the aftermarket.

The study is important to *corporate managers* who would want to see their firm survive in the capital market. This will give them information on what factors affect the survival. Survival is important for *publicly listed firms* that would want to have continued access to publicly available funds through subsequent offerings. Survival will also give them an idea about the market value of the firm as perceived by the investors. Survival is also important to the *marginal investors* who do not want their money tied up to a firm that suddenly got delisted. The study is also important to *regulators* such as the Securities and Exchange Commission and the Philippine Stock Exchange (PSE), which is a self-regulatory organization. The results of the study can provide inputs into the formulation of appropriate policies for the Philippine Stock Exchange. This paper contributes to literature in many ways. The study confirms that relevant information in the prospectus can predict the survival of IPOs in the Philippines. Specifically, the higher the ownership retained by original owners the higher the survival of IPO firms in the aftermarket. In addition, the higher the ownership concentration, the lower the tendency of IPO firms to survive. Moreover, firms that belong to the manufacturing industry sector tend to survive less than non-manufacturing firms do. Contrary to expectations, bigger firms tend to survive less. Organization of the rest of the paper is as follows. Section 2 presents the literature review and hypotheses. Discussion of the data and methodology follows in Section 3. Results and discussion follows in Section 4. The paper ends with the conclusion in Section 5.

LITERATURE REVIEW AND HYPOTHESES

Lamberto and Rath (2010) examined 154 samples of IPO firms from 1995 to 1997 in Australia. They defined a non-survivor IPO firm using a five-year and seven-year observation period. Firms that were suspended and acquired or merged within the observation period are non-survivors. This definition is similar to that of Bhabra and Pettway (2003). They studied 242 IPO firms from 1987 to 1991 and used a five-year observation period. This paper, consistent with Lamberto and Rath (2010) defines delisting or non-survivor as an IPO firm removed from listing in the PSE using a seven-year observation period due to either voluntary, involuntary or merger reasons. The dependent variable in a survival analysis considers the time to failure. Lane, Looney and Wansley (1986) assert that the absence of time to failure in multi discriminant analysis, logit, probit, and regression analyses lessens their usefulness. In addition, these methods are parametric in nature that is often hard to meet. On the other hand, the Cox (1972) proportional hazards model consider the time to failure. It is a semiparametric or partially parametric approach. The model does not specify the distribution of the event time making it nonparametric. The Cox proportional hazard model specifies a regression model with a functional form making it parametric.

Corporate Governance

Corporate governance refers to the role of the board of directors in implementing decisions and policies that are for the best interest of the firm. This paper uses two proxies for corporate governance - the percentage of independent directors (PBOD) and the number of lead underwriters (U_J) used during the IPO process. The agency theory (Jensen & Meckling, 1976) implies that the board of directors limit the opportunistic behavior of managers. Fama and Jensen (1983) highlighted the important role of outside directors in controlling opportunistic behavior of managers. The shareholders and managers do not influence the independent external directors because they protect their reputation as experts. They bring their expertise to the firm and decide what is best for the firm. Thus, the higher the percentage of independent directors in the board, the more well managed the firm is. The board of directors decide the choice and number of lead and managing underwriters during the IPO process. Large IPO firms in terms of total assets, number of employees, and revenues, usually make IPOs with larger gross proceeds. Audretsch and Mahmood (1995) found that firm size relates positively with survival. Larger gross proceeds require more than one lead underwriters to sell the shares. This paper treats the number of lead underwriters as a categorical variable; one (1) represents two or more underwriters and zero (0) otherwise. Based on the preceding discussion the paper makes the following hypotheses:

H1: The higher the percent of independent directors the higher the survival.
H2: IPO firms underwritten by two or more underwriters have higher survival.

<u>Ownership Structure</u>

This paper uses two proxies for ownership structure variables, ownership retention (Own_Ret) and the ratio of the ownership of top five shareholders to non-top five shareholders (Own). Ownership retention is the ownership retained by the original owners after the IPO. Hensler et al. (1997) conducted one of the early important studies on survival analysis of IPOs. They found that survival time for IPO increases as the percentage of insider ownership increases. Higher ownership retention implies that the original owners believe in the viability and future prospects of the firm (Leland & Pyle, 1977). Ownership retention acts as a signal that the original owners believe in the quality of the firm. Thus, the paper makes the following hypothesis:

H3: The higher the ownership retention the higher the survival.

Because of structural deficiencies in emerging markets, conglomerates flourish. Ownership is concentrated among few shareholders (La Porta, Lopez-de-Silanes & Shleifer, 1999, Claessens, Djankov & Lang, 2020, Chen, 2001). Possible principal-principal conflicts happen between the majority shareholders and the minority shareholders in this situation due to poor institutional protection of minority shareholders (La Porta, Lopez-de-Silanes, Shleifer & Vishny, 1997). These conflicts could lead to poor results. In connection, this study makes the following hypothesis:

H4: The higher the ownership concentration the lower the survival.

<u>Additional Predictor Variables</u>

The age of the firm, measured as the time from incorporation to the time it went public is one of the first variables examined in explaining the survival of the firm. Many studies confirmed that age of the firm positively affects the survival of IPOs in the aftermarket. These studies indicate that indeed age positively and significantly affect survival of IPOs in the aftermarket (Carroll, 1983, Schultz, 1993, Hensler et al., 1997, Kim et al., 2002, Baluja & Singh, 2016). Thus, the study makes the following hypothesis:

H5: The higher the age of the IPO firm the higher the survival.

There is limited study on the influence of the type of offering on survival of IPOs in the aftermarket. An offering can be primary, secondary or a combination of both during an IPO. The paper measures type of offering (Primary) one (1) if the offering is one hundred percent primary offering and zero (0) otherwise.

H6: Primary offering relates significantly with survival.

Industry classification (Ind2) appeared frequently in literature as a variable that affected survival of IPOs in the aftermarket. For instance, Hensler et al. (1997) found that computer and data, wholesale, restaurant, and airline industries relate negatively with survival duration in the aftermarket while optical and drug industries relates positively with aftermarket survival duration. Rath (2008) found that the likelihood of survival in finance and natural resources industries is higher than the survival probabilities of firms in other industries. Lamberto and Rath (2010) arrived at the same finding. In addition, Baluja and Singh (2016) found that mining, construction, wholesale and retail, accommodation, information and communication, and finance and insurance sectors positively affect survival of IPOs in the aftermarket. Accordingly, this paper makes the following hypothesis:

H7: Industry sector relates significantly with survival.

Higher pre-operating performance is more likely to lead to survival of IPOs in the aftermarket. Studies conducted by Jain and Kini (1999), and Peristiani and Hong (2004) support this hypothesis. Most commonly used proxy for pre-operating performance is the return on assets (ROA). Consequently, consistent with this finding, this paper makes the following hypothesis:

H8: The higher the return on asset the higher the survival.

Mata and Portugal (1994) found that new entrants that are larger and are comprised of many establishments tend to stay longer periods in the market compared to smaller entrants. This implies that larger IPO firms will survive more than small IPO firms will. Kim et al. (2002) confirmed that in the case of South Korea firm size was positively associated with survivability. Thereby, consistent with these findings, the paper makes the following hypothesis:

H9: The bigger the firm size the higher the survival.

DATA AND METHODOLOGY

This study gathered data from the prospectuses gleaned from Thomson Reuters' Eikon database. Not all prospectuses were available from Eikon. Subsequently, prospectuses were purchased from the library of the Philippine Stock Exchange. The study covers the IPOs issued from 1989 to 2011 and excludes IPOs from 2012 to 2018 because of the 7-year observation period. IPO firms that survive more than seven years are survivors (Bhabra & Pettway, 2003, Lamberto & Rath, 2010). Two hundred ninety-two (292) IPOs were initially identified. However, only 141 IPOs have complete data. Table 1 summarizes the frequency distribution of the IPO firms. The industry sector classification follows the Philippine Standard Industrial Classification. The same table shows that majority of the IPOs come from the Real Estate and Manufacturing sectors with 28 companies each. Entities from the Financial and Insurance sector follow next with 20, and the Information and Communication sector with 15.

Table 1: Frequency Distribution of Sample IPOs

Sector	Frequency
Financial and Insurance	20
Real Estate	28
Wholesale and Retail Trade	7
Manufacturing	28
Mining and Quarrying	8
Holding	5
Professional, Scientific and Technical Services	3
Information and Communications	15
Transportation and Storage	6
Electricity, Gas, Steam, and Air-conditioning Supply	7
Arts, Entertainment and Recreation	3
Water Supply, Sewerage, Waste Management, and Remediation	3
Accommodation and Food Services	6
Agriculture, Fishery and Fishing	1
Construction	1
Total	141

This table shows the industry sectors of the IPO firms using the Philippine Standard Industrial Classification.

Table 2: Definition of Variables and Expected Relationship with Survival

Variable	Definition and Measurement	Predicted Relationship with Survival
PBOD	Percentage of independent directors in the board	+
U_J	Number of underwriter 1 if jointly underwritten by two or more lead underwriters, 0 otherwise	+
Own_Ret	Percentage of shares retained by original owners	+
Own	Ratio of the percentage of shares owned top 5 shareholders to non-top 5 shareholder	-
Age	Natural logarithm of 1 + number of years from the time the firm is incorporated to the time of the IPO.	+
Primary	Type of offering 1 if primary, 0 otherwise (secondary and a combination of primary and secondary offering)	?
Ind2	Ind2 - 1 if manufacturing industry sector, 0 otherwise	?
ROA	Return on Assets	+
Assets_Proceeds	Total Assets divided by Gross Proceeds	+

This table presents the variable definition, measurement, and the expected sign of the relationship between the independent variables and survival of IPO firms.

In the case of survival analysis, the dependent variables are the time variable and the event variable. The time variable refers to the length of time from the listing of the firm until the time the event happened or as long as they are in the study. The event variable is the recognition whether the event happened or not. It is equal to one (1) when the event happened and zero (0) otherwise. As previously mentioned, in this study, survivors are IPOs that continue to list in the PSE for a period of more than seven years after listing while non-survivors are IPOs that are delisted from the PSE due to voluntary, involuntary or mergers within the first seven years (Lamberto & Rath, 2010). The independent variables of interest in this study are variables that are proxies of corporate governance, ownership structure and additional variables used in survival analysis studies but not tested in the Philippines. Proxies for corporate governance used in this study are percentage of independent directors (PBOD) and number of underwriters (U_J) while the proxies for ownership structure are ownership retention (Own_Ret) and ownership concentration (Own). Additional variables used are age of the firm (Age), type of offering (Primary), industry classification (Ind2), return on asset (ROA) and firm size (Assets_Proceeds) Table 2 summarizes the definition, measurement of the independent variables, and the predicted relationship with survival.

Allison (1984) asserts that since the definition events are in terms of change over time, more authors recognized that the best way to study events and their causes is to collect event history data. Further, although event histories are ideal in studying the causes of events, they typically possess two characteristics that create problem for standard statistical methods such as simple linear regression. The first characteristic is censoring and the other one is time-varying explanatory variables. Censoring happens when the event has not yet happened at the end of the observation period or for some other reason, the firm left the sample before the end of the observation period. A time-varying explanatory variable such as income, which varies over time, also gives rise to a problem in a simple linear regression. Allison (1984) traced the history of studying events history data. It started with life tables used in demography. Cox's (1972) partial likelihood method, the most influential regression method found inspiration from the fundamental ideas behind life table. Early methods preferred by biostatisticians are nonparametric methods that make few assumptions, if any, about the distribution of event times. Parametric methods preferred by engineers in their studies on time to failure of machines follows next. Cox's (1972) proportional hazards model was a major bridge between the two approaches. It is a semiparametric or partially parametric approach. The model does not specify the distribution of the event time making it nonparametric. It specifies a regression model with a specific functional form making it parametric.

The Cox Proportional Hazard Model

The Cox proportional hazard model evaluates the effect of several factors, considered simultaneously, on survival. In this paper, the factors used are the percentage of independent directors, number of underwriters, ownership retention, ownership concentration, age of the firm, type of IPO, gross proceeds, industry classification, return on assets and firm size. The model allows the researcher to examine how these factors influence the rate of a particular event happening at a particular point in time that is the rate at which delisting is happening. There are important assumptions for the appropriate use of the Cox proportional hazards regression model. One assumption is the independence of survival times (t) between observations in the sample. Another assumption is a multiplicative relationship between the predictors and the baseline hazard compared to a linear relationship in multiple regression analysis. A third assumption is hazard ratios are proportional which means that they are constant over time. A fourth assumption is that the values of X's do not change over time. A fifth assumption is that censoring is non-informative which means that being censored or not is not a related to probability of event from occurring. Lastly, the baseline hazard $\lambda_0(t)$ is unspecified which means that it is free to vary over time. Below is the general form of the Cox proportional hazard model.

$$\lambda_i(t/\boldsymbol{Z}) = \lambda_0(t)exp(\beta_1 Z_{1i} + \beta_2 Z_{2i} + \cdots + \beta_k Z_{ki}) \tag{1}$$

Where λ_i (t) is the expected hazard at time t of the ith observation, λ_0(t) is the baseline hazard at time t and represents the hazard when all of the predictors Z_1, Z_2, Z_k are equal to zero.

$$\lambda_1(t\ /\boldsymbol{Z} = 0) = \lambda_0(t)exp(\beta_1 * 0 + \beta_2 X_2 * 0 + \cdots + \beta_k 0)$$

$$\lambda_1(t) = \lambda_0(t) \tag{2}$$

Equation 2 shows that hazard rate$\lambda_1(t)$ is equal to the baseline hazard $\lambda_0(t)$. Therefore if Z_k is not equal to zero, hazard rate is a multiple of the baseline hazard or the reference hazard and the covariate. Dividing both sides of equation 1 by $\lambda_0(t)$ yields,

$$\frac{\lambda_i(t)}{\lambda_0\ (t)} = exp(\beta_1 Z_{1i} + \beta_2 Z_{2i} + \cdots + \beta_k Z_{ki}) \tag{3}$$

Taking the log of both sides of equation 3 yields,

$$\text{Ln}\left\{\frac{\lambda_i(t)}{\lambda_0\ (t)}\right\} = \ \beta_1 Z_{1i} + \beta_2 Z_{2i} + \cdots + \beta_k Z_{ki} \quad (4)$$

Equation (4) shows that the Cox proportional hazard model is a linear model of the log of the hazard ratios. The Model uses partial likelihood estimation to estimate the coefficientsβ_i. If the hazard ratio is greater than one, it means lower duration and higher hazard rate, which means that the event is more likely to happen. If the hazard ratio is between 0 and 1 it means higher duration or lower hazard rate, which means that the event is less likely to happen. The regression result in a Cox proportional hazard model only shows the coefficient or the hazard ratios. The coefficients or the hazard ratios show the effect of the covariates on the dependent variable, which is a combination of the time variable and the event variable. The baseline hazard,$\lambda_0\ (t)$ is unspecified and free to vary and thus cannot be estimated.

RESULTS AND DISCUSSION

Table 3 summarizes the dependent and the independent variables used in the study. The mean duration (Duration) of the sample firms is 6.87 years with minimum duration of two years, and a maximum of 7 years. Delisting (Event_7) occurs in 6.38% of the samples. These are firms with life span of less than seven years from the time of listing. The proxies for corporate governance shown in Table 3 are the percentage of independent directors (PBOD) and number of underwriters (U_J). The table reveals that on the average, 5.81% of the board of directors are independent directors (PBOD). The study predicts a positive relationship between board independence and survival. This paper measures the number of lead underwriters as one (1) if the IPO is jointly underwritten by two or more lead underwriters and zero (0) if only one lead underwriter. Table 3 shows that 47.52% of the time, two or more lead underwriters jointly underwrites an IPO.

Table 3: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Duration	141	6.865	0.6461	2	7
Event_7	141	0.0638	0.2453	0	1
PBOD	141	0.0581	0.1133	0	0.4286
U_J	141	0.4752	0.5012	0	1
Own_Ret	141	0.7168	0.1126	0.2504	0.95
Own	141	2.469	2.091	0.1078	17.939
Age	141	2.267	1.205	0	4.7791
Primary	141	0.5887	0.4938	0	1
ROA	138	0.0687	0.1057	-0.6035	0.3855
Ind2	141	0.2128	0.4107	0	1
Assets_Proceeds	141	6.959	27.605	0	315.32

This table presents the descriptive statistics of the variables. Duration is length of time in years the IPO firms survive. Event_7 is one (1) if the firm is delisted zero (0) otherwise during the first seven years. PBOD is the percent of independent directors while U_J is one (1) if two or more underwriters underwrite the IPO and zero (0) otherwise. Own_Ret is the percentage shares retained by the original owners while Own is the ratio of the ownership of the top five owners to non-top five owners. Age is the natural log of one (1) plus the time from incorporation until the time of the IPO while Primary is one (1) if offering is primary shares zero (0) otherwise. ROA is the return on assets while Ind2 is one (1) if firm belongs to manufacturing industry sector and zero (0) otherwise. Assets_Proceeds is the total assets standardized by the gross proceeds of the offering.

The proxies for ownership structure shown in Table 3 are ownership retention (Own_Ret) and ownership concentration (Own). As shown, the mean ownership retention (Own_Ret) is 71.68%. This implies that the public owns the balance of 28.32%, on the average. It indicates that the original owners retain a substantial percentage. Ownership concentration is 2.47. Table 3 shows a collection of additional variables namely: age of the firm (Age), type of offering (Primary), return on assets (ROA), industry sector (Ind2) and firm size (Assets_Proceeds). The measurement of age is the natural log of one (1) plus age of the firm from the time of incorporation. Table 3 reveals that 58.87% of the time, the offering is purely primary offering. The balance of 41.13% indicates secondary or a mix of primary and secondary offering. ROA on the average is 6.87%. In addition, 21.28% of the offering is under the manufacturing sector while 57.45% of the offering is non-manufacturing. Lastly, on the average, total assets to gross proceeds ratio is 6.96:1.

Table 4 shows the correlation matrix among variables. It shows that the highest correlation among the independent variables is 0.5727. This is between Own_Ret and Own. Testing the independent variables in an OLS regression and getting the variance inflation factor (VIF) obtain the highest value at 1.62. This shows that multicollinearity is not an issue in the estimation.

Table 4: Correlation Matrix of Independent Variables

	PBOD	**U_J**	**Own_Ret**	**Own**	**Age**	**Primary**	**ROA**	**Ind2**	**Assets~s**
PBOD	1								
U_J	-0.1202	1							
Own_Ret	0.0359	0.0729	1						
Own	0.0708	0.0747	0.5727	1					
Age	-0.0941	0.0727	0.1425	0.0982	1				
Primary	0.0542	-0.1691	-0.3136	-0.3297	-0.0869	1			
ROA	0.0037	0.1166	0.1327	0.2492	0.195	-0.3473	1		
Ind2	-0.0916	0.0046	-0.0044	0.0993	0.2887	-0.0369	0.1837	1	
Assets_Proceeds	-0.0444	-0.119	0.1024	-0.0038	0.0308	0.0349	-0.0853	-0.0655	1

This table shows the correlation between the independent variables. The values show the absence of multicollinearity issues.

Table 5 shows the survivor function. It shows that at t=1 100% of IPO firms survived. After that, One (1) IPO firm experienced the event each year from the second to the fourth year resulting in 97.87% survival at the end of year 4. Failures increased during year five and year six to two, and three respectively resulting in 94.33% survival at the end of year six. Finally, at year seven one more firm failed resulting in 93.62% survival. In addition, at the end of year seven 132 firms were censored. This result shows that as time goes on IPO firms are more likely to experience the event. This result is good for IPO investors because only a few exited the capital market. The risk of losing money due to delisting is minimal. The recorded survival is high compared with the study of Lamberto and Rath (2010) in Australia that reported a 71% survival using a seven-year observation period. Caution should be made in comparing the results since the periods of study are different. This paper covered the period from 1989 to 2011 while their study covered the period from 1995 to 1997.

Non-Parametric Estimation

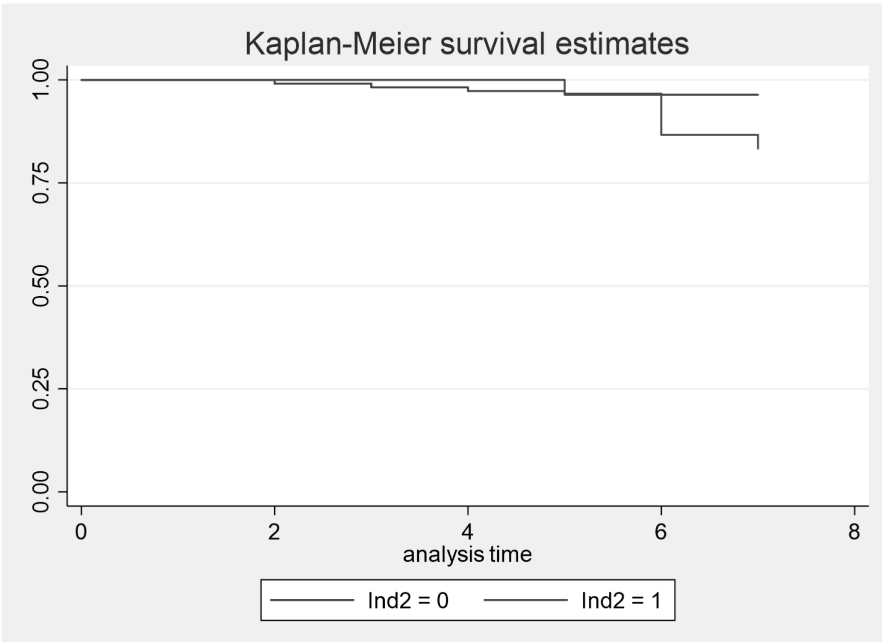
Table 5: Life Table

Time	**Beg. Total**	**Fail**	**Net Lost /Censored**	**Proportion Fail**	**Proportion Surviving**	**Survivor Function**	**Std. Error of Survivor Function**
1	141	0	0	0	1	1	
2	141	1	0	0.0071	0.9929	0.9929	0.0071
3	140	1	0	0.0071	0.9929	0.9858	0.01
4	139	1	0	0.0072	0.9928	0.9787	0.0122
5	138	2	0	0.0145	0.9855	0.9645	0.0156
6	136	3	0	0.0221	0.9779	0.9433	0.0195
7	133	1	132	0.0075	0.9925	0.9362	0.0206

This table shows the number of IPO firms observed, the number of firms that fail or experienced the event, number of firms censored, and the survival function.

Figure 1 shows the difference between the survival functions of manufacturing and the non-manufacturing sector. The Figure shows that the non-manufacturing sector has higher survival compared with the manufacturing sector. The figure shows that at year 6 there is a sharp decrease in the survival of the manufacturing sector.

Figure 1: Kaplan-Meier Survival Estimates



This figure shows the difference of the survival between the manufacturing and non-manufacturing sector.

The log-rank test for equality of survivor functions in Table 6 shows that the difference between the survival estimates of the manufacturing and the non-manufacturing sector is significant.

Table 6: Log-rank Test for Equality of Survivor Functions

Ind2	Events Observed	Events Expected
0	4	7.09
1	5	1.91
Total	9	9
chi2(1)	=	6.37
Pr>chi2	=	0.0116

Semi-Parametric Estimation

The Cox hazard model in Table 7 shows two models. Model 1 uses all independent variables that theoretically have an effect on survival. Model 2 uses only the variables that show significant relationships in Model 1. The results show that Model 2 has a significant model fit with a Prob>chi2 of 0.0165 while Model 1 has an insignificant model fit with a Prob>chi2 of 0.1904. Table 7 presents the effect of the covariates effect on survival. The first proxy used for corporate governance is board independence (PBOD). Contrary to prediction that board independence (PBOD) can have a negative effect on hazard rate or conversely positive effect on survival, the result shows an insignificant relationship. Thus, the Philippine data do not support the improved board-monitoring role implied by Fama and Jensen (1983) when applied to survival of IPO firms. It is possible that in the Philippines where ownership concentration is high, independent directors cannot perform their role properly. Table 3 reveals that the ratio of the shares owned by top five owners to non-top 5 owners is 2.47:1. This implies that top five shareholders own 71% of the firm. Thereupon, it is possible that independent directors do not perform their role properly for fear of losing their position if they do not agree with the majority.

Table 7: Cox Proportional Hazard Model Estimation Results

	Model 1	**Model 2**
_t	**Haz. Ratio**	**Haz. Ratio**
PBOD	0.4901	
U_J	1.177	
Own_Ret	0.0027*	0.0037*
Own	1.340**	1.320***
Age	0.9701	
Primary	0.6541	
ROA	0.3168	
Ind2	4.391*	4.275**
Assets_Proceeds	1.010*	1.010*
Log Likelihood	-37.896	-38.248
LR chi2(9)	12.43	12.12
Prob > chi2	0.1904	0.0165

*This table shows the covariates that explain the survival of IPO firms. Variables with ***, **, and * indicate significance at 1%, 5% and 10% respectively. Values of the dependent variables are expressed as hazard ratios. Values more than one imply shorter duration or event is more likely to happen while values between zero and one imply longer duration or the event is less likely to happen.*

Another proxy for corporate governance is number of underwriters. The results show an insignificant relationship with survival. The number of underwriter is not a risk factor. Ownership structure proxies were included in this study to see if principal-principal conflict is a factor in preventing failures. The results show that ownership retention negatively affects delisting and is significant at 10% level of confidence. This partially supports the hypothesis and the finding of Hensler et al. (1997) and is in line with Leland and Pyle's (1977) assertion that a higher retained ownership by the original owners signals confidence in the enterprise. It signals that the original owners see the value of their business and is communicating it by retaining a large portion of ownership. The second proxy for ownership structure used in this study is ownership concentration (Own). In emerging countries like the Philippines, family ownership dominates the ownership structure. In such case, principal-principal conflicts are common. The results show that ownership concentration positively affects failure and is significant at 1% level of confidence. This means that the delisting event happens quicker or survival time is shorter. Possible explanation for this is that conflicts between the majority shareholder and the minority shareholders are more frequent. These squabbles could lead to failure, which is consistent with the prediction.

The paper predicts the age of the firm negatively affect delisting. The results show an insignificant relationship, which is inconsistent with Schultz (1993) who found a significant negative relationship when he examined the survival of IPO firms in CRSP NASDAQ between 1986 and 1988. Schultz found that age positively relates with survival. Carroll (1983) asserts that the rate of death decline with age. Hensler et al. (1997) mentioned that longevity brings stability. They found that survival time for IPOs increases with age. In the same manner, Kim et al. (2002) found that age significantly and negatively relate with hazard rate, which implies that history of the firm matters. Established firms will last longer. In the case of the Philippines, the data do not support these findings. A priori expectation about the effect of the type of offering (Primary) on delisting is unsigned but significant. The results show an insignificant relationship.

The type of offering is not significantly different from zero. The variable total assets, deflated by the offer size (Assets_Proceeds) relates positively and significantly with firm failure. This result does not support the hypothesis and is contrary to the finding of Mata and Portugal (1994) where they found that new entrants that are larger tend to stay longer in the market. Kim et al. (2002) also found that in the case of South Korea, larger IPOs tend to survive longer. One possible explanation for this is that in the Philippines, majority of the failures are due to mergers. Six out of nine failures recorded during the 7-year observation period or 67% of the failures are due to mergers.

The effect of return on asset (ROA) on survivability is insignificant. This result does not support the hypothesis. In the literature, there is a positive relationship between higher pre-operating performance and survival (Jain & Kini, 1999, Peristiani and Hong, 2004). The result in Table 7 shows that industry classification (Ind2) is positively and significantly related with failure. The result is significant at 5% level. This means that in the case of the Philippines, IPOs that belong to manufacturing industry is more likely to fail in the aftermarket. Five out of the nine IPO firms that failed during the 7-year observation period come from the manufacturing industry.

CONCLUSION

The goal of the paper is to determine the effect of corporate governance variables, ownership structure variables, and some other variables found in literature on the survival of IPOs in the Philippines from 1989 to 2011 using a seven-year observation period . The study wants to know if information disclosed in the prospectus at the time of the offering affects survival. The paper used the non-parametric method by Kaplan-Meier to determine the survival rates. Next, the paper employed the Cox (1972) proportional hazards model to determine the effect of the identified covariates on survival. One hundred forty one (141) IPO prospectuses were collected from Thomson Reuters' Eikon and from the Philippine Stock Exchange Library. The results show that relevant information from the prospectus can explain the survival of IPOs. The two ownership structure proxies significantly affect survival. First, ownership retention signals important information. Particularly, the higher the ownership retention of the original owners the more likely the firm will survive. Second, ownership concentration signals another important information. The paper finds that the higher the ownership concentration the more likely the IPO firm will fail. Industry sector signals another important information. Particularly, firms that belong to the manufacturing industry are more likely to fail than non-manufacturing firms are. In addition, contrary to theory, bigger IPO firms tend to survive less. On the other hand, the effect of the two corporate governance proxies, the percent of independent directors and the numbers of underwriters, on survival are insignificant. Age of the firm, ROA, and type of offering have insignificant results.

The result is important to IPO investors because it gives them additional information on what IPO firms to buy. According to the result, it is ideal to buy IPO firms with high ownership retention, low ownership concentration, do not belong to the manufacturing sector, and low to medium sized firms. There is an important policy implication of the result to the Philippine Securities and exchange Commission. There is a need to improve the corporate governance code of the Philippines to make it more effective in monitoring opportunistic behavior of managers. The result shows that the role of independent directors is insignificant. The main limitation of the study is that the samples used are few. Because of this, the robustness of the empirical analysis is not established. The findings on the significance of ownership retention and ownership concentration need deeper scrutiny. Why do these variables affect survival significantly? Why does ownership concentration hasten the delisting event from happening? What is the nature of the conflicts between the majority and minority owners? There is a need for further research on why board independence is insignificant in explaining IPO survival. In addition, the current method in measuring underwriter prestige is hard to apply in the Philippines. Additional method of measuring underwriter prestige is another area for further research. There is also a need to do further research on why bigger firms tend to survive less.

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