Asian Academy of Management Journal of Accounting and Finance

AAMJAF Vol. 13, No. 2, 1–26, 2017

BANK RISK TAKING BEHAVIOUR IN MALAYSIA: ROLE OF BOARD AND OWNERSHIP STRUCTURE

Linda Loh and Chan Sok-Gee*

Department of Finance and Banking, Faculty of Business and Accountancy, University of Malaya, 50603 Kuala Lumpur, Malaysia

*Corresponding author: sokgee@um.edu.my

ABSTRACTS

This paper examines the role of board structure and ownership concentration on bank risk-taking of public listed commercial banks in Malaysia from 2001 to 2012. The study focuses on the bank-risk taking behaviour after the major bank consolidation in Malaysia in year 2000. Using two-market model to estimate the risk of the commercial banks in Malaysia, the results suggest that higher ownership concentration and larger board size resulted in higher bank risk-taking of the listed commercial banks in Malaysia. Given that the board structure is an important element of bank risk-taking, regulators should continue to enhance the monitoring of banks (where board size is large and ownership concentration is high) to control the banks' potential for excessive risk taking.

Keywords: bank-risk taking, corporate governance, board structure, ownership concentration, commercial banks

INTRODUCTION

Corporate governance issues received considerable attention in Asian with no exceptional for Malaysia following 1997 Asian Financial Crisis (Cheung & Chan, 2004). The Malaysian banking industry was severely affected with evidence of tremendous increased domestic interest rates, increased outflows of ringgit funds, tight liquidity conditions, increased loan provision requirements and high borrowers default (due to sharp falls in the value of real estate and equities which

Publication date: 28 February 2018

To cite this article: Loh, L., & Chan, S.-G. (2017). Bank risk taking behaviour in Malaysia: Role of board and ownership structure. *Asian Academy of Management Journal of Accounting and Finance, 13*(2), 1–26. https://doi.org/10.21315/aamjaf2017.13.2.1

To link to this article: https://doi.org/10.21315/aamjaf2017.13.2.1

were used as bank collaterals) following large devaluation of the Malaysian ringgit and the plunge of the Kuala Lumpur Stock Exchange (Takatoshi & Yuko, 2007). This had resulted in sharp increase in the non-performing loans from 3.6% as at June 1997 to 9.0% at the end of 1998 (Takatoshi & Yuko, 2007).

Following the 1997 Asian Financial Crisis, Malaysia's central bank (or Bank Negara Malaysia) focused its effort on consolidating the domestic banks in an effort to restore the financial stability as the financial sector plays an important role in the economy (Bank Negara Malaysia, 2001). The central bank's longer-term goal is aimed towards building a domestic banking sector that is resilient and competitive (Bank Negara Malaysia, 2001). By 2001, 50 out of 54 domestic banks were consolidated into 10 banking groups, and 94% of the total assets of the domestic banking sector were rationalised and consolidated (Bank Negara Malaysia, 2001). In addition to the consolidation efforts, Bank Negara Malaysia also implemented various regulatory and supervisory reforms to enhance the strength, capacity and corporate governance of banking institutions, such as issuing guidelines on credit risk management, introducing credit accreditation program, and launching the Enterprise Programme to support viable small and medium scale enterprises, among others (Bank Negara Malaysia, 2001).

In addition, the Finance Committee on Corporate Governance (FCCG) was formed in March 1998 to improve the corporate governance practices in the country (Haniffa & Hudaib, 2006). The FCCG focused on issues of ownership concentration, effectiveness of board of directors, lack of enforcement mechanisms, and lack of responsibilities awareness by directors, among others (Haniffa & Hudaib, 2006). To date the Malaysian Code of Corporate Governance had been revised for three times in view of the importance role of corporate governance in firms' surveillance in long-run.

Theoretically, the important role of corporate governance is widely recognised to overcome the conflict between shareholders and managers such as the agency theory. This is especially true with good board structure and ownership concentration which is believed to contribute positively to more transparent information disclosure about a corporation. Transparency is particularly important in the banking industry as it serves as the main channel for monetary policy transmission of the economy as a whole. Therefore, good corporate practices undeniably contribute towards the stability of a financial ecosystem and the sustainability of an economy.

Failure in the banking system may impede the economic activities and lead to major financial crisis. The Global Financial Crisis is an example of the impact of the financial industry meltdown effecting economies worldwide. Therefore, it

is pertinent that banks lead good corporate practices especially in the composition of board structure and ownership concentration for long-term financial and economy stability. A poor board structure and ownership concentration could drive the market to lose confidence not only in the financial industry but also drive away foreign investments in a country. Hence, this study focuses on the impact of board structure and ownership concentration on risk taking behaviours of the Malaysian banks.

Excessive bank risk taking was viewed as a key factor towards the cause of the Global Financial Crisis in 2007 (Paligorova, 2010). A bank with poor corporate governance could cause the market to lose confidence in the bank, and this could result in a liquidity crisis, which could in turn pose a systemic risk to the country (Htay & Rashid, 2011). Therefore, the risk management of the financial industry plays an important role towards developing a robust and stable economic growth. Krugman (1998) stated that the Asian Financial Crisis was contributed by the domestic banks' structural weaknesses and the economy in Asian countries were further weakened by unsound macroecomic policies (including low international reserves holdings, low current account balances, weak banking industry and competitive devaluation) and moral hazard. Thus, this study further analysed the role of board composition and ownership concentration on the risk-taking behaviour of commercial banks in Malaysia. This study focuses on equity based risk with the estimation of total risk, market risk and idiosyncratic risk of the banks using two-market model. Unlike previous study of conventional risk taking that focuses on the accounting based risk, we shift our focus into equity based risk because investors and shareholders are more interested in the ability of the banks to diversify the firm-specific risk to reduce their total risk of the banks and to minimise its market exposure. In fact, good corporate governance practices in banks should minimise the market risk of the banks while incurring higher bank specific risk in generating higher return to shareholders based on the risk-return relationship.

This study further adds to the scant of the existing literatures especially after the banking consolidation in Malaysia that takes place since 2001. As there has not been much empirical work done on the board structure and the ownership concentration relationship with bank risk taking in Malaysia especially on equity based risk measures, there is a need to investigate the board structure and ownership concentration factors affecting bank risk-taking in Malaysia from the shareholders and investors perspective which had been largely neglected by the banking authority. This is especially true when the banks are publicly listed. Therefore, this study on bank risk taking using the equity based risk provides a better overview not only to the bank regulators, but also to the shareholders and

investors. This certainly contribute as a guide for monitoring the implementation of continuous measures of corporate governance code of conduct in Malaysia in achieving financial stability. Growth of the banks may affect the risk-taking behaviour and therefore, proper governance practices must be in place to ensure that the industry does not face with the issue of "too big to fail" that would result in the disturbances of the payment system and economic as a whole. This further justifies the need for this study to be conducted.

CORPORATE GOVERNANCE IN MALAYSIA

Poor risk management, weak corporate governance, and excessive lending resulted in large amount of non-performing loans (with average non-performing loans as a percentage of Gross Domestic Product (GDP) reached 20.8% among Indonesia, Thailand, Republic of Korea, Malaysia and Philippines in September 1998) and insolvent banking institutions during the 1997 Asian Financial Crisis (Dadush, Lynn, Riordan, Dasgupta, & Johannes, 1998). The element of poor governance was said to be the main contributor to explain the 1997 Asian Financial Crisis (Zulkafli, Abdul Samad, & Ismail, 2005). As a result, there were a series of reforms in the Corporate Code of Conduct in Malaysia.

Malaysia's journey on embracing corporate governance began with the establishment of Malaysian Code on Corporate Governance in March 2000 which focused on four areas, i.e. board of directors, director's remuneration, shareholders and accountability and audit. Under the Malaysian Code on Corporate Governance, companies are encouraged to apply the broad principles of good corporate governance sets out by the code flexibly and applying common sense under various circumstances.

The Malaysian Code of Corporate Governance was subsequently revised in 2007 to strengthen the roles and responsibilities of the board of directors, audit committee and internal audit. In 2012, the Malaysian Code on Corporate Governance 2012 was issued with further emphasis on strengthening board structure and the board's responsibilities. The Malaysian Code on Corporate Governance 2012 listed eight principles focusing on establishing clear roles and responsibilities of the board, continuous strengthening the board's composition, reinforcing the board independence, fostering commitment for an organisation's members, upholding integrity in financial reporting, recognising and managing risks, ensuring timely, and high quality disclosure and strengthening the relationship between company and shareholders (Securities Commission Malaysia, 2012).

The continuous revisions of the Corporate Governance Code of Practice represent the continuous efforts made by the government to improve and raise the corporate governance standard. In addition to the Corporate Governance Code of Practice, Bank Negara Malaysia launched the Financial Sector Master Plan in March 2001 which charts a 10-year plan for the financial industry with the objective of developing a more resilient, competitive and dynamic financial system (Zulkafli et al., 2005). More recently, Bank Negara Malaysia introduced the Financial Services Act 2013 and Islamic Financial Service Act 2013 and one of its key aims was to further strengthen its regulatory and supervisory of the financial institutions. All these efforts are mainly to strengthen the financial industry's corporate governance structure.

In addition, Bank Negara Malaysia introduced the "Guidelines on Corporate Governance for Licensed Institutions" that highlighted the principles of corporate governance with more emphasis on the role of board and management in June 2013 (Bank Negara Malaysia, 2013). The "Guidelines on Corporate Governance for Licensed Institutions" requires licensed institutions to ensure that at least one-third of their board members are independent directors to ensure a strong element of independence on the board and there should be not more than one executive director on the board to maintain effective oversight over management (Bank Negara Malaysia, 2013).

In terms of shareholdings, on average the single largest shareholder and the five largest shareholders of companies in Malaysia were 31% and 62% respectively between the period 1996 to 2000, and this had raised the issues of the protection for minority shareholders (Haniffa & Hudaib, 2006). Most of the companies in Malaysia are highly concentrated and this increases the risk of expropriation from minority shareholders (Khan, 1999). Hence, this motivates us to further study the impact of corporate practices and ownership concentration on risk-taking behaviour of the listed banks in Malaysia. This is because excessive risk-taking resulted in the failure of the banking institutions and also hurt the minority shareholders as they are the entity that received the least protection.

LITERATURE REVIEW

This section reviews the studies on board compositions and ownership concentration in affecting the firms' performance. In the presence of opacity in the banking activities, the boards of directors of the bank play an important role in enforcing effective corporate governance (Leaven & Levine, 2007). Pathan (2009) in his study of the U.S. banks holding companies strongly suggests that strong bank boards with small number of board members and less restrictive

board encourage the banks to take on more risk. This is because strong board of directors are better at representing the bank shareholders' interest and this motivates the bank to take up more risky activities to generate better returns. Similar results are also found by Rachdi and Ameur (2011) in their analysis of the relationship between board characteristics, bank performance and bank risk taking activities based on a sample of 11 large Tunisian commercial banks from 1997 to 2007. This is supported by Sullivan and Hassan (2012) who found that large board reduced the risk taking behaviour of banks based on a sample of 150 bank holding companies from 1999 to 2000 in the United States.

On the contrary, Lipton and Lorsch (1992) and Jensen (1993) found that larger board size resulted in less effective board of directors due to free-rider problems (due to agency problem) as well as difficulty of getting timely decisions. As pointed out by Jensen (1993), board sizes which are above seven or eight members are considered to be ineffective due to the issues of communication and coordination. This will eventually affect the firm's performance. Yermack (1996) found a negative relationship between board size and firm value based on a sample of 452 large U.S. industrial corporations between 1984 and 1991 due to inefficient use of assets.

On the other hand, the role of independent directors cannot be neglected. This is because the independent directors assume the role to oversight and monitor the top management of the firm to maximise shareholders' wealth. The use of independent directors is crucial to resolve the agency problems (Hermalin & Weisbach, 2003). According to Fama (1980) and Fama and Jensen (1983), independent directors are more likely to maintain proper oversight over a firm's top management as they have the incentives to build their reputation as expert monitors. This is in line with Pathan (2009) who found a negative relationship betweeen the precentage of independent directors and bank risk-taking. According to Pathan (2009), this could be due to independent directors view their role as balancing between shareholders' interest and other stakeholders such as regulators and depositors.

Similarly, Htay and Rashid (2011) also found that higher percentage of independent directors would lead to higher risk management information disclosure. On the contary, Sullivan and Hassan (2012) found that higher percentage of independent directors increases the operational risk and market risk of the firms. This contrasts with the findings from Fama (1980), Fama and Jensen (1983), Pathan (2009) and Htay and Rashid (2011). Increase in operational risk could happen when the banks are dependent to higher percentage of independent directors. This may due to the independent directors failed to oversight the internal

operation as compared to the internal or excutive directors who have more control over the processess and operations of the banks. As pointed out by Sullivan and Hassan (2012), higher percentage of independent directors in the banks that failed to oversight the operation of the banks may wrongly fight for the bank's employee salaries and benefits with the perception to retain better human capital (Sullivan & Hassan, 2012).

On the other hand, Dionne and Triki (2005) found that the Sarbarnes-Oxley Act enacted in 2002 in the U.S. which required a majority of the board to consist of unrelated directors has no effect on the corporate risk management activity based on a sample of 36 U.S. gold mining firms from 1993 to 1999. Their finding is aligned with Rachdi and Ameur (2011) who studied the relationship between board characteristics with risk-taking on 11 Tunisian commercial banks from 1997 to 2006. They also found that the presence of independent directors within the board has no significant impact on risk-taking.

The study of ownership structure can be categorised into two categories, i.e. the ownership concentration and the type of ownership. Ownership concentration refers to the percentage of ownership by the largest shareholders whereas the type of ownership are individual, institution, state, foreign or managerial ownership (Zulkafli et al., 2005). Large shareholders or high concentration ownership are also referred to as block shareholders (Zulkafli et al., 2005).

Marco and Fernandez (2003) found that ownership concentration increase the bank risk-taking behaviour of the commercial banks in Spain from 1993 to 2000. Leaven and Levine (2007) also found that large owners with substantial cash-flow rights have a tendency to take on more risk based on a sample of 288 banks across 48 countries from 1996 to 2001. As highlighted by Paligorova (2010), there is a positive relationship between equity ownership and corporate risk-taking where owners have a portfolio of share in more than one company, based on a sample of 13,486 firms in 38 countries from 2003 to 2006. Htay and Rashid (2011) also found that high directors' ownership concentration would lead to lower risk management information disclosure based on a sample of 12 listed banks in Malaysia.

On the contary, Anderson and Fraser (2000) found that managers with substantial ownership took on less risk in response to the regulatory changes which were designed to reduce incentives for risk-taking based on a sample of 150 banks from 1992 to 1994 in the U.S. Lee (2008) also found a negative relationship between ownership and bank risk-taking activities from 1999 to 2006 in Korean banks. However, there was a positive relationship between insider

ownership and capital to equity ratio. This indicates that banks take on less risk and change their financial structures toward safer and more conservative financial structures when their ownership concentration increases. This is supported by Riewsathirathorn, Jumroenvong and Jiraporn (2011) who analysed the impact of ownership concentration on risk-taking behaviour of banks based on a sample of 36 banks in East Asia (namely Thailand, Hong Kong, Singapore, Indonesia and Malaysia) from 2004 to 2008. They found that higher ownership concentration reduced the risk-taking behaviour of banks. This could be due to as ownership concentration gets more significant, the controlling shareholders are more able to exploit minority shareholders and the owners may impose more stringent monitoring on managers, thereby limiting the managers' incentives to take excessive risks.

In a similar vein, Magalhaes, Gutierrez and Tribo (2010) found that bank risk-taking varies at different level of ownership concentration. They found a non-linear relationship between ownership concentration and risk taking in banks of 818 banks around 490 countries worldwide for the period 2000 to 2005. At low level of ownership concentration, the banks' risk increases through less effective monitoring by owners. As the level of ownership concentration increases to moderate level, the banks would take on less risk taking activities due to stringent monitoring by the owners. However, at high level of ownership concentration, banks would increase their risk taking activities when the shareholders act on their own interests on the expenses of minority shareholders which is known as expropriation-of-minority shareholders hypothesis. This is in contrast with Anderson and Fraser (2000), Lee (2008) and Riewsathirathorn et al. (2011).

Due to the inconclusive findings on the impact of board structure and ownership concentration on bank risk-taking behaviour, we would like to find out the impact of ownership concentration on bank risk-taking behaviour in Malaysia after the 1997 Asian Financial Crisis. As suggested by Htay and Rashid (2011), the board can influence better disclosure of risk management information and hence serves as the basic guideline for firm's performance and sustainability of the firms in the particular industry.

METHODOLOGY

This study employs balanced-panel data analysis based on Generalized Least Square estimation to examine the effects of board structure and ownership concentration of the commercial banks in Malaysia on bank risk-taking behaviour from 2001 to 2012. We employ the market risk components; total risk (*TR*), idiosyncratic risk (*IDIOR*), and systematic risk (*SYSR*) estimated using two-market

model. This model had been widely used in the analysis of risk-taking behaviour of commercial banks. Among others that had used this method in estimating the risk factors of commercial banks include Anderson and Fraser (2000), Chen, Steiner and Whyte (2006), and Pathan (2009). Total risk is the standard deviation of a listed company's daily stock returns (R_{it}) for each financial year-end. Total risk measures the dispersion of the stock returns from the expected stock returns. Besides, it represents the risks inherent in a company's assets, liabilities and off-balance sheet positions. The daily stock return is calculated as $R_{it} = \ln (P_{it}/P_{it-1})$, where P_{it} is the stock price which is adjusted for any capital adjustments.

We next estimate the systematic risk and idiosyncratic risk (or unsystematic risks) by applying the two-index market model as previously done by Anderson and Fraser (2000), Chen et al. (2006) and Pathan (2009). The two-index market model is estimated using Equation (1) below:

$$Return_{it} = \alpha_i + \beta_{1i} R_{mt} + \beta_{2i} INTEREST_t + \varepsilon_{it} \quad (1)$$

where $Return_{it}$ is the bank's stock returns of bank i at time t; R_{mt} is the return of KLCI market index at time t; *INTEREST* is the yield on a Malaysian government three-month treasury bill at time t; α is the intercept term; β_{1i} is the systematic risk of bank i and ε_{it} is the error term of bank i at time t. The unsystematic risk is defined as the standard deviation of the residual obtained from the estimation of the two-market model.

We employ Equation (2) to estimate the impact of board structure and ownership concentration on bank risk-taking behaviour of the commercial banks in Malaysia.

$$\begin{aligned} Risk_{it} = {} & \alpha_i + \beta_1 (OWCON)_{i,t} + \beta_2 \ln(BS)_{i,t} + \beta_3 (INDIR)_{i,t} \\ & + \beta_4 (BankSize)_{i,t} + \beta_5 (CV)_{i,t} + \beta_6 (CAPITAL)_{i,t} \\ & + \beta_7 (FREQ)_{i,t} + \varepsilon_{it} \end{aligned} \quad (2)$$

Where

$Risk_{it}$ = Total risk/ systematic risk/ idiosyncratic risk of bank i at time t.

$OWCON_{it}$ = Percentage of shares held by the top five shareholders of bank i at time t.

BS_{it} = Natural logarithm of number of directors of bank i at time t.

$INDIR_{it}$ = Percentage of the number of independent directors over the total number of independent directors of bank i at time t.

$BankSize_{it}$ = Natural logarithm of total assets of a bank at the end of each financial year of bank i at time t.

CV_{it} = charter value of bank i at time t.

$CAPITAL_{it}$ = Bank's total equity as a percentage of its total assets of bank *i* at time *t*.

$FREQ_{it}$ = The average daily trading volume of shares in a year divided the number of total outstanding shares at the beginning of each year of bank *i* at time *t*.

We reestimate Equation (2) the possibility of non-linearity in the ownership concentration which may affect the risk-taking behaviour by including square of ownership concentration as stated by Equation (3).

$$\begin{aligned} Risk_{it} = {} & \alpha_i + \beta_1 (OWCON)_{i,t} + \beta_2 (OWCON^2)_{i,t} + \beta_3 \ln(BS)_{i,t} \\ & + \beta_4 (INDIR)_{i,t} + \beta_5 (BankSize)_{i,t} + \beta_6 (CV)_{i,t} + \\ & \beta_7 (CAPITAL)_{i,t} + \beta_8 (FREQ)_{i,t} + \varepsilon_{it} \end{aligned} \quad (3)$$

We expect that the square of ownership concentration to have negative effect on bank risk-taking behaviour because the large shareholders may be more risk adverse in order to reduce their losses and to safeguard the value of their shares (Shleifer & Vishny, 1986).

Data and Sample Selection

The sample of this study consists of eight listed banking institutions, i.e. Malayan Banking Berhad, CIMB Bank Berhad, Public Bank Berhad, Hong Leong Bank Berhad, RHB Bank Berhad, AmBank (M) Berhad, Affin Bank Berhad and Alliance Bank Malaysia Berhad. In order to analyse the risk-taking behaviour based on market model, the study took the public listed entities of the commercial banks as a representative of the banking institution. The listed entities of the commercial banks mentioned above are Malayan Banking Berhad, CIMB Bank Berhad, Public Bank Berhad, Hong Leong Bank Berhad, RHB Capital Berhad, AMMB Holdings Berhad, Affin Holdings Berhad and Alliance Financial Group Berhad.

The period of study is from 2001 to 2012. The data source that is extracted from Bloomberg include daily stock prices, volume of stocks traded, total stocks outstanding, total equity of the banks, total assets of the banks and ownership concentration of the banks. The data of board size and the number of independent directors of the banks are extracted from various issues of banks' annual reports.

Definition of Variables

We use board size and the percentage of independent directors to represent the board structure of the commercial banks in Malaysia. Board size refers to the number of directors on the board. This is done by taking the natural logarithm of the total number of directors on the board of each commercial banks from year 2001 to 2012. We expect that large board size would reduce bank risk taking activities in Malaysia. This is because in the presence of opacity in bank lending activities, large bank board size can impose more effective governance in banks. Large bank board size could also provide diversity in terms of knowledge, experience and expertise in various fields that could help to minimise the bank's risk.

Next, we use the percentage of independent directors to investigate the impact of independent directors towards risk-taking behaviour in Malaysian commercial banks. We expect that more independent boards will reduce bank risk taking activities in Malaysia. This is because independent directors rely on their reputation as effective monitors in order to maintain their existing positions and obtain new positions in other organisations. Therefore, independent directors tend to be more risk adverse and impose more effective governance in banks.

Ownership concentration is also referred to as large block holders (Demsetz, Saidenberg, & Strahan, 1997). This study defines ownership concentration as the total ownership percentage of shares held by the top five shareholders in a listed company, which is similar to a study conducted by Haniffa and Hudaib (2006) and Riewsathirathorn et al. (2011). We expect higher ownership concentration is related to higher risk takings in Malaysian banks. This is because shareholders with large ownership concentration may find it mutually advantageous to cooperate with management to take on higher risk taking activities, and this may lead to poor corporate performance due to less effective monitoring. Nevertheless, the relationship may be non-linear because large shareholders who hold substantial amount of shares in the firm may be more risk adverse in order to safeguard the value of their shares and to reduce any losses (Shleifer & Vishny, 1986).

We employ bank size (*BankSize*), charter value (*CV*), financial leverage (*CAPITAL*) and frequency of trading (FREQ) suggested by Saunders, Strock and Travlos (1990), Demsetz et al. (1997), Anderson and Fraser (2000) and Pathan (2009) as control variables in our study. Demsetz and Strahan (1997) found that the frequency of trading is a substitution for the speed of new information reflected in stock price and therefore, this variable should be correlated with the variances in a bank's on-balance sheet and off-balance sheet portfolios.

Descriptive Statistics

The descriptive statistics are presented in Table 1. Based on Table 1, the mean total risk of 1.66% is lower than the reported 2.13% by Anderson and Fraser (2000) based on the U.S. market from 1992 to 1994 and Pathan (2009) based on the U.S. market with average mean of 2.26% from 1997 to 2004. The mean systematic risk of 0.49% is lower than the reported 0.52% by Pathan (2009) based on the U.S. market from 1997 to 2004. The mean idiosyncratic risk of 16.68% is higher than the reported 2.08% by Anderson and Fraser (2000) and 1.98% by Pathan (2009).

Based on Table 1, the mean board size is 9.854 (or 10 persons) with a minimum of 6 persons and a maximum of 14 persons. This is lower than the reported mean board size of large U.S. bank holding companies by Pathan (2009) of 12.92 (or 13 persons). The mean of the independent directors in this study is 4.875 (or 5 persons) with a minimum of 2 persons and a maximum of 9 persons.

The mean of the independent directors to total board size ratio in this study is 50.27% which is in line with the Malaysian Code of Corporate Governance 2012. The Malaysian Code of Corporate Governance 2012 states that the board must comprise a majority of independent directors. The Bank Negara Malaysia's "Guidelines on Corporate Governance for Licensed Institutions" states that banks are required to have at least one-third of their board members are independent directors. The mean independent directors to total board size ratio of 50.27% however is lower than the reported percentage of independent directors of large U.S. bank holding companies of 64.52% by Pathan (2009).

The mean ownership concentration in this study is 57.10%. This means that the top five shareholders on average own 57.10% shareholdings of the banks and this is considered to be highly concentrated. This ownership concentration is only slightly lower than the reported mean percentage of shares held by the top 5 shareholders of banks in East Asia (which include Thailand, Hong Kong, Singapore, Indonesia and Malaysia) of 57.87% by Riewsathirathorn et al. (2011). This is because the stock exchanges in the South East Asia such as Bursa Malaysia, is dominated by companies with substantial shareholders, who are typically government owned or promoted institutions or by families who usually appoint independent directors for political reasons, for contracts and contacts, and due to their personal relationship with the CEO and other non-independent directors (Haniffa & Hudaib, 2006).

Table 1
Descriptive statistics

Variable	Anderson & Fraser (2000)	Pathan (2009)	Mean	Std. Dev.	Min	Max
Total risk	2.13%	2.2%	1.66%	0.66%	0.45%	3.83%
Systematic risk	0.04%	0.52%	0.49%	0.34%	−0.12%	2.16%
Idiosyncratic risk	2.08%	1.98%	16.68%	15.31%	0.64%	116.09%
Board size			9.854	1.542	6.000	14.000
Independent directors board size			4.875	1.308	2.000	9.000
Independent directors ratio to total board size (%)			50.27%	13.59%	16.67%	80.00%
Ownership concentration (%)			57.10%	19.39%	15.16%	86.72%
Bank size (in million)			115,248	95,009	17,220	494,866
Charter value			1.050	0.056	0.942	1.156
Bank capital (%)			8.32%	1.78%	5.13%	14.41%
Frequency of trading			0.12%	0.07%	0.02%	0.36%

This table presents the results of the descriptive statistics. Total risk is the standard deviation of the bank's daily stock returns over a year. Systematic risk is the coefficient of R_{mt}, i.e. β_1 in the two-index market model as represented by Equation (1). *IDIOR* is calculated as the standard deviation of ε_{it} in Equation (1). Ownership concentration is the percentage of shares held by the top five shareholders of the bank. Board size is the number of directors on the board. Independent Directors is the percentage of the independent directors as a percentage of board size. Bank size is the total assets of a bank at the end of financial year. Charter value is the charter value of the bank calculated (following Keeley, 1990) as the book value of total assets plus market value of equity minus book value of equity, all divided by the book value of total assets. Bank capital is the bank total equity as a percentage of its total assets. Frequency of trading is the average daily trading volume of shares in a year divided the number of total outstanding shares.

The mean bank size is RM115.25 billion (or equivalent to USD32.63 billion based on exchange rate of 3.5321, i.e. the average yearly exchange rate from 2001 to 2012). This bank size is higher than the mean bank size of USD23.66 billion of the large U.S. bank holding companies as reported by Pathan (2009). The mean bank size is also higher than the reported mean bank size of USD16.26 billion in East Asia banks as reported by Riewsathirathorn et al. (2011).

The mean charter value in this study at 1.05 is lower than the reported mean charter value of 1.10 by Pathan (2009). The mean bank capital at 8.32% is lower than the reported mean bank capital of 9.26% by Pathan (2009) and it is also lower than the reported mean bank capital of 9.00% by Riewsathirathorn et al. (2011). The mean frequency of trading at 0.12% is lower than the reported mean frequency of trading of 0.32% by Pathan (2009).

Correlation Analysis

The correlation coefficients between board size, independent directors, ownership concentration and bank risk measures are largely consistent with the expectation. The correlation coefficients between *CV* and *TR* of 0.592 and between *CV* and *LNTA* of 0.578 are only marginally above average. The correlation matrix suggests the study does not suffer from serious multicollinearity problem among the regressors (Gujarati, 2004).

Table 2 presents the Pearson's pair-wise correlation matrix between variables.

Table 2
Correlation matrix

Variables	TR	SYST	IDIOR	LNBS	INDIR	OWNCON	LNTA	CV	CAPITAL	FREQ
TR	1.000									
SYSR	−0.221	1.000								
IDIOR	−0.075	0.431	1.000							
LNBS	0.003	0.137	0.010	1.000						
INDIR	−0.151	0.014	−0.035	−0.375	1.000					
OWNCON	0.182	−0.015	0.000	0.144	−0.439	1.000				
LNTA	−0.475	0.475	0.105	0.206	0.297	−0.116	1.000			
CV	−0.592	0.447	0.193	0.116	0.198	−0.388	0.578	1.000		
CAPITAL	−0.064	−0.166	−0.254	−0.046	0.150	−0.040	−0.163	−0.181	1.000	
FREQ	0.267	−0.085	−0.040	0.001	0.130	−0.295	−0.074	−0.009	0.010	1.000

This table presents the Pearson pair-wise correlation matrix of total risk (*TR*), systematic risk (*SYSR*), idiosyncratic risk (*IDIOR*), board size (*LNBS*), independent directors (*INDIR*), ownership concentration (*OWNCON*), bank size (*LNTA*), charter value (*CV*), bank capital (*CAPITAL*) and frequency of trading (*FREQ*).

RESULTS AND DISCUSSION

The estimated results of the board size, percentage of independent directors and ownership concentration on bank risk-taking behaviour are presented in Table 3.

Table 3 presents the estimated results for total risk based on GLS estimation. Based on the Hausman test, BP LM test and redundant F-test, the fixed effect model is deemed to be appropriate for Model (1) and (3) whereas we used Pooled OLS for Model (2).

Results found that board size is positively related to total risk and credit risk and it is statistically significant at 1% and 5% significance level, respectively. This means that larger board size increase the total risk of the commercial banks in Malaysia. The result is consistent with the findings by Lipton and Lorsch (1992) and Jensen (1993) that larger board size result in less effective board of directors as there would be free-rider problems (due to agency problem) as well as the difficulty of getting timely decisions. The board size on average in Malaysia is 10 members. Board sizes, which are above seven or eight members, are considered to be ineffective as any additional benefits from increased monitoring gained by additional membership will outweigh the cost related with slow decision making, the effort problem and easier control by the CEO (Jensen, 1993). A CEO who is risk inclined may take the opportunity to influence the board to take on higher risk. This may contribute to ineffective management of the board of directors and hence excessive risk-taking.

In addition, Haniffa and Hudaib (2006) found that larger board size affects firm's performance of 347 companies listed on the Kuala Lumpur Stock Exchange. They attributed this to the higher compensation cost of the board and higher incentives to reduce their duties as the size of the board gets bigger. Tarraf and Majeske (2010) also found the bank holding companies with higher risk-taking levels have lower financial performance from 2006 to 2009 based on a sample of 74 U.S. bank holding companies. Similar results are also suggested by Rashid, Zoysa, Lodh and Rudkin (2010) in Bangladesh from 2005 to 2009. According to Rashid et al. (2010), higher number of board of directors could lead to information asymmetries between the independent directors and other directors, which would lead to lower firm performance. The result supports that higher board size would have a significant relationship with bank risk taking in Malaysia.

Table 3
Estimated results for bank risk-taking behaviour

Variable	Model 1(a)	Model 1(b)	Model 2(a)	Model 2(b)	Model 3(a)	Model 3(b)
Board size	0.010***	0.010***	−0.001	−0.001	0.147	0.130
	(0.004)	(0.004)	(0.002)	(0.003)	(0.108)	(0.112)
Independent directors	0.005	0.005	−0.003	−0.003	0.181	0.166*
	(0.005)	(0.004)	(0.003)	(0.004)	(0.146)	(0.083)
Ownership concentration	0.039***	0.055**	0.002	−0.004	0.434	−0.944
	(0.009)	(0.018)	(0.002)	(0.006)	(0.276)	(0.829)
Ownership concentration^2	−	−0.012	−	0.006	−	1.041
		(0.012)		(0.006)		(0.671)
Bank size	0.010***	0.010***	0.001***	0.001**	0.065	0.073
	(0.001)	(0.001)	(0.001)	(0.001)	(0.044)	(0.061)
Charter value	−0.046***	−0.045**	−0.019**	−0.018**	0.309	0.230
	(0.014)	(0.014)	(0.007)	(0.006)	(0.434)	(0.474)
Bank capital	−0.114***	−0.111***	−0.007	−0.009	−1.054	−1.289
	(0.028)	(0.014)	(0.180)	(0.018)	(0.850)	(1.038)
Frequency of trading	4.240***	4.360***	−0.076	0.126	52.298*	42.043*
	(0.979)	(0.460)	(0.477)	(0.248)	(30.095)	(19.270)
Constant	0.129***	0.124***	−0.029***	−0.028**	−1.547***	−1.067**
	(0.017)	(0.022)	(0.008)	(0.010)	(0.523)	
Overall R^2	0.332	0.324	0.299	0.302	0.013	0.088
F-test	16.09***	13.97***	5.36***	4.71***	3.10***	2.93***
F-test (POLS vs. FEM)	7.07***	7.00***	0.64	0.58	6.99**	4.09***
BP LM test	0.00	0.02	4.05	1.52	40.65***	4.30**
Hausman test	48.18***	34.73***	1.52	3.81	16.86***	27.17***

Notes: Model (1) estimates the relationship between board structure and ownership concentration on total risk, Model (2) estimates the relationship between board structure and ownership concentration on systematic risk and Model (3) estimates the relationship between board structure and ownership concentration on idiosyncratic risk. Model (a) estimates the direct effect of ownership concentration while Model (b) provides the estimation of non-linear relationship between ownership concentration and risk-taking of the banks. *, ** and *** indicates significance level at 10%, 5% and 1% respectively. Robust standard error is reported in parenthesis. (Refer to Appendix A, B and C for details estimation)

The results showed that ownership concentration is positively related to total risk and credit risk of the commercial banks at 1% and 5% significance level, respectively. This indicates that more concentrated ownership increase the total risk of the banks. This means that an increase in ownership concentration encourage risk-taking activities of banks. According to McConnell and Servaes (1990), as ownership increases beyond a certain point, the shareholders with high shareholdings will allocate firm resources for their own interest regardless of its

impact to other shareholders. The result is consistent with Marco and Fernandez (2003) studies in Spain from year 1993 to 2000. Similarly, Haniffa and Hudaib (2006) also found that concentrated shareholdings lead to ineffective monitoring due to conflict of interest based on a sample of 347 non-financial and non-unit trust main board listed companies in Malaysia from 1996 to 2000.

The study by Leaven and Levine (2007) also suggests that large owners with substantial cash-flow rights in highly regulated banking industry have a tendency to increase risk taking because of the perception that the bank will be bailout during financial crisis by the regulator. Nevertheless, this relationship is subject to management structure, bank regulations and investor protection laws. Magalhaes et al. (2010) study found that high level of ownership concentration would result in higher bank risk based on a sample of 818 banks around 490 countries from year 2000 to 2005. Based on their argument, high level of ownership concentration, banks would increase their risk-taking activities when the shareholders act on their own interests on the expenses of minority shareholders which is known as expropriation-of-minority shareholders hypothesis.

Paligorova (2010) also found a positive relationship between equity ownership and corporate risk-taking behaviour where owners have a portfolio of shares in more than one company, based on a sample of 13,486 firms in 38 countries from year 2003 to 2006. The finding is consistent with McConnell and Servaes (1990), Marco and Fernandez (2003), Haniffa and Hudaib (2006), Leaven and Levine (2007), and Magalhaes et al. (2010). In summary, the result support the above hypothesis that high ownership concentration have a significant relationship on bank risk-taking in Malaysia.

On the other hand, we found no significant relationship between bank risk-taking with the independent directors of the banks in Malaysia. The result is consistent with the study by Bhagat and Bernard (1999) that found no empirical support that higher board independence correlates with higher firm performance based on a sample of 205 large U.S. public companies from 1988 to 1991. In a similar vein, Dionne and Triki (2005) also found a majority of the board to consist of unrelated directors has no effect on the corporate risk management activity based on a sample of 36 U.S. gold mining firms from 1993 to 1999.

In Malaysia, Haniffa and Hudaib (2006) found that boards which consists a majority of independent directors do not affect firm performance. This could be due to Malaysia is a developing country where independent directors are selected more often for political reasons, for contacts and contracts, and not due to their expertise and experience (Haniffa & Hudaib, 2006). In addition, they discussed that the selection of independent directors which were not based on expertise

and experience would result in directors who are not able to perform their roles effectively and may be unable to perform independent monitoring role.

This is supported by Rashid et al. (2010) who found that independent directors do not add value to firm economic performance based on a sample of 274 non-financial firms in Bangladesh from 2005 to 2009. It is also possible that independent directors have personal relationships with the CEO and other non-independent directors prior to their appointment as independent directors (Rashid et al., 2010). Similar results were found by Rachdi and Ameur (2011) based on a sample of 11 large Tunisian commercial banks from 1997 to 2006. The finding that independent directors do not affect firm performance was consistent with Bhagat and Bernard (1999), Hermalin and Weisbach (2003), Dionne and Triki (2005), Haniffa and Hudaib (2006), and Rashid et al. (2010).

Our results suggest that bank size is positively related to the bank risk-taking behaviour of the commercial banks in Malaysia and it is statistically significant at 1% significance level for both total risk, systematic risk and credit risk. As pointed out by Barth, Lin, Ma, Seade and Song (2013), larger banks are better off in terms of risk management and hence can assume higher risky asset in their portfolio with more lending activities which increased the overall risk of the banks. Besides, Mishkin (1999) pointed out that larger banks were more likely to be bailed out by the government and this led to moral hazard in the large banks and this might also be reflected in the overall risk profile of the banks.

We found that charter value and bank capital are negatively related to the bank's total risk and systematic risk. This result is consistent with Pathan (2009) and Rachdi and Ameur (2011). Kochubey and Kowalczky (2014) found an inverse relationship between banks' capital level and risk-taking based on a panel dataset of U.S. commercial banks from 2001 to 2009. In a similar vein, Deelchand and Padgett (2009) found a negative relationship between bank capital and bank risk-taking based on a sample of 263 Japanese cooperative banks from 2003 to 2006. Moussa (2015) also found a negative relationship between bank capital and bank risk-taking based on a sample of 18 banks in Tunisia from 2000 to 2010. Furlong and Kwan (2005) found a strong negative relationship between bank charter value and bank risk-taking in particular during the earlier periods of 1986 to 2003 as the average charter value of the banks were relatively low.

Frequency of trading is found to be positively related to total risk and also the idiosyncratic risk of the banks which suggest that more transactions of the banking stock increase the risk of the banks. This indicates that the greater the speed at which new information is reflected in the stock price, the higher the bank risk. The result is supported by Anderson and Fraser (2000) and Pathan (2009).

Negative relationship is found between bank capital and total risk. This indicates that highly capitalised banks have lower bank risk. This could be due to banks with higher capital would be in a better position to withstand any unforeseen circumstances, have better liquidity and are able to quickly draw on their capital should the need arise.

CONCLUSION

This study examines the relationship between ownership concentration, board size and independent directors and risk-taking behaviours in Malaysian banks. Ownership concentration is measured as the total ownership percentage of share held by the top five shareholders in a bank. Board size refers to the number of directors on the board. Independent directors are measured by the percentage of independent directors to the total number of directors on the board.

The total risk (*TR*), systematic risk (*SYSR*) and idiosyncratic risk (*IDIOR*) are estimated using the market model. The impact of the ownership concentration, board size and independent directors on the bank risk is then estimated based on GLS estimation. The sample of this study consists of eight listed banks in Malaysia, namely, Malayan Banking Berhad, CIMB Bank Berhad, Public Bank Berhad, Hong Leong Bank Berhad, RHB Bank Berhad, AmBank (M) Berhad, Affin Bank Berhad and Alliance Bank Berhad. The period of study is from 2001 to 2012.

The study found that ownership concentration has a significant positive relationship with the total risk of the banks. This result was consistent with McConnell and Servaes (1990), Marco and Fernandez (2003), Haniffa and Hudaib (2006), Leaven and Levine (2007), Magalhaes et al. (2010) and Paligorova (2010). The study also suggest non-linear relationship of ownership concentration with bank credit risk as suggested by Shleifer and Vishny (1986).

The study suggests that board size has a significant positive relationship with total risk taking of the banks. The result is consistent with Lipton and Lorsch (1992), Jensen (1993), Yermack (1996), Eisenberg, Sundgren and Wells (1998), Haniffa and Hudaib (2006), Rashid et al. (2010), and Tarraf and Majeske (2010).

Contary to expectation, there is no significant impact of the presence independent directors to the risk taking behaviour of banks. The result is supported by Bhagat and Bernard (1999), Hermalin and Weisbach (2003), Dionne and Triki (2005), Haniffa and Hudaib (2006), Rashid et al. (2010), and Rachdi and Ameur (2011). The Malaysian Code of Corporate Governance 2012 recommend that the

board must comprise of a majority of independent directors. This may not be effective if the independent directors are appointed based on political reasons, for contracts and due to their personal relationship with the CEO and other executive directors especially in developing countries such as Malaysia. Therefore, the contributions of independent directors may not be significant and effective in monitoring and advicing the company accordingly.

As concluding remark, the findings in this study implied that bank board size and ownership concentration are important determinants of bank risk-taking behaviour while the percentage of independent directors is statistically insignificant. Given that the board structure is an important element of bank risk-taking, regulators should continue to enhance the monitoring of banks (where bank size is large and ownership concentration is high) to control the banks' potential for excessive risk taking.

This study covered the general perspective of the role of board of directors and ownership concentration on bank risk-taking in Malaysia. We suggest that future research could extensively look at various aspects of corporate governance which include characteristics of board remuneration; independent directors tenure; board professionalism or qualifications; and risk management information disclosure. Future studies could also analyse bank risk-taking from the risk adjusted return of bank perspective.

ACKNOWLEDGEMENTS

This paper is part of the research supported by UMRG research grant (RP001B-13SBS), University of Malaya.

REFERENCES

Anderson, R. C., & Fraser, D. R. (2000). Corporate control, bank risk taking, and the health of the banking industry. *Journal of Banking and Finance*, *24*(8), 1383–1398. https://doi.org/10.1016/S0378-4266(99)00088-6

Bank Negara Malaysia. (2001). Bank Negara Malaysia annual report 2000. Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_ar&ac=4&lang=en

Bank Negara Malaysia. (2013). Guidelines on corporate governance for licensed institutions. Retrieved 25 January 2015, from http://www.bnm.gov.my/guidelines/01_banking/04_prudential_stds/16_corporate_governance.pdf

Barth, J. R., Lin, C., Ma, Y., Seade, J., & Song, F. M. (2013). Do bank regulation, supervision and monitoring enhance or impede bank efficiency? *Journal of Banking and Finance*, *37*, 2879–2892. https://doi.org/10.1016/j.jbankfin.2013.04.030

Bhagat, S., & Bernard, B. (1999). The uncertain relationship between board composition and firm performance. *Business Lawyer*, *54*(3), 921–963.

Chen, C. R., Steiner, T. L., & Whyte, A. M. (2006). Does stock option-based executive compensation induce risk-taking? An analysis of the banking industry. *Journal of Banking & Finance*, *30*(3), 915–945. https://doi.org/10.1016/j.jbankfin.2005.06.004

Cheung, Y. L. & Chan, Y. (2004). Corporate governance in Asia. *Asia Pacific Development Journal, 11*(2), 1–31.

Dadush, U., Lynn, R., Riordan, M., Dasgupta, D., & Johannes, R. (1998). What effect will East Asia's crisis have on developing countries? *PREM Notes No. 1*. Washington, DC: World Bank. Retrieved 30 April 2014, from https://openknowledge.worldbank.org/handle/10986/11558

Deelchand, T. & Padgett, C. (2009). The relationship between risk, capital and efficiency: Evidence from Japanese Cooperative Banks. *ICMA Centre Discussion Papers in Finance DP2009-12.* https://doi.org/10.2139/ssrn.1525423

Demsetz, R. S., & Strahan, P. E. (1997). Diversification, size, and risk at bank holding companies. *Journal of Money, Credit and Banking*, *29*, 300–313. https://doi.org/10.2307/2953695

Demsetz, R. S., Saidenberg, M. R., & Strahan, P. E. (1997). Agency problem and risk taking at banks. *Working paper no. 19*, Federal Reserve Bank of New York.

Dionne, G., & Triki, T. (2005). Risk management and corporate governance: The importance of independence and financial knowledge for the board and the audit committee, *HEC Montreal Working Paper No. 05-03.* Available at SSRN: https://ssrn.com/abstract=730743 or https://doi.org/10.2139/ssrn.730743

Eisenberg, T., Sundgren, S., & Wells, M. T. (1998). Larger board size and decreasing firm value in small firms. *Journal of Financial Economics*, *48*(1), 35–54. https://doi.org/10.1016/S0304-405X(98)00003-8

Fama, E. (1980). Agency problems and the theory of the firm. *Journal of Political Economy*, *88*(2), 288–307. https://doi.org/10.1086/260866

Fama, E., & Jensen, M. (1983). Separation of ownership and control. *Journal of Law and Economics*, *26*, 301–325. https://doi.org/10.1086/467037

Furlong, F., & Kwan, S. (2005). *Market-to-book, charter value and bank risk-taking: A recent perspective.* San Francisco: Research Department, Federal Reserve Bank of San Francisco. Retrieved from https://www.bis.org/bcbs/events/rtf05Kwan.pdf

Gujarati, D. (2004). *Basics econometrics* (4th ed.). New York: The McGraw-Hill Companies.

Haniffa, R., & Hudaib, M. (2006). Corporate governance structure and performance of Malaysian listed companies. *Journal of Business Finance & Accounting*, *33*(7–8), 1034–-1062. https://doi.org/10.1111/j.1468-5957.2006.00594.x

Hermalin, B. E., & Weisbach, M. S. (2003). Boards of directors as an endogeneously determined institution: A survey of the economic literature. *Economic Policy Review, 9*(1), 7–26.

Htay, S. N., & Rashid, H. M. (2011). Corporate governance and risk management information disclosure in Malaysian listed banks: Panel data analysis. *International Review of Business Research Papers*, *7*, 159–176.

Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *The Journal of Finance, 48*(3), 831–880. https://doi.org/10.1111/j.1540-6261.1993.tb04022.x

Keeley, M. (1990). Deposit insurance, risk and market power in banking. *The American Economic Review*, *80*(5), 1183–1200.

Khan, H. (1999). Corporate governance of family business in Asia: What's right and what's wrong? *The World Bank Working Paper No. 13*, World Bank.

Kochubey, T., & Kowalczyk, D. (2014). *The relationship between capital, liquidity and risk in commercial banks.* Praha: Praha Centre for Economic Research and Graduate Education.

Krugman, P. (1998, 7 September). *Saving Asia: It's time to get radical the IMF plan not only has fialed to reviview Asia's troubled economies but has worsened the situation. It's now time for some painful medicine.* Retrieved 15 May 2014, from http://www.money.cnn.com/magazines/fortune/forture_archive/1998/09/07/247884/

Leaven, L., & Levine, R. (2007). *Corporate governance, regulation, and bank risk taking*. Rhode Island: Brown University.

Lee, S. W. (2008). Ownership structure, regulation, and bank risk-taking: Evidence from Korean banking industry. *Journal of Investment Management and Financial Innovations*, *5*(4), 70–74.

Lipton, M., & Lorsch, J. W. (1992). A modest proposal for improved corporate governance. *Business Lawyer*, *48*(1), 59–77.

Magalhaes, R., Gutiérrez U. M., & Tribo, J. A. (2010). *Banks' ownership structure, risk and performance.* Available at SSRN: https://ssrn.com/abstract=1102390. https://doi.org/10.2139/ssrn.1102390

Marco, T. G., & Fernandez, M. D. (2003). *Risk-taking behaviour and ownership in the banking industry: The Spanish evidence.* Pampalona: Public University of Navarre.

McConnell, J. J., & Servaes, H. (1990). Additional evidence on equity ownership and corporate value. *Journal of Financial Economics*, *27*(2), 595-612. https://doi.org/10.1016/0304-405X(90)90069-C

Mishkin, F. S. (1999). Financial consolidation: Dangers and opportunities. *Journal of Finance and Banking*, *23*(2–4), 675–691. https://doi.org/10.1016/S0378-4266(98)00084-3

Moussa, M. A. (2015). The relationship between capital and bank risk: Evidence from Tunisia. *International Journal of Economics and Finance, 7*(4), 223–232. https://doi.org/10.5539/ijef.v7n4p223

Paligorova, T. (2010). *Corporate risk taking and ownership structure*. Ontario: Bank of Canada.

Pathan, S. (2009). Strong boards, CEO power and bank risk-taking. *Journal of Banking & Finance*, *33*(7), 1340–1350. https://doi.org/10.1016/j.jbankfin.2009.02.001

Rachdi, H., & Ameur, I. G. (2011). Board characteristics, performance and risk taking behaviour in Tunisian banks. *International Journal of Business and Management*, *6*(6), 88–97. https://doi.org/10.5539/ijbm.v6n6p88

Rashid, A., Zoysa, A. D., Lodh, S., & Rudkin, K. (2010). Board composition and firm performance: Evidence from Bangladesh. *Australasian Accounting Business and Finance Journal*, *4*(1), 76–95.

Riewsathirathorn, P., Jumroenvong, S., & Jiraporn, P. (2011). *The impact of ownership concentration on bank performance and risk-taking: Evidence from East Asia*. Bangkok: Thammasat University Bangkok.

Saunders, A., Strock, E., & Travlos, N. G. (1990). Ownership structure, deregulation, and bank risk-taking. *The Journal of Finance*, *45*(2), 643–654. https://doi.org/10.1111/j.1540-6261.1990.tb03709.x

Securities Commission Malaysia. (2012). *Malaysian code on corporate governance 2012*. Kuala Lumpur: Securities Commission Malaysia.

Shleifer, A., & Vishny, R. (1986). Large shareholders and corporate control. *Journal of Political Economy*, *94*(3), 461–488. https://doi.org/10.1086/261385

Sullivan, J. O., & Hassan, M. K. (2012). *The relationship between board characteristics and risk-taking: Evidence from bank holding companies*. New Orleans: Southern University at New Orleans.

Takatoshi, I., & Yuko, H. (2007). Bank restructuring in Asia: Crisis management in the aftermath of the Asian finanacial crisis and prospects for crisis prevention in Malaysia. *The RIETI Discussion Paper Series 07-E-039,* The Research Institute of Economy, Trade and Industry, Japan.

Tarraf, H., & Majeske, K. (2010). *Impact of risk taking on bank financial performance during 2008 financial crisis*. Oakland: Oakland University.

Yermack, D. (1996). Higher market valuation of companies with a small board of directors. *Journal of Financial Economics*, *40*(2), 185–211. https://doi.org/10.1016/0304-405X(95)00844-5

Zulkafli, A. H., Abdul Samad, M. F., & Ismail, M. I. (2005). *Corporate governance in Malaysia*. Kuala Lumpur: University of Malaya.

APPENDIX A

Regression model for total risk

Variable	Model (a)			Model (b)		
	POLS	Fixed Effect	Random Effect	POLS	Fixed Effect	Random Effect
Board size	0.005 (0.004)	0.010*** (0.004)	0.005 (0.004)	0.006 (0.006)	0.010** (0.004)	0.006 (0.006)
Independent directors	0.004 (0.005)	0.005 (0.005)	0.004 (0.005)	0.004 (0.002)	0.005 (0.004)	0.004* (0.002)
Ownership concentration	0.002 (0.003)	0.039*** (0.009)	0.002 (0.003)	−0.004 (0.017)	0.055** (0.018)	−0.004 (0.017)
Ownership concentration^2	–	–	–	0.006 (0.017)	−0.012 (0.012)	0.006 (0.017)
Bank size	0.002*** (0.001)	0.010*** (0.001)	0.002** (0.001)	0.002** (0.001)	0.010*** (0.001)	0.002*** (0.001)
Charter value	−0.059*** (0.012)	−0.046*** (0.014)	−0.059*** (0.012)	−0.059*** (0.012)	−0.045** (0.014)	−0.059*** (0.012)
Bank capital	−0.075** (0.030)	−0.114*** (0.028)	−0.075** (0.030)	−0.077** (0.031)	−0.111*** (0.014)	−0.077** (0.031)
Frequency of trading	2.409*** (0.792)	4.240*** (0.979)	2.409*** (0.792)	2.605*** (0.393)	4.360*** (0.459)	2.605*** (0.393)
Constant	0.090*** (0.140)	0.129*** (0.017)	0.090*** (0.140)	0.091*** (0.013)	0.124*** (0.022)	0.091*** (0.013)
Overall R^2	0.487	0.332	0.487	0.488	0.324	0.488
F-test	11.92	16.09	83.05***	10.34***	13.97***	82.74***
F-test (POLS vs. FEM)		7.07**			7.00***	
BP LM test		0.00			0.02	
Hausman test		48.18***			34.73***	

Notes: Model (a) estimates the direct effect of ownership concentration and Model (b) estimates the non-linear relationship of ownership concentration.
*, ** and *** denote statistical significance at 10%, 5% and 1% levels, respectively. Robust standard error is stated in parenthesis.

APPENDIX B

Regression model for market risk

Variable	Model (a)			Model (b)		
	POLS	Fixed Effect	Random Effect	POLS	Fixed Effect	Random Effect
Board size	−0.001 (0.002)	0.000 (0.003)	−0.001 (0.002)	−0.001 (0.003)	0.000 (0.002)	−0.000 (0.003)
Independent directors	−0.003 (0.003)	0.001 (0.004)	−0.003 (0.003)	−0.003 (0.004)	0.001 (0.003)	−0.003 (0.004)
Ownership concentration	0.002 (0.002)	0.001 (0.007)	0.002 (0.002)	−0.004 (0.006)	0.006 (0.020)	−0.004 (0.006)
Ownership concentration^2	–	–	–	0.006 (0.006)	−0.003 (0.016)	0.006 (0.006)
Bank size	0.001*** (0.001)	0.001 (0.001)	0.001*** (0.001)	0.001** (0.001)	0.001 (0.002)	0.001*** (0.001)
Charter value	−0.019** (0.007)	−0.026** (0.011)	−0.019** (0.007)	−0.018** (0.006)	−0.026** (0.009)	−0.018*** (0.006)
Bank capital	−0.007 (0.180)	−0.007 (0.021)	−0.007 (0.018)	−0.009 (0.018)	−0.007 (0.020)	−0.009 (0.018)
Frequency of trading	−0.076 (0.477)	0.046 (0.728)	−0.076 (0.477)	0.126 (0.248)	0.080 (0.393)	0.126 (0.248)
Constant	−0.029*** (0.008)	−0.029** (0.013)	−0.029*** (0.008)	−0.028** (0.010)	−0.031 (0.022)	−0.028 (0.010)
Overall R^2	0.299	0.260	0.299	0.302	0.260	0.302
F-test	5.36***	1.62	38.90***	4.71***	1.40	37.65***
F-test (POLS vs. FEM)		0.64			0.58	
BP LM test		4.05			1.52	
Hausman test		1.52			3.81	

Notes: Model (a) estimates the direct effect of ownership concentration and Model (b) estimates the non-linear relationship of ownership concentration.
*, ** and *** denote statistical significance at 10%, 5% and 1% levels, respectively. Robust standard error is stated in parenthesis.

APPENDIX C

Regression model for idiosyncratic risk

Variable	Model (a)			Model (b)		
	POLS	Fixed Effect	Random Effect	POLS	Fixed Effect	Random Effect
Board size	0.031 (0.115)	0.147 (0.108)	0.031 (0.115)	0.061 (0.171)	0.130 (0.112)	0.061 (0.171)
Independent directors	−0.020 (0.153)	0.181 (0.146)	−0.020 (0.153)	−0.056 (0.140)	0.166* (0.083)	−0.056 (0.140)
Ownership concentration	0.044 (0.103)	0.434 (0.276)	0.044 (0.103)	−1.829** (0.649)	−0.944 (0.829)	−1.829*** (0.649)
Ownership concentration^2				1.824** (0.648)	1.041 (0.671)	1.824*** (0.648)
Bank size	−0.006 (0.027)	0.065 (0.044)	−0.006 (0.027)	−0.002 (0.024)	0.073 (0.061)	−0.002 (0.024)
Charter value	0.544 (0.380)	0.309 (0.434)	0.544 (0.380)	0.420 (0.312)	0.230 (0.474)	0.420 (0.312)
Bank capital	−1.880** (0.916)	−1.054 (0.850)	−1.880** (0.916)	−2.408* (1.206)	−1.289 (1.038)	−2.408** (1.206)
Frequency of trading	−4.333 (24.285)	52.298* (30.095)	−4.333 (24.285)	59.487** (27.020)	42.043* (19.270)	59.487** (27.020)
Constant	−0.125 (0.429)	−1.547*** (0.523)	−0.125 (0.429)	0.153 (0.782)	−1.067** (0.406)	0.153 (0.782)
Overall R^2	0.246	0.013	0.246	0.246	0.088	0.246
F-test	3.65***	3.10***	29.01***	3.56***	2.93***	28.45***
F-test (POLS vs. FEM)		6.99**			4.09***	
BP LM test		40.65***			4.30***	
Hausman test		16.86***			27.17***	

Notes: Model (a) estimates the direct effect of ownership concentration and Model (b) estimates the non-linear relationship of ownership concentration.
*, ** and *** denote statistical significance at 10%, 5% and 1% levels, respectively. Robust standard error is stated in parenthesis.

Asian Academy of Management Journal of Accounting and Finance

AAMJAF Vol. 13, No. 2, 27–44, 2017

NEW PERSPECTIVE ON THE 'NET ERRORS AND OMISSIONS' IN BALANCE OF PAYMENT ACCOUNTS: AN EMPIRICAL STUDY IN AUSTRALIA

Tang Tuck Cheong

Department of Economics, Faculty of Economics & Administration
University of Malaya, 50603 Kuala Lumpur, Malaysia

E-mail: tangtuckcheong@um.edu.my

ABSTRACT

This study explores the macroeconomic determinants of the 'net errors and omissions' behaviour in balance of payment accounts. Two empirical equations are being estimated as suggested by the balance of payments constraint, and income-expenditure approach, respectively. This study finds that GDP, interest rate, and exchange rate are the important factors explaining the Australian 'net errors and omissions'. Causality tests have recognized the possible transmission channels. This study can be considered a new perspective in this topic and reference for further research.

Keywords: Australia, balance of payment, balancing item, causality, net errors and omissions

INTRODUCTION

New publication on balance of payments (BoP) statistics by the local government authorities is crucial for practitioners and academic economists for analysing and forecasting the country's economic performance, and to formulate economic policy including monetary and foreign exchange policy. Net 'errors and omissions' (EO) is one of the indicators that can be utilised to validate the quality or reliability of the BoP statistics. More technically, 'errors' refer to the

Publication date: 28 February 2018

To cite this article: Tang, T. C. (2017). New perspective on the 'net error and ommision' in balance of payment accounts: An empirical study in Australia. *Asian Academy of Management Journal of Accounting and Finance, 13*(2), 27–44. https://doi.org/10.21315/aamjaf2017.13.2.2

To link to this article: https://doi.org/10.21315/aamjaf2017.13.2.2

transactions are recorded incorrectly while, the 'omissions' are the transactions are not recorded at all (Fausten & Brooks, 1996, p. 1303). As printed in the IMF Balance of Payments Manual,[1] 'errors and omissions' is considered 'too big' if it exceeds 5% of the sum of gross merchandise imports and exports. According to Fausten and Brooks, "…balance of payments statistics, and their reliability, are matters of public interest. Their importance in the public and policy arena is, *ipso facto* transmitted to the balancing item (EO) because that statistic is generated by the factual and systemic imperfections, the errors and omissions, that permeate the balance of payments statistics" (Fausten & Brooks, 1996, p. 1303). Therefore, the size of the 'errors' and 'omissions' does matter for the use and interpretation of economic and financial statistics, where the BoP contributes a base.

Ideally, the total recorded debit does always equal the total recorded credit of a country's balance of payments accounts. But, it is always not the case in practice that the BoP accounts are subjected to the 'adding up' problem i.e. both the total recorded debit and credit are not recorded with the same monetary amounts. In this regards, a numeric value of EO is technically added to equalise both the total recorded debit and credit columns—it is just the difference between total recorded credit transactions and total recorded debit transactions per time period. A positive EO may indicate the under-recording of credits (capital inflows, exports of goods and services or other current account receivables) or the overstating of debits (capital outflows, imports of goods and services or other current account payables), or both. Meanwhile, EO is in negative if the debits are under-recorded and/or overstating of credits, see (ABS, section 2.14).[2] If the EO is predominantly in one direction, this suggests that errors and omissions are occurring systematically rather than randomly. In fact, the "leads and lags" in trade may have been the dominant source of recording errors—with the progressive dismantling of exchange controls and financial liberalization and securitization, "hot money" flows and "off-balance-sheet" transactions are likely to have assumed increasing importance as determinants of errors and omissions in the balance of payments records (Tang & Fausten, 2012, p. 235).

Tombazos (2003) has made a 'strong' view that data of EO that incorporates excessively a dynamically asymmetric concentration of revisions and are therefore unsuitable for statistical analysis. EO is a potential research topic because of its policy implications, especially more works on EO in the recent. In fact, EO contains 'hidden' information for the markets i.e. goods and services, and financial markets. Blomberg, Forss and Karlsson's (2003) study relate the currency deregulation and the large expansion in the financial flows to

EO.[3] By the same token, Vukšić (2009) finds that unreported income from tourists can be 'captured' by EO.[4] According to Duffy and Renton (1971, p. 451), there is very little knowledge about the sources of errors in the balance of payments accounts. Indeed, study on the influences of economic variables on EO is limited, and it has been ignored by many researchers on the topic. The economic variables under examination are for examples, monetary balances (Duffy & Renton, 1971), exchange rate (Duffy & Renton, 1971; Fausten & Brooks, 1996), exchange rate volatility (Tang, 2005), interest differential (Duffy & Renton, 1971), and economic openness (Fausten & Brooks, 1996; Tang, 2006a; Lin & Wang, 2009). These variables are being considered as *ad hoc* because they are no rigorous theoritical basis or systematically derived from theory. It inspires this study.

In this context, the association between these *ad hoc* variables and EO may not reveal the true structural relationship as informed by economic theory. And, positive findings about the EO determination is plausible. This is the key concern this study needs to contend with. Clearly, the conventional macroeconomic determinants of current account and financial account of BoP, undoubtedly may explain the behaviour of the EO from the BoP theory. This study is motivated by a need to explore the macroeconomic variables on the determination of EO behaviour in BoP. Hence, this study explores the structural relationships between a set of macroeconomic variables and EO from BoP constraint and open economy macro equilibrium (see, Tang & Fausten, 2012) with an Asia Pacific country, Australia as case study.

Figure 1 is about that the 'emotions' of the EO in the Australian BoP accounts over the past decades, 1960–2010. The reported EO values are small or less volatile in between 1960s, and early 1970s. It is noted that Australia introduced the Australian Dollar pegged to U.S. Dollar from 1946 to 1971 under the Bretton Woods system, until September 1974 and the trade weighted index took place until November 1976. Small volumes of international transactions, especially from the financial account in the early 1970s may explain the small 'errors' and omissions'. However, substantial negative EO is occurred in late 1980s, in which the Australian exchange system is under managed floating from December 1983 to present. In 1990s until 2010, the EO values are more volatile, but in a predictable pattern (with a given range). Of course, other fundamental and non-fundamental factors as described early in the literature review are correlated with the 'emotions' of EO.

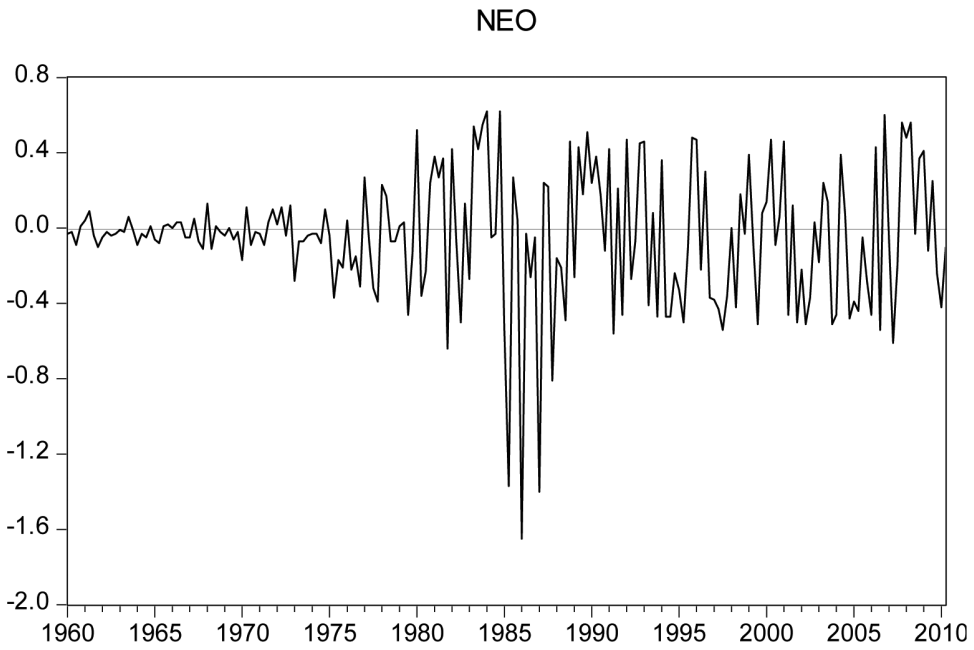

Figure 1. Plot of the Australian 'Net EO' for the period 1960Q1–2010Q2 (in A$ billions), OECD main economic indicators

LITERATURE REVIEW

Literature survey shows that study on EO or balancing items[5] is relatively few. Among the authors are Duffy, Renton, Fausten, Brooks, Pickett, Tombazos, Lin, Wang, Blomberg, Forss, Karlsson, Vukšić, and Tang. Their findings are mixture. A seminal work is Duffy and Renton (1971) they have explored empirically the balancing item behaviour of U.K. Major 'errors' (and omissions) have been identified by the principal components of the BoP accounts, and by some determinants of unidentified monetary flows. The 'explanators' are exports and re-exports of goods, imports of goods, net total invisibles, net private investment abroad and in the U.K., the net change in external Sterling liabilities, miscellaneous capital, the overall monetary balances, spot exchange rate, interest differential, and one-quarter lagged balancing item. The regression estimates show that the major errors are explained by the principle components of BoP for 1958–1976. In addition, U.K.–U.S. covered interest rate differential does not appear to be 'significantly' in explaining the balancing item. And, the exchange rate has an implausible sign. The lagged variable of balancing item contributes significantly revealing that the U.K.'s 'errors and omissions' arises from timing errors in the recording of transactions.[6]

It is interesting to acknowledge that this research topic is in vacuum for a quarter of century after Duffy and Renton (1971). In 1996, Fausten and Brooks have studied the Australian balancing item of BoP with both descriptive and data-driven approaches. The variability of the balancing item of Australia, Germany, Japan, U.K. and U.S. can be understand from the time pattern of institutional changes that results a gradual secular shift from current transactions (leads and lags) to capital transactions (hot money) in response to the liberalisation throughout the 1970s of world financial markets, together with deregulation of Australian financial markets in the mid-1980s. Other qualitative factor is the country-specific traits and the particular timing of financial deregulation in Australia (Fausten & Brooks, 1996, p. 1304). Of the data-driven approach, the behaviour of balancing item is potentially being explained by the gross transactions flows of the principle components of BoP. It is similar to Duffy. The components are merchandise trade, services, income payments, unrequited transfers, general government, Reserve Bank, direct investment, and portfolio investment. The regression results show the current account variables have a role to play in determining the balancing item for the quarterly observations between 1959 and 1992. Also, the capital (or financial) account variables are important drivers. They find that recording mistakes are not a major source of the balancing item. Also, the exchange rate and economic openness do not explain the Australian balancing item.

Few years later, Tombazos (2003) commented Fausten and Brook's (1996) study with a model of the process of revisions of BoP data. He concludes dynamically inconsistent time series of the balancing item, such as that has been employed by Fausten and Brooks are bound to generate an artificial impression that it follows an 'explosive' time trend, therefore unsuitable for statistical analysis. Using BoP statistics revisions, Fausten and Pickett (2004) re-examine the 'drivers' of the Australian balancing item behaviour. They find only limited evidence of convergence of measured to true magnitudes of cross-border transactions. Empirical results show that there is robust evidence of structural instability of the balancing item, and the financial sector transactions appear increasingly to constitute the major source of misreporting of balance of payments outcomes.[7]

Following Fausten and Brooks (1996), Tang (2005) has examined the influence of exchange rate volatility on the balancing item in Japan. Subset VAR (vector autoregression) method, Granger non-causality test, impulse responses function, and variance decomposition show that the finding is positive. In addition, Tang (2006a) has empirically re-investigated the Japanese balancing item behaviour by considering economic openness. Applying the similar methods, his results support the hypothesis that economic openness does influence Japan's balancing item. Tang (2006b) also tests the first differenced lagged balancing

item along a set of principle components of BoP as explanatory variables to the balancing item behaviour for Japan. The services credit, services debit, income credit, portfolio investment assets, and liability do solely Granger-cause the variation of balancing item. The data-driven regression supports the components accounts as well as the timing errors the main sources of statistical discrepancy for the balance of payments accounts. Lin and Wang (2009) have extended the previous studies by examining the role of timing errors, capital flows, and economic openness on the balancing item for four countries, namely Norway, Sweden, the Philippines, and South Africa.[8] The estimated multiple regressions show that the factors are different among the four countries that trade openness for Norway, seasonal factor for Sweden, all of the factors for South Africa (except for timing errors), and none for the Philippines. The timing errors fail to explain the balancing item behaviour. Other EO studies are not reviewed here because they looks at the different aspects, i.e. sustainability and non-linearity.

ANALYTICAL FRAMEWORK

This section proposes two empirical equations (structural equations) for modelling EO behaviour. They are theoretically derived from the BoP constraint and the open economy macro equilibrium (viz. income-expenditure approach), respectively. Following the approach used by Tang and Fausten (2012): in principle, the BoP constraint dictates that the *ex post* BoP identity is given by:

$$\text{BoP} = \text{CA} + \text{FA} \equiv 0 \tag{1}$$

where current account (CA) is current account, and FA is financial account which in conformity with current nomenclature (i.e. $\text{FA} \equiv \text{KA} + \Delta\text{IR}$). Both accounts are the true balances of transaction flows on current and financial accounts. Equation (1) is not purely a double entry bookkeeping principle because it does explain the relevant economic behaviour between CA and FA balances, see Fausten (1989–1990). For instance, CA imbalances can be financed either in private capital markets (KA) or by official reserve flows (ΔIR). Any attempt by the authorities to build up their net foreign asset holdings requires commensurate current account surpluses unless they acquire those foreign assets from private domestic holdings.

In Fausten and Pickett (2004, p. 111), BoP accounts report the measured quantities.

$$\widehat{CA} + \widehat{FA} \equiv 0 \tag{2}$$

where the '^' denotes measured quantities. Solving Equations (1) and (2) simultaneously for EO yields Equation (3).

$$EO \equiv (CA - \widehat{CA}) + (FA - \widehat{FA}) = EO_{CA} + EO_{FA} = \Sigma_i \varepsilon_i + \Sigma_i \nu_i \quad (3)$$

The EO is composed of the sum of discrepancies between true and measured transactions balances on current CA and FA. Either current EO_{CA} or financial accounts EO_{FA} or both simultaneously contribute to the total EO. The discrepancies may consist of systematic errors (ε) and of unsystematic errors (ν). For simplicity, they assume that unsystematic errors are independently and identically distributed with zero mean and constant variance so that the EO represents the systematic errors (Fausten & Pickett, 2004, p. 111).

BoP Constraint

Equation (1) captures the BoP constraint framework. Assuming (in practice) the true values of CA and FA are unknown. They are only available the reported values from the BoP statistics (denoted with '^'), $CA \equiv \widehat{CA} + EO_{CA,}$ and $FA \equiv \widehat{FA} + EO_{FA}$. Re-arranging Equation (2) for EO yields

$$EO = -\widehat{CA} - \widehat{FA} \quad (4)$$

The values of EO are assumed in positive sign indicating under-recording of credits or the overstating of debits, or both. The current account balance is CA = X − M (where X is exports of goods and services, and M is imports). The financial account balance is FA = DI + PI + OI + ΔIR (where DI is net direct investment flows, PI is net portfolio flows, OI is other investment flows, and ΔIR is change in reserve asset holdings). Both balances are in deficits.

Builds on the composite nature of the component balances, the deficits of both current account −CA and financial account −FA are offset by a positive value of EO. The BoP constraint suggests that EO can be explained by a set of behavioural variables that determine the CA and FA. The relevant behavioural relationships that underlie the determination of CA and FA accounts are:

$$EO = -\widehat{CA(.)} - FA(.)$$

$$EO = -\widehat{CA}(y^{(-)}, e^{(-)}, y^{*(+)}) - \widehat{FA}(r^{(+)}, r^{*(-)}) \quad (5)$$

where y is domestic output or GDP; e is nominal exchange rate expressed by unit of foreign exchange per one unit of local exchange; The foreign income is denoted as y^* ; and r and r^* represent domestic and foreign interest rates, respectively.

Standard economic theory states that the current account is positively associated with exchange rate (e), and foreign income (y^*), while the domestic income (y) has negative effect. The financial account balance (FA) is positively

explained by domestic interest rates (r), but negatively related to foreign interest rates (r^*). It summarizes that, $\frac{dEO}{dy} = -\frac{d\widehat{CA}}{dy} > 0$, $\frac{dEO}{de} = -\frac{d\widehat{CA}}{de} > 0$, $\frac{dEO}{dy^*} = -\frac{d\widehat{CA}}{dy^*} < 0$, $\frac{dEO}{dr} = -\frac{d\widehat{FA}}{dr} < 0$, and $\frac{dEO}{dr^*} = \frac{d\widehat{FA}}{dr^*} > 0$. Both y, e and r^* variables are expected to have a positive impact on a country's EO by either current account or financial account. The y^* and r have negative impact on EO.

Open Economy Macro Equilibrium: Income-Expenditure Approach

An alternative approach to derive the EO equation is by the general equilibrium perspective of two-sector open economy, namely income-expenditure approach. It 'complements' the former approach which is essentially based on accounting relationships by incorporating relevant structural relationships. From national income-expenditure approach the CA balance (CA) is equivalent to the national saving (S^n) minus investment (I) balance

$$\text{CA} = S^n - I \tag{6}$$

In a closed economy, total national savings is fully utilised to domestic investment. But, in an open economy, national saving can be invested at home or abroad that the relationship between savings and investment can be rewritten as $S^n = I^d + I^f$ where $\text{I}^\text{f} \equiv \text{CA} = -\text{FA}$. Foreign investment ($I^f$) is reflected in the acquisition of foreign assets (FA < 0) and commensurate transfers of domestic real resources to users abroad (CA > 0) (see, Fausten, 1989–90). The two main component accounts (CA and FA) of the BoP enter into the relevant market clearing conditions of an open economy. The CA balance represents the excess supply of domestic output (real sector) while the balance on FA reflects the excess demand for assets (financial sector) (see Tang & Fausten, 2012, p. 236).

The structure of this interdependency is conceptually informed by the recognition that any economic disturbance and its response are not restricted to a particular subset of markets (Tang & Fausten, 2012, p. 230). All transactions in goods and services are mediated by financial instruments of one kind or another. In view of the interdependence between the CA and FA accounts, Equation (4) in Fausten and Pickett (2004, p.111) can be rewritten as $S^n - I = \text{CA} \equiv \widehat{CA} + \text{EO} = -\text{FA} \equiv -(\widehat{FA} + \text{EO})$. They have conceptually introduced some macroeconomic structure such as savings-investment balance into the EO determination, but no further empirical work. They have raised a concern that "Since that type of reduced form does not discriminate between the alternative interpretations of the saving-investment balance it is unlikely to isolate the dominant source of E&O (errors and omissions)" (Fausten & Pickett, 2004, pp. 111−112). Accordingly, the

estimated parameters of S^n and I are not adequately explaining the 'emotions' of EO. At least, the so-called 'interpretations' issue can be handled by modelling the behaviour of $\widehat{S^n}(.)$ and $\widehat{I}(.)$ from the general equilibrium perspective i.e. income-expenditure approach, for example. Substituting Equation (6) onto Equation (4) yields $EO = -\widehat{S^n}(.) + \widehat{I}(.) - \widehat{FA}(.)$. The requirements in the goods market suggest that EO can be explained by a set of behavioural variables that determine national saying (S^n), private investment (I), and FA. The relevant behavioural relationships that underlie the determination of national saying, private investment, and financial account are depicted in Equation (7).

$$EO = -\widehat{S^n}(y(+), r(+)) + \widehat{I}(r(-)) - \widehat{FA}(r(+), r^*(-)) \quad (7)$$

Fundamental economic theory suggests that national saving (S^n) is positively explained by households' disposable income (y), and domestic interest rate (r). Meanwhile, domestic investment (I) is negatively related to domestic interest rate (r), and the financial account balance (FA) is positively explained by domestic interest rate (r), and negatively related to foreign interest rate (r^*). Their associations can be communicated as $\frac{dEO}{dy} = -\frac{d\widehat{S^n}}{dy} < 0$, $\frac{dEO}{dr} = -\frac{d\widehat{S^n}}{dr} = \frac{dI}{dr} = -\frac{d\widehat{FA}}{dr} < 0$, and $\frac{dEO}{dr^*} = -\frac{d\widehat{FA}}{dr^*} > 0$. Both y and r has negative impact on a country's 'net errors and omissions', while the r^* has positive sign.

EMPIRICAL ILLUSTRATION

This section reports the estimates of two EO equations with the Australian data including the graphical presentation of non-causality tests. The sample covers quarterly observations between 1960Q1 and 2010Q2. The core variables are described as follows.

i. *Net errors & omissions*, ln*EO*: The data are obtained from OECD Main Economic Indicators. It is reported in local currency A$ (in billions). Nominal values are converted into real term by GDP deflator. The 'ln' is natural logarithm (a constant value is added to ensure positive values).

ii. *Real GDP*, ln*y*: The data are directly collected from International Financial Statistics, IMF, GDP volume constant prices (A$, in billions).

iii. *Real interest rate*, *r*: It is the Australian long-term government bond yield (% p.a). Real interest rate is adjusted by domestic inflation rate. The data source is similar to (ii).

iv. *Real exchange rate*, ln*e*: It is quoted as US$ per A$. Nominal exchange rate is multiplied by a price ratio, Australia's GDP deflator per U.S.'s GDP deflator. The raw data are obtained from International Financial Statistics, IMF.

v. *Foreign real interest rate*, r^*: Same as calculation in (iii). The "foreign" interest rate is proxied by U.S. long-term government bond yield. Nominal values are converted into real terms by US inflation rate. The data are collected from the source as in ii.

vi. *Foreign real GDP*, lny^*: As noted in (v), the "foreign" is U.S. The data of US GDP volume constant prices are directly obtained from International Financial Statistics, IMF.

In the first place, Phillips and Perron (PP) unit root test (Phillips & Perron, 1988) suggest ln*EO* is stationary in level, *I*(0) as well as by the 'minimise ADF test' for structural break (i.e. 1984Q4). But, other variables are non-stationary, *I*(1) as informed by the PP test.[9] Since the dependent variable, ln*EO* is *I*(0), the Equations (5) and (7) are not in favour for cointegration testing while possible cointegrating relation(s) can be occurred among the variables such as growth equation (i.e. ln$y$- r-ln$e$) exchange rate equation (i.e. ln$e$ –ln$y$ –r –r^* – ln$y$ -lny^*), and so on, but they are not in the present interest on net errors and omissions, ln*EO*. Perhaps, first differed variables for stationary transformation will result information loss. Hence, OLS linear estimator (non-cointegration case) and multivariate Granger non-causality approach are employed for the data in level.

Table 1
Summary statistics for the Australian net errors & omissions, 1960Q1–2010Q2 (in A$ billions)

Mean	−0.05
Median	−0.04
Maximum	0.62
Minimum	−1.65
Standard Deviation	0.35
Skewness	−0.88
Kurtosis	6.02
Jarque-Bera (Probability)	102.36 (0.00)
Observations	202

Table 1 reports the summary statistics of the Australian EO over the past decades 1960–2010. On average, the Australian EO is reported in negative sign, −A$0.04 billions (median), which may conceptually suggest under-recording of debits and/or overstating of credits. The largest negative EO is in 1986Q1 with A$1.65 billions but, in 1984Q1 and Q4 largest positive EO are recorded around A$0.62 billions, respectively.

The OLS estimates with respect to the structural Equations (5) and (7) are tabulated in Tables (2) and (3), respectively. Equation (A) (or A') is full-sample. For robustness check, Equations (B1) (or B1') and (B2) (or B2') examine the role of progressive liberalisation of capital markets since 1989. The remaining Equations (C), (D) and (E) (or C', D' and E') are based on the sub-periods of different exchange rate regimes implemented by Australia's central bank. Of Equation (A) in Table 2, none of the independent variables supports the theory at the 10% level of significance, except for the constant term suggesting some potentially unidentified variables of EO that a constant value of EO that always exists in Australia's BoP accounts.

To recall, Equations (B1) and (B2) are established in order to recognise explicitly the rapid globalisation of the capital markets in the late-1980s and until the mid-1990s, domestic real interest rate (r) is statistically significant with 1.7 and −1.8. Under the managed floating system started from 6 December 1983 to present, the real exchange rate plays a significant role in determining EO that an appreciation of A$ (with increase of US$ per A$), worsens (increases) the Australian EO (Equation E). This finding is contrary to early study by Fausten and Brooks (1996) that exchange rate has no role in explaining the Australian balancing item. This empirical findings partially support the BoP constraint predication.

Alternative structural EO equation from the income-expenditure approach only considers the role of y, r, and r^*. None of the variables is statistically significant at 10% level, expect for the constant term (equation A'). It is also the case for other Equations (C', D' and E') those takes the exchange rate regimes into account. The progressive globalisation (liberalisation) of capital markets started in late 1980s changes this observation that the domestic income ($\ln y$) has a negative impact on EO as showed in Equation (B2'), −0.129.

Table 2
Regression results of Equation (5): BoP constraint

Regression:	A	B1	B2	C	D	E
ln*y*	0.132	0.140	−0.561	−0.172	−0.694	−0.796
	(0.460)	(0.636)	(0.303)	(0.686)	(0.739)	(0.173)
ln*e*	0.000	0.260	0.523	−0.200	−1.759	1.034*
	(0.999)	(0.263)	(0.364)	(0.640)	(0.608)	(0.093)
ln*y**	−0.090	−0.257	0.425	0.249	−0.361	0.872
	(0.481)	(0.196)	(0.486)	(0.600)	(0.832)	(0.159)
r	0.793	1.665*	−1.760*	−1.229	5.138	−0.428
	(0.157)	(0.064)	(0.070)	(0.390)	(0.245)	(0.723)
*r**	−0.287	0.661	0.181	−0.394	−0.705	1.493
	(0.687)	(0.5147)	(0.885)	(0.838)	(0.711)	(0.489)
Constant	1.701***	3.126***	0.829	0.211	7.539	−2.100
	(0.000)	(0.000)	(0.765)	(0.916)	(0.470)	(0.435)
Adjusted R^2	−0.004	0.038	0.043	−0.065	−0.024	0.024
Sample period	1960Q1–2010Q2	1960Q1–1988Q4	1989Q1–2010Q2	1960Q1–1974Q3	1976Q4–1983Q4	1983Q4–2010Q2

Notes: Equation (A) is on full sample period; Equations (B1) and (B2) capture the progressive liberalisation of capital markets since 1989, for pre-liberalisation and post-liberalisation, respectively; Equation (C) is designed for sub-period of A$ first pegged to US$ until September 1974; Equation (D) considers the period exchange rate moves within a limited band against the trade weighted index (November 1976–December 1983); Equation (E) is where the exchange rate under managed floating from 6 December 1983 to present. The sub-period of trade weighted index is too short from September 1974 until November 1976, and ignored from analysis. The value reported in ( ) is the *p*-value. ***, ** and * denote significant at 1%, 5% and 10%, respectively.

Table 3
Regression results of Equation (7): Income-expenditure approach

Regression:	A'	B1'	B2'	C'	D'	E'
ln*y*	0.019	−0.048	−0.129*	0.015	−0.846	0.057
	(0.416)	(0.437)	(0.059)	(0.886)	(0.581)	(0.598)
r	0.590	0.455	−0.893	−0.060	3.427	0.831
	(0.253)	(0.570)	(0.225)	(0.952)	(0.284)	(0.432)
*r**	−0.483	−0.060	−1.142	0.487	0.606	−1.328
	(0.485)	(0.953)	(0.268)	(0.775)	(0.632)	(0.369)
Constant	1.470***	1.763***	2.366***	1.490***	5.582	1.279**
	(0.000)	(0.000)	(0.000)	(0.002)	(0.446)	(0.043)
Adjusted R^2	−0.001	−0.016	0.025	−0.053	0.014	−0.000
Sample period	1960Q1–2010Q2	1960Q1–1988Q4	1989Q1–2010Q2	1960Q1–1974Q3	1976Q4–1983Q4	1983Q4–2010Q2

Notes: Similar to the notes documented in Table 1.

Multivariate VAR Granger Non-Causality

The empirical investigation is extended to the Granger non-causality tests. Non-causality tests help to identify the possible linkages or transmission channels among the variables − in Granger's reading, "the X causes Y". According to Granger (1988, p. 200), the cause occurs before the effect, and the causal series contains special information about the series being caused that is not available in the other available series. A multivariate VAR(8) system is employed in which taking all variables into account, simultaneously i.e. ln*EO*, ln*y*, ln*e*, lny^*, r and r^*, and ln*EO*, ln*y*, r and r^* for the Equations (5) and (7), respectively.[10] For convenient, the findings of Granger non-causality are graphically illustrated in diagrams Figures 2 and 3 for the Equations (5) and (7), respectively.

From the causation patterns observed in Figure 2, they are direct and indirect causation from the macroeconomic variables to EO. Also, their directions of causality are reported in Table 4. The variables y, y^*, and e have directly caused the Australian EO. They (y^*, and e) and other variables r^* and r have indirect causal effect on EO through real sector (i.e. real GDP) and financial sector (i.e. domestic interest rates). Interestingly, the causality tests show that EO does Granger-cause the domestic real interest rate, r. It implies that the past values of EO have relevant information to understand (predict) the current Australia's interest rate movements.

Figure 3 exhibits the causal linkages among r^*, r, ln$y$, and ln*EO*. The Granger-causality results from the income-expenditure approach show only real GDP causes the Australian EO of balance of payment accounts. This appears contrary to the former approach (BoP constraint) that both domestic and foreign interest rates have indirect impact on EO. A causal linkage is found from real GDP to interest rate; and from foreign interest rate to the Australian interest rate.

The 'old' variables (from the past studies) such as monetary base, exchange rate (volatility), interest differential, economic openness, and the past EO in explaining the 'emotion' of EO, are complemented by two new variables − domestic real GDP (y), and foreign real GDP (y^*). The 'repeated' variables proposed are exchange rate (e), and domestic and foreign interest rates (r and r^*) in which the latter has been implicitly captured by interest differential. In general, the above findings offer a new perspective to the literature. For the two newly introduced variables, the OLS results do support domestic real GDP only based on the income-expenditure approach, but foreign income (real GDP) is statistically insignificant. Meanwhile, exchange rate, and domestic interest rate variables, to some extent are in line with the past studies. By the same token, the causality findings acknowledge the role of exchange rate employed in the past studies.

In fact, this study is the only work considers causality approach for identifying the transmission channels of EO - the identified channels are real interest rate and real GDP.

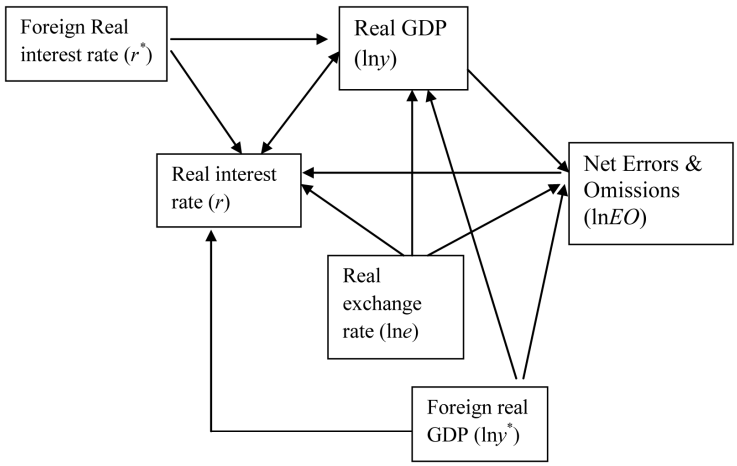

Figure 2. Granger Causality Test – BoP Constraint

Table 4
Summary of the Multivariate Granger Non-Causality Tests (Figure 2)

Direct causation	Indirect causation
Real GDP → EO	Foreign GDP → real GDP → EO
Foreign GDP → EO	Foreign GDP → real interest rate → real GDP → EO
Real exchange rate → EO	Foreign interest rate → real GDP → EO
	Foreign interest rate → real interest rate → real GDP → EO
	Real interest rate → real GDP → EO
	Real exchange rate → real GDP → EO
	Real exchange rate → real interest rate → real GDP → EO

Note: → stands for "does Granger-cause"

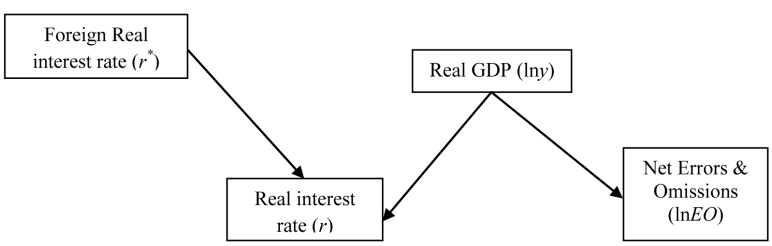

Figure 3. Granger Non-Causality Test – Income-Expenditure Approach

CONCLUDING REMARKS

This study explores the potential role of macroeconomic determinants on the 'net errors and omissions' (EO) behaviour. Two structural equations are systematically derived from the BoP constraint and open economy macro equilibrium (i.e. income-expenditure approach). The BoP constraint proposes that real GDP, exchange rate, interest rates, foreign GDP, and foreign interest rates as explanatory variables to EO. Meanwhile, the model derived from income-expenditure approach takes only real GDP, domestic interest rate, and foreign interest rate into consideration. The empirical results suggest that exchange rate and real interest rate are important determinants to Australia's EO from the BoP constraint approach, while only real GDP from the income-expenditure approach. The main findings of Granger non-causality tests are follows. Real GDP does cause the EO from both approaches. Foreign income, and exchange rate have either direct or indirect causation on EO, while domestic interest rate, and foreign interest rate also influence the EO indirectly. The past EO may be informative in predicting the interest rate (i.e. EO causes interest rate). It adds to the literature a variable has to been considered in modelling the interest rate.

Of the findings, this study is important from several aspects. Firstly, the potential role of macroeconomic influences on the 'emotions' of EO cannot be ignored for further study. The two EO equations proposed by this study are not *ad hoc* as the existing studies because they are derived with theoretical foundation. Secondly, findings from the Australian data offer new knowledge to the existing literature, and for policy implications such as in formulating the economic policy based on the quality of the BoP statistics. Finally, it supports that EO is not just a number in order to ratify the double entry bookkeeping principle, but a variable in predicting domestic interest rate.

A few of suggestions are outlined for future research. Firstly, the so-called portfolio balance approach of BoP theory can be explored, in which a "monetised" economy that takes both bond and money markets into account. Secondly, to extract the 'hidden' information of EO for better predication or policy modelling such as on other variables (i.e. interest rate) or phenomenon (i.e. unreported income from tourism). Thirdly, to apply these EO equations to other countries or global wise for generating more confirmative findings. Finally, other time series methods can be applied by researchers such as panel data approach.

NOTES

1. Accessed 5 October 2015 from http://www.imf.org/external/pubs/ft/bopman/bopman.pdf
2. Accessed 15 July 2013 from, http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/ 98382A262D7DFDDFCA25697E0018FDB0?opendocument
3. An article published by Sveriges Riksbank Economic Review (Blomberg et al., 2003) has documented that the EO has increased significantly for some years now, and an international comparison shows that the Swedish errors and omissions item is considerable. The article analysed the factors contributing to this item and discusses how it affects the interpretation of the balance of payments statistics and other economic statistics. Factors those have most probably contributed to the rapid increase in EO at the end of the 1980s and beginning of the 1990s are the currency deregulation and the large expansion in the financial flows in particular in the form of securities and short-term transactions that followed on from this.
4. A newsletter from Croatia, *Institut Za Javne Financije* (Vukšić, 2009) has evaluated the size of unreported income from foreign tourists using EO statistics. The large amounts of unrecorded accumulation of foreign cash from foreign tourist spending are largely related to shadow economy in tourism, i.e. to unreported – and therefore untaxed – income from foreign tourists. A relatively high correlation (0.95) is also illustrated between two variables with exception for 2001 which saw a fall of the EO value and a significant rise in tourism income provides a basis for some conclusions in the interpretation of the EO item in Croatia.
5. Some of the past studies have used the term *balancing item*, hence we use them interchangeably.
6. They (Duffy & Renton, 1971, p. 461) note that "…in a way that is meaningful from an economic point of view – for the "significant" and negative coefficient on the lagged first differences of the balancing item suggests that this item accounts for timing errors in the recording of transactions'.
7. They considered the statement made by International Monetary Fund that the global incidence of errors and omissions recognised by debtor countries but not by creditors (International Monetary Fund, 1987, p. 2). IMF also identified persistent overrecording of debits in the shipping and transportation accounts and in the reporting of official unrequited transfers. Hence, Fausten and Pickett (2004) include capital transfers, net direct investment flows, net portfolio flows, and net other investment flows as explanatory variables.
8. The sampled countries recorded more than 20% of the observations exceed the IMF's 5% criterion of 'smallness'. The explanatory variables are the lagged term of the balancing item, spot exchange rate
9. The computed tests statistics are not reported here but they are available from the author upon request.
10. The computed statistics of the Granger non-causality/block exogeneity tests are not reported here, but they are available upon request. Also, the conceptual framework of the tests is not illustrated here since it has been widely followed by researchers and well-documented in the literature. A lag structure of 8 is included onto VAR(*d*) system

by given a view that EO is a matter of timing (errors) phenomenon (Tang, 2006b). For the VAR system of ln*EO*, ln*y*, ln*e*, lny^*, r and r^*, the LR (sequential modified LR test statistic) suggests 8 lags, while 2 lags by FPE (Final prediction error), AIC (Akaike information criterion), and HQ (Hannan-Quinn information criterion). SC (Schwarz information criterion) suggests 1 lag. The AIC, FPE, and LR suggest 8 lags, while 1 lag by SC and HQ for the VAR system of ln*EO*, ln*y*, r and r^*.

REFERENCES

Blomberg, G., Forss, L., & Karlsson, I. (2003). Errors and omissions in the balance of payments statistics – a problem? *Sveriges Riksbank Economic Review, 2*, 41−50. http://www.riksbank.se/Upload/Dokument_riksbank/Kat_publicerat/PoV_sve/sv/2003_2.pdf

Duffy, M., & Renton, A. (1971). An analysis of the U.K. balancing item. *International Economic Review, 12*(3), 448−464. https://doi.org/10.2307/2525357

Fausten, D. K. (1989–1990). Current and capital account interdependence. *Journal of Post Keynesian Economics, 12*(2), 273−292. https://doi.org/10.1080/01603477.1989.11489798

Fausten, D. K., & Brooks, R. D. (1996). The balancing item in Australia's balance of payments accounts: an impressionistic view. *Applied Economics, 28*(10), 1303−1311. https://doi.org/10.1080/000368496327859

Fausten, D. K., & Pickett, B. (2004). 'Errors & omissions' in the reporting of Australia's cross-border transactions. *Australian Economic Paper, 43*(1), 101−115. https://doi.org/10.1111/j.1467-8454.2004.00219.x

Granger, C. W. (1988). Some recent developments in a concept of causality. *Journal of Econometrics, 39* (1-2), 199−211. https://doi.org/10.1016/0304-4076(88)90045-0

International Monetary Fund. (1987). *Report on the world current account discrepancy.* Washington, DC, September. Retrieved from https://www.imf.org/en/Publications/Books/Issues/2016/12/30/Report-on-the-World-Current-Account-Discrepancy-25

Lin, M.-y., & Wang, H.-h. (2009). What causes the volatility of the balancing item? *Economics Bulletin, 29*(4), 2749−2759. Retrieved from http://www.accessecon.com/Pubs/EB/2009/Volume29/EB-09-V29-I4-P28.pdf

Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika, 75*(2), 335−346. https://doi.org/10.1093/biomet/75.2.335

Tang, T. C. (2005). Does exchange rate volatility matter for the balancing item of balance of payments accounts in Japan? an empirical note. *Rivista Internazionale di Scienze Economiche e Commerciali* (Now known as *International Review of Economics - Journal of Civil Economy*), *52*(4), 581−590. Retrieved from http://repository.um.edu.my/40623/

Tang, T. C. (2006a). The influences of economics openness on Japan's balancing item: An empirical note. *Applied Economics Letters, 13*(1), 7−10. https://doi.org/10.1080/13504850500119146

Tang, T. C. (2006b). Japan's balancing item: do timing errors matters? *Applied Economics Letters, 13*(2), 81−87. https://doi.org/10.1080/13504850500378718

Tang, T. C., & Fausten, D. K. (2012). Current and capital account interdependence: an empirical test. *International Journal of Business and Society, 13*(3), 229−244. Retrieved from http://citeweb.info/20081689557

Tombazos, C. G. (2003). New light on the 'impressionistic view' of the balancing item in Australia's balance of payments accounts. *Applied Economics, 35*(12), 1369−1379. https://doi.org/10.1080/0003684032000129354

Vukšić, G. (2009, May). Croatian balance of payments: Implications of net errors and omissions for economic policy. *Institut Za Javne Financije - Newsletter, 41*, 1−5. Retrieved from http://www.ijf.hr/eng/newsletter/41.pdf

Asian Academy of Management Journal of Accounting and Finance

AAMJAF Vol. 13, No. 2, 45–68, 2017

FRAMING OF CLIMATE CHANGE IMPACTS AND USE OF MANAGEMENT ACCOUNTING PRACTICES

Jayanthi Kumarasiri[1]* and Christine Jubb[2]

[1]Faculty of Business and Law, Swinburne University of Technology, PO Box 218 Hawthorn VIC 3122 Australia
[2]Centre for Transformative Innovation, Faculty of Business and Law, Swinburne University of Technology, PO Box 218 Hawthorn VIC 3122 Australia

*Corresponding author: jkumarasiri@swin.edu.au

ABSTRACT

This study examines (i) how companies perceive climate change impacts in terms of opportunities or threats and the reasons for these perceptions, and (ii) use of management accounting practices to manage carbon emissions and the relationship between climate change perceptions and accounting use. The sample consists of Australian companies that participated in the Carbon Disclosure Project (CDP) 2009 survey. We find that how climate change impacts are framed (as threat or opportunity) influences the use of planning and target setting, performance measurement and incentivisation in managing emissions. However, in general, use of accounting practices in managing carbon emissions is limited.

Keywords: climate change, carbon emissions, management accounting, prospect theory

INTRODUCTION

Climate change issues are one of the major challenges faced by modern companies (Solomon, Solomon, Norton, & Joseph, 2011; Subramaniam, Wahyuni, Cooper, Leung, & Wines, 2015). Strategic decision-making on environmental issues brings many challenges to managers within these companies, especially due to the uncertainty and complexity surrounding these issues (Lee & Klassen, 2015). Although there is research in relation to management accounting practices

Publication date: 28 February 2018

To cite this article: Kumarasiri, J., & Jubb, C. (2017). Framing of climate change impacts and use of management accounting practices. *Asian Academy of Management Journal of Accounting and Finance, 13*(2), 45–68. https://doi.org/10.21315/aamjaf2017.13.2.3

To link to this article: https://doi.org/10.21315/aamjaf2017.13.2.3

that facilitate provision of environmental information for managers (Burritt, Schaltegger, & Zvezdov, 2011; Subramaniam et al., 2015), far less is known about accounting practices used in relation to environmental issues surrounding carbon emissions. Hartmann, Perego and Young (2013) argue that a disproportionate focus on examining carbon disclosures, the absence of academic debate from a management accounting and control perspective, together with few empirical studies, are responsible for a lack of clarity in this area. As such, we respond to calls stressing the importance of research that investigates management practices used by companies in mitigating carbon emission issues (Burritt et al., 2011; Milne & Grubnic, 2011).

We analyse company information reported through the Carbon Disclosure Project (CDP), a publicly available global database containing annual survey responses by companies about their carbon emissions and climate change-related perceptions and actions. Our purpose is to answer two research questions. First, how do companies frame climate change impacts – that is, how do they perceive climate change in terms of opportunities and/or threats and what are the reasons for these perceptions? Second, how do companies use accounting practices in managing their carbon emissions and what, if any, is the linkage between use of accounting practices and climate change perceptions?

Our first question is important because existing literature argues that the *extent* to which companies are aware of the impacts of climate change is an important precursor to action in terms of carbon emission management (Hoffmann, Sprengel, Ziegler, Kolb, & Abegg, 2009; Winn, Kirchgeorg, Griffiths, Linnenluecke, & Gunther, 2011). However, there has been little analysis of *how* companies frame or perceive climate change impacts, or of the possibilities that these perceptions create for stimulating action to manage carbon emissions. Furthermore, accounting research is yet to investigate whether the *type* of perception – as opportunity or threat – influences these actions. This is despite theories of decision-making under conditions of uncertainty, notably prospect theory, suggesting that perceptions of threat rather than opportunity have different consequences for action (Kahneman & Tversky, 1979; 2000).

Our second question is important because accounting practice can be intertwined inextricably with carbon emission management. Setting plans, selecting performance indicators and targets, measuring achievements and incentivising effort are traditional management accounting techniques that arguably will benefit companies' management of carbon emissions (Rietbergen, van Rheede, & Blok, 2015). Indeed, guides for developing organisational action plans to manage carbon emissions emphasise the setting of measurable goals and targets and consideration of incentives (Hoffmann et al., 2009). Yet there has been

little study of how organisations utilise these practices. Overall, much work is required to understand better the role that accounting can and does play in carbon emission management as well as factors that influence its use (Hopwood, 2009).

We seek to contribute by exploring accounting practices used in carbon emission management and how their adoption might be influenced by the framing of climate change impacts. To date, research that examines the relationship between internal and external environmental reporting has tended to be qualitative in nature. Researchers have argued that we need engagement with practice to understand the practice of environmental reporting (Adams & Larrinaga-Gonzalez, 2007; Bebbington, Larrinaga & Moneva, 2008; Lodhia & Jacobs, 2013; Wahyuni & Ratnatunga, 2015). This study provides empirical evidence in respect of this relationship.

UNCERTAINTY, MANAGING CARBON EMISSIONS AND ACCOUNTING PRACTICE

Stern (2007) identifies uncertainty as a central element in most aspects of climate change issues. Not only is there uncertainty about the nature and effects of carbon emissions, there is significant regulatory uncertainty (for example, relating to the politics and detail of pricing carbon). Australia has been particularly prone to political uncertainty surrounding climate change issues (Talberg, Hui, & Loynes, 2013).

Awareness of climate change opportunities and threats is important for overcoming the effects of uncertainty and for stimulating corporate action to manage carbon emissions (Hoffmann et al., 2009; Winn et al., 2011). Recent studies highlight pressures on companies to identify and manage climate change opportunities and threats (Subramaniam et al., 2015). Accounting practices have a productive role to play in activities to manage carbon emissions (Burritt et al., 2011), but little research examines how these practices are involved in plans or actions.

Research shows that companies using accounting practices embed environmental issues into organisational strategies and show improvements in their environmental performance (Perez, Ruiz, & Fenech, 2007; Henri & Journeault, 2010). These studies signal the importance of specific practices involving: (a) planning and target setting, (b) performance measurement, and (c) incentivisation. We explore perceptions of climate change in association with application of these management accounting practices in companies' carbon emission management efforts.

Findings are that the number of accounting practices involved with (a) planning and target setting; (b) performance measurement; and (c) incentivisation is associated with climate change perceptions of net threats (threats less opportunities), but not with carbon intensity sector or control variables. These results provide rare empirical evidence of the relationship between environmentally relevant internal accounting practices and emissions management. As such, we contribute to existing research on corporate climate change responses by providing insights into how managerial perceptions of climate change uncertainties influence the use of management accounting practices in carbon emissions management. An understanding of the above aspect can, in turn, provide managers and policy makers with insights into the mechanisms that stimulate climate change actions by organisations.

Factors that Could Influence Decision Framing

We review prior literature that discusses factors driving companies' environmental actions to develop a set of categories through which to analyse CDP responders' perceptions about climate change (Carbon Disclosure Project (CDP), 2009; Sprengel & Busch, 2011). Arising from this review, we identify four categories of issues, comprising:

1. Compliance: Compliance recognition;
2. Cost: Cost savings/ cost increases/ efficiency;
3. Customer: Customer demand/ customer needs/ new products, services and projects;
4. Reputation: Social responsibility/ social expectancy/ reputation

We use these four categories as the prism through which to measure the identification of threats as well as opportunities arising from regulatory, physical and other uncertainties of climate change.

Prospect Theory and Framing

Prospect theory, which is based on the concept of decision-making under uncertainty, suggests that how decisions are framed and understood leads to different decision outcomes (Kahneman & Tversky, 1979; 2000). If a decision is framed and understood in terms of gains, people tend to avoid risk (risk avoiders), whereas if it is framed as loss, people are more willing to take risk (risk takers). Thus, according to prospect theory, there is an asymmetry in how decision-makers perceive gains and losses of equal amount, with individuals weighting losses more heavily than gains. Although prospect theory focuses on decision-

making at an individual level, researchers have found that it can be applied to study decision-making at the organisational level (e.g. Bromiley, Miller & Rau (2001), Shimizu (2007) and Barberis (2013)).

Prospect theory has been used by researchers in accounting to examine the impact of the framing of bonus contracts on individual performance (Church, Libby, & Zhang, 2008; Hannan, Hoffman, & Moser, 2005) and the influence of performance standards on managers' willingness to pursue risky projects (Chow, Kohlmeyer, & Wu, 2007). Consistent with prospect theory, Widener (2007) found that the extent to which a company faces strategic threats (referred to as 'risk' in her study) influences the importance placed on accounting. Dutton and Jackson (1987) and Jackson and Dutton (1988) studied the link between categorisation of strategic issues and organisational actions. They found that strategic decision-makers are more sensitive to and react more quickly when decisions are framed as "threats" rather than "opportunities". Jackson and Dutton (1988) argued that this "threat-bias" is consistent with the prediction under prospect theory that individuals react quickly to prevent losses compared to realising gains. Moreover, studies which examine Dutton and Jackson's (1987) arguments also find that issues categorised as threats and opportunities have direct influence on executives' decision-making and that strategic decision-makers are threat-biased (Engau & Hoffmann, 2011).

Taking Dutton and Jackson's (1987) assertion that under prospect theory, decision-makers are threat-biased, it can be argued that managers who perceive climate change issues to pose threats rather than opportunities are more likely to engage in carbon emissions management practices and take action to adopt accounting practices for emissions management. Thus, in relation to the research questions (i.e. how companies frame risks associated with climate change and how managerial perceptions of carbon emission issues influence the use of accounting practices in managing carbon emissions), the following hypothesis is posed:

> H1: Companies that frame climate change impact as posing greater rather than lower net threats are more likely to adopt a greater number of management accounting practices comprising: (a) planning and target setting; (b) performance measurement; and (c) incentivisation.

RESEARCH APPROACH

Sample and Data Sources

The sample consists of 69 Australian companies that provided identifiable responses to sections of relevance to this study in the CDP 2009 survey (see Appendix A). The Morningstar FinAnalysis database is used for financial data. Australian companies are considered appropriate for two main reasons. First, Australia has the highest per capita emissions in the developed world (see Garnaut, 2008). Second, Australia is particularly vulnerable to climate change (Stern, 2007). Additionally, at the time of the CDP (2009) survey, there was considerable political uncertainty surrounding climate change policy (see Talberg et al., 2013).

The year 2009 is chosen since it represents the first operative year of Australia's *National Greenhouse Energy Reporting Act 2007*, which required disclosure by high emitters to a government authority of actual carbon dioxide emissions, subsequently made publicly available on a government website. Eligible companies had to register in 2008 and hence incentives for the management of carbon emissions had become much more prominent than previously during this period.

Data Analysis

The main objective of our CDP survey analysis is to gain insight to participants' perceptions of climate change issues as threats, or opportunities, or both. To partition as threats or opportunities, we use a set of four categories developed based on prior literature as set out in "Factor that Could Influence Decision Framing". An 'infrastructure category', focusing on protection of asset infrastructure and business continuity, was added in response to a preliminary review of the CDP (2009) survey data. These five categories (i.e. compliance, cost, customer, reputation, and infrastructure) were used to measure perceived threats and opportunities arising from regulatory, physical and other uncertainties associated with climate change. In relation to use of accounting techniques in managing carbon emissions, we analyse companies' narratives in relation to specific CDP survey questions as is explained later.

Milne and Adler (1999) emphasise how reliability in analysis is enhanced by using well-specified categories and decision-rules, and multiple coders. Decision-rules were developed and pilot tested and a second, independent reviewer coded the entire sample of qualitative responses to questions. Interrater coding agreement exceeded 90%. The next sub-section outlines categorisation protocols and our coding process.

Category Decision-Rules and Variable Construction

Climate Change Perception is assessed using responses to Questions 1 to 6 of the CDP 2009 survey (refer Appendix A). Respondents are asked to consider the threats (referred to as risks) and opportunities arising from: (i) changes in regulation (Questions 1 and 4), (ii) physical climate parameters (Questions 2 and 5), and (iii) other climate change-related issues (Questions 3 and 6). Collectively, these questions request identification of threats and opportunities arising from regulatory, physical and other uncertainties associated with climate change.

For responses to each of Questions 1 to 3, the presence of any of the five categories (compliance, cost, customer, reputation, infrastructure) in discussion of climate change threats is coded '1', and its absence '0'. The same process was repeated for responses to Questions 4 to 6 to examine and code climate change opportunities. When an opportunity or threat was identified, responses to other questions by the same company were examined to tease out the exact nature of the perceived threat or opportunity. Multiple identifications of the same opportunity or threat category in responses to different questions are each counted as separate occurrences. A summary *Climate Change Perception* variable was constructed by subtracting the number of opportunity categories from the number of threat categories identified, creating a difference score. A positive score indicates perception of more threats than opportunities. Table 1 indicates a range for this variable amongst the 69 sample companies of −5 to +7. (Appendix B provides an example calculation).

We examine for patterns between *Climate Change Perception* and use of accounting information. To this end, the quantitative scores generated for each of the constructs of interest are analysed statistically. An assessment of the CDP survey yielded a number of questionnaire items that linked to the management accounting practices of interest. '*Planning and Target-Setting*' was determined from responses to Questions 23.1–23.7, which asked whether the organisation had carbon emission reduction plans and targets and the details of these. '*Performance Measurement'* was measured using responses to Question 23.9 that probed the benchmarks respondents used to assess and monitor progress against carbon emission reduction goals. '*Incentivisation*' was derived from responses to Questions 26.1–26.3, together with comments relating to whether the organisation provided incentives for individual management of climate change issues and specific details of these incentives. Variable descriptives for the management accounting practices are detailed in Table 1.

Table 1
Descriptive statistics

Variable	Observed range	Mean	Standard deviation
Log of size [7.2% <$1bn total assets; 34.8% between $1bn–$5b; 31.9% between $5bn−$10bn; and 26.1% >$10bn]	19 to 27	$22.64bn	1.628
Carbon Intensity Sector [Greenhouse intensive (3) = 31.9%; Climate change exposed (2) = 46.4%; Less exposed (1) = 21.7%]*	1 to 3	2.1	0.731
Climate change perception	−5 to 7	0.667	2.273
Dichotomous variables			
Emissions reduction target setting	0/1	66.7%	
Performance measurement	0/1	55.1%	
Incentivisation	0/1	44.9%	

*These categories are collapsed to Carbon Intensive (CI) (32%) and Low Carbon (LC) (68%) Sectors

Carbon intensity sector, company size, capital intensity, new finance, return on assets, Tobin's Q and new property, plant and equipment are controlled for (Henri & Journeault, 2010). Since systems need to be in place to measure environmental information before it can be disclosed, variables associated with disclosure are expected to be associated with the accounting practices of interest to this study.

Carbon Intensity Sector is coded initially using the three-level sector classification provided in the *CDP Report 2009*. Companies in the Carbon Intensive (CI) sector include utilities, chemicals, construction materials, oil, gas and consumable fuels, metals and mining and transportation. Companies in the 'Other climate change exposed sector' include those exposed to physical risks of climate change (e.g., property), or displaying vulnerability through their customer base (e.g. finance companies and mining contractors). Finally, companies in the "Low Carbon (LC) sector" sector comprise pharmaceutical wholesalers, media providers and telecommunication service providers, coded CI equal to 1, and LC equal to 0. CI companies are expected to use more management accounting practices than LC companies.

RESULTS

Exploring Perceptions of Climate Change Impacts

As reported in Table 2, overall, companies perceive climate change issues as a threat (mean is 0.67). In considering *Climate Change Perceptions* of the two carbon intensity sectors, the LC sector has a mean of 0.36, while for the CI sector it was 1.32. The difference between the two sectors' mean values is significant at the 10% level (*t*-statistic = 1.868).

The rationale for perceiving opportunities or threats attached to the regulatory, physical and other uncertainties of climate change could vary between the LC and CI sectors because climate change issues perceived by managers in the two sectors may not be the same. It is also possible that managers of different companies within the same carbon intensity sector perceive climate change issues differently from one another. For example, as reported earlier in Table 1, the *Climate Change Perception* of the LC sector responders ranged from −5 to 7 with a standard deviation of 2.44. On the other hand, the range for perception in the CI sector was −1 to 5 with a standard deviation of 1.73. From these statistics, it is possible to see differences in perceptions between the two sectors, as well as within a particular sector (as implied by the high standard deviation) but the major focus of this study is on comparison between the two groups.

Table 2 reports how the two sectors' responses identified each issue category arising from climate change issues. There is a significant difference in the way that the two sectors' responses identify compliance issues. The CI sector responses identify a significantly higher (at 5%) mean compliance threat (0.682) than the LC sector (0.234). This finding is not surprising as the CI sector companies are under much higher compliance requirements than the LC sector companies. For the other four issue categories, both sectors have similar responses, with mean differences not significant.

The sub-sections below discuss the narratives companies provided.

Customer threats and opportunities

Customer issues manifested the most often as opportunities or threats when considering regulatory, physical and other uncertainties of climate change, with 218 mentions (Table 2). This profile was weighted towards organisational benefits from climate change, with opportunities comprising 60% of total perceptions from both LC and CI sectors (e.g., being able to fulfil new climate change-related needs, develop new products and work collaboratively with customers

Table 2
Perceptions of Climate Change Impact

Issue category	Low Carbon Sector (LC) N = 48 (70%)			Carbon Intensive Sector (CI) N = 21 (30%)			Full Sample N = 69			*Climate Change Perception* [Total Threats-Total opportunities]/ No. of companies]			*t*- test LC vs CI sectors (*p*-value)
	Total no.	Total Threats	Total Opp.	Total no.	Total Threats	Total Opp.	Total no.	Total Threats	Total Opp.	LC Sector	CI sector	Full Sample	
Compliance	**75** (100%)	43 (57%)	32 (43%)	**37** (100%)	26 (70%)	11 (30%)	**112** (100%)	69 (62%)	43 (38%)	0.234#	0.682	0.377	−2.407 (0.021)
Cost	**138** (100%)	75 (54%)	63 (46%)	**49** (100%)	31 (63%)	18 (37%)	**187** (100%)	106 (57%)	81 (43%)	0.255	0.591	0.362	−1.449 (0.152)
Customer	**155** (100%)	62 (40%)	93 (60%)	**63** (100%)	25 (40%)	38 (60%)	**218** (100%)	87 (40%)	131 (60%)	−0.660	−0.591	−0.638	−0.236 (0.815)
Infrastructure	**62** (100%)	49 (79%)	13 (21%)	**30** (100%)	21 (70%)	9 (20%)	**92** (100%)	70 (76%)	22 (24%)	0.766	0.545	0.696	1.566 (0.125)
Reputation	**61** (100%)	25 (41%)	36 (59%)	**38** (100%)	20 (53%)	18 (47%)	**99** (100%)	45 (45%)	54 (55%)	−0.234	0.091	−0.130	0.923 (0.362)
Mean *Climate Change Perception*										**0.361**	**1.318**	**0.667**	−1.865 (0.067)

#Example calculation: Compliance Low Carbon (LC) Sector (Total Threats-Total Opportunities)/No. of companies = [(43)–(32)]/48 = 0.234

in managing carbon emissions). Thus, revenue and opportunities to deepen relationships were identified, and arose more frequently in relation to regulatory and other climate change uncertainties than to physical uncertainties. For example, Telstra Corporation Ltd, a telecommunication and information service company, identified "customer" opportunities that derived from regulatory uncertainties and flowed to existing products and services as follows:

> Current and anticipated regulatory requirements... creates an opportunity for Telstra as use of our telecommunications products and services (e.g. teleconferencing) can provide practical ways for our customers to use energy more efficiently, and save on carbon emissions

Conversely, a significant number of customer threats were identified, often by the same company representatives who perceived customer opportunities to exist. These were due largely to concerns about the inability to respond in a timely and appropriate manner in accordance with shifting customer expectations in relation to climate change. They arose more frequently in relation to physical and other dimensions of climate change than to regulatory dimensions. Customers reconfiguring their supply chain or reducing their demand for services were the main cause of threats, as the following examples from Telstra, and Amcor, a packaging manufacturer, illustrate:

> Customer demand for our product may decrease in periods where they are affected by weather events.

> Changing expectation of our major customers such as banks or large corporations means that our response to climate change could impact on how we are perceived by our customers. Some customers are already considering greenhouse gas emissions in their supply chain decisions.

However, overall if considering only customer issues, climate change issues were reported by both CI and LC sectors as bringing more opportunities than threats.

Cost threats and opportunities

Cost threats and opportunities were second most frequently identified in relation to climate change uncertainties, with 187 manifestations. This category was considered to represent more negative than positive potential, with threats reported as 54% and 63% of total perceptions by the LC and CI sectors respectively or

57% overall. The cost threat was the largest identified, with 106 total threats. Regulatory and legislative uncertainty was seen as possibly causing cost increases through carbon taxes, compliance costs and increased energy costs. For example, a CI sector company, Boral, a building and construction materials company and heavy user of electricity, commented:

> A third regulatory risk is that of costs imposed by other schemes such as the revamped Australian Mandatory Renewable Energy Target ("RET") scheme. This scheme results in higher electricity prices due to a regulatory target that 20% of electricity supplied must come from renewable generation.

Physical weather-related uncertainty was seen as causing increased insurance and repair and maintenance costs, while other cost increases were considered likely due to resource scarcity. LC sector company, Woolworths, a major retailer, highlighted cost and other threats from resource scarcity:

> Impacts of climate change and drought upon suppliers, including farmers or any food provider, pose a critical risk to Woolworths as it can affect the reliability of supply, cost and quality of products.

Companies also identified opportunities to reduce both costs and emissions by changing internal practices, such as reductions in energy use, travel and fuel consumption, and greater efficiency in resource use. Providing accurate emissions data for regulatory purposes was seen by some as helping to provide insights and impetus to behavioural change towards cost efficiency. LC sector company, United Group, an engineering and property services company, was one such company:

> Regulatory requirements associated with climate change may present opportunities for UGL given the increased rigour that will be required in relation to collecting and collating energy use data. Monitoring and measuring energy use associated with operations may lead to opportunities to reduce energy use and cut energy costs.

In addition, the possibility that customer and supplier behaviours might change as part of climate change action was seen as providing cost reduction opportunities. A change in practices by customers and suppliers to use less carbon intensive products and services and avoid threats associated with climate change was seen as providing opportunities for companies, with QBE Group, one of Australia's larger insurance companies, reflecting this sentiment:

> An increase in customer awareness of potential climate change risks which should positively impact QBE and the insurance industry generally to the extent that increased risk mitigation by the insured could reduce claims costs.

Compliance threats and opportunities

As noted, regulatory impacts had a number of 'indirect effects', but more "direct effects" in terms of compliance were noted, with this being the third most frequently identified issue overall. Reported 62% of the time as threats within the full sample (refer Table 2), compliance issues related almost exclusively to the associated regulatory uncertainties. The CI sector reported much higher threats (70%) than LC sector companies (57%) (refer Table 2). Relating to regulatory threats, potential changes in carbon emissions legislation and regulatory reporting requirements were noted as making it difficult for organisations to make investment decisions, particularly in relation to assets that might have significant carbon emission profiles. Company representatives also noted that it was difficult to understand their regulatory obligations and then fulfil these without experiencing severe economic impacts. For instance, Infigen Energy, a leading independent renewable energy company, noted the following:

> Continual change in regulatory conditions can result in increased uncertainty in the investment environment; unclear, inconsistent or rapidly evolving regulations which make compliance challenging.

High emitters that faced regulatory obligations featured prominently in noting compliance threats. On the other hand, and similar to cost issues, the increased attention to emissions, energy use and measurement of associated activities arising from regulatory requirements, was seen as providing a possibility for overall business benefit. For instance Sigma Pharmaceuticals, a pharmaceutical wholesaler and distribution business, explained that:

> Financial and technical support available ... may result in business/ operational improvements that have financial advantages in excess of higher energy costs.

Thus, it can be seen that compliance issues had some effect on all sample companies either directly or indirectly.

Reputation threats and opportunities

Reputation was the fourth most identified threat-opportunity category in relation to climate change uncertainty, manifesting 54% of the time as opportunities by the whole sample (refer Table 2). However, only the LC sector reported climate change issues bringing more reputational opportunities (59%) than threats (refer Table 2). In considering the CI sector alone, climate change issues were reported as slightly higher threats (53%) than opportunities (refer Table 2). These findings are not surprising as CI sector companies are more prone to negative public perceptions as 'environmental polluters'. In considering the reputational opportunities, being seen as environmental leaders and as proactive companies were some of the commonly cited reasons. For example, LC sector company ANZ Bank explains reputational opportunities as follows:

> Understanding and minimising our environmental footprint is an important part of our responsibility as a large corporation. We face risks to our reputation if we do not meet the environmental standards and practices we encourage our corporate customers and suppliers to adopt.

In other cases, enhanced reputation was reported as providing business and economic benefits. Development of new, environmentally friendly products and enhanced competitive advantage were sometimes identified as reputational benefits. For example, Amcor, a CI sector company and the world's largest packaging company, reported reputational opportunities as follows:

> Amcor Ltd anticipates general opportunities in staying ahead of competitors with regard to climate change preparedness. These opportunities relate to the mitigation of physical, regulatory and other risks as described previously. Amcor Ltd anticipates demand for new or modified packaging options and enhanced reputation.

Conversely, companies also saw reputational threats because of climate change issues. Failure to perform their business activities in accordance with social and environmental norms, and increased exposure to scrutiny of business activities were some of the concerns highlighted as reputational threats.

Infrastructure threats and opportunities

Infrastructure issues were the fifth most identified category of threats and opportunities, but manifested most strongly as having potential for negative

organisational effects, with threats representing 76% of the full sample (refer Table 2). Both sectors see more threats than opportunities; with LC and CI sectors accounting for 79% and 70%, respectively (refer Table 2). These threats were due largely to uncertainty in relation to physical weather parameters and possible increases in the frequency of extreme weather patterns. These possibilities were seen as translating into potentially compromised asset values and reduced infrastructure lifecycles, with on-going capital expenditure implications. Transurban Group highlighted a study it had recently completed in responding to threats from changes in weather parameters associated with climate change:

> Accelerated degradation of materials, structures and foundations of transport infrastructure may occur through increased ground movement and changes in groundwater.

The majority of companies mentioning infrastructure issues raised concerns about their asset mix. However, a minority did report some infrastructure opportunities from climate change. These were mainly in relation to new investment in assets and infrastructure projects suited to a carbon-constrained environment.

In summary, protection of economic interest is the primary concern in relation to climate change issues. Customer and cost opportunities and threats were the most common, with little concern for reputation or corporate social responsibility unless associated with economic benefits. This absence of discussion about ethical or moral obligations may be due to the role of institutional investors as the main CDP audience (Solomon et al., 2011), creating an investor driven and 'market governance' system (Rankin, Windsor, & Wahyuni, 2011).

Accounting Practice Use in Carbon Emission Management

Table 3 reports results for accounting practices overall and for LC and CI companies. Frequencies are: (i) Planning and target-setting (67% overall, 62% for LC, 77% for CI); (ii) Performance measurement (55% overall, 57% for LC, 50% for CI); and (iii) Incentivisation (45% overall, 47% for LC and 41% for CI). None of these mean differences is significant.

The next four sub-sections discuss the use of the four accounting practices and the disclosed reasons for use.

Table 3
Use of accounting practices in emission management

Accounting practices	Carbon Intensity Sector				Full Sample N = 69		*t*-test (*p*-value)
	Low Carbon Sector (LC) N = 47		Carbon Intensive Sector (CI) N = 22				
	Yes	No	Yes	No	Yes	No	
Planning and target setting	29 (62%)	18 (38%)	17 (77%)	5 (23%)	46 (67%)	23 (33%)	−1.275 (0.207)
Performance measurement	27 (57%)	20 (43%)	11 (50%)	11 (50%)	38 (55%)	31 (45%)	0.572 (0.569)
Incentivisation	22 (47%)	25 (53%)	9 (41%)	13 (59%)	31 (45%)	38 (55%)	0.453 (0.652)

Planning and target setting

Planning and Target Setting, comprising the development of emission reduction plans and targets, was the most widely used accounting practice (67%). However, one-third of companies failed to establish targets for emission reduction purposes. As explained in the CDP 2009 report, planning and target setting provide evidence of companies' commitment to reducing their carbon emissions and the actions they intend to take in mitigating any emissions liabilities. The lack of emissions reduction targets among these companies could be a concern to their investors as "*…it may indicate that emissions reduction actions are not being strategically planned*" (CDP, 2009, p.12).

The motives for companies that had implemented emissions reduction targets included improvement of internal impetus and fulfilment of external regulatory requirements. The main internal drivers for companies to engage in target setting included shaping actions relating to emissions reduction, improving operational efficiency, minimisation of waste, and communication of levels of performance to be achieved. For example, Telstra explained how it used planning and target setting as tools in driving its environmental commitment and improving environmental performance as follows:

> Setting measurable targets demonstrates that we are serious about providing good stewardship of the environment – and what gets measured gets done. We believe that adopting a target will help motivate our company to Identify novel solutions to reduce Telstra's carbon intensity.

Measurement was cited as the key barrier to targets, illustrated by Computershare's response:

> ...we recognise that more needs to be done, particularly in the area of measurement and targets. We have therefore begun the task of measuring our operational impact to date, to create a baseline against which we can establish the implementation of environmental objectives...

Performance measurement

The use of performance measurement, usually using non-financial measures, as part of monitoring progress was claimed by 55% of companies. For example, Commonwealth Bank of Australia provided the following:

> The Bank will track progress towards our reduction target of 20% CO_2-e by 1 July 2013 by using two key performance indicators: CO_2-e emissions per FTE and CO_2-e emissions per net lettable area of commercial and retail space occupied by the Bank in Australia.

A few companies reported energy savings as well as cost savings, including Coca-Cola Amatil:

> In our plants, CCA looks to innovate through energy saving projects. At 2008, 24 energy saving projects identified with the Australian EEO [energy Efficiency Opportunity] scheme had been implemented. This has saved more than 22,000GJ energy or 6,111 megawatt hours/4,500 TCO2-e, equating to annual net benefits of approximately $160,000.

Of companies without performance measurement, approximately one-third claimed to be considering or developing measurement approaches to support assessment of carbon emission management initiatives. The remainder failed to provide any explanation for their lack of use.

Incentivisation

The use of incentives was amongst the least frequently used accounting practice (45%). Amongst those companies using incentives to manage carbon emissions, variation existed with respect to the specificity of incentives offered. Only a third of companies indicated explicitly that they provided incentives that rewarded

specific carbon emission reduction behaviours and achievements. Westpac Bank was one such company, focusing specifically on incentives for carbon emission reduction to motivate efforts and hold people accountable where considered appropriate:

> Emissions reduction targets are included in personal scorecards of a number of individuals across the organisation and directly impact on their bonus potential. Our Executive Team (i.e. our CEO and their direct reports) have a shared emissions reductions target and where appropriate to job role these have been cascaded to General Manager Level and below.

In contrast, half providing incentives used general incentives aimed at driving overall corporate social responsibility actions.

Of the 38 (55%) companies that did not report incentives, 28 did not provide any explanation. These companies represent not only large companies but are also members of industries such as energy, resources, construction, mining and manufacturing, which have a significant emission exposure. Of the remainder, one company indicated an absence of incentives due to a relatively small carbon footprint, while the others argued existing incentive schemes influenced climate change action indirectly, with the following response from Origin Energy illustrative of this approach:

> Executive management does not have specific incentives for managing climate change issues. However, a significant part of the remuneration of senior management consists of equity and equity-based instruments whose value is dictated by the long-term performance of the company. The long-term performance of the company is influenced to a very large extent by the company's ability to foresee and to deliver within the regulatory environment, of which climate change regulation forms a great part, and the social and economic environment, which is also affected by climate change issues

CONCLUSION, LIMITATIONS AND FUTURE RESEARCH

The findings revealed that first, companies, in general, perceived carbon emission issues as a risk when attempting to achieve organisational objectives. Customer, cost, and compliance issues were identified as the most influential factors that manifested most threats and opportunities associated with climate change issues.

It was seen also that companies' identification of climate change threats and opportunities was driven primarily by the motive of protecting their financial interests.

Second, low use of accounting practices in managing climate change issues was uncovered, perhaps a consequence of the lack of involvement of accounting professionals in emission management activities. Arguably, accounting professionals could have a substantial role in driving implementation of practices such as appropriate planning, measurement and incentivisation schemes in managing emissions.

Third, consistent with prospect theory arguments, a significant positive association was found between perceptions of threats or opportunities and the accounting practices. As argued by Sebora and Cornwall (1995), if prospect theory explains strategic decision makers' behaviours under conditions of uncertainty, creating greater awareness of framing effects could achieve positive outcomes.

Finally, regulatory requirements seem to have a significant influence on companies' responses. In particular, not only the cost enforced by a carbon tax, but also the uncertainty associated with climate change appears influential. While such 'direct effects' were noted, with compliance issues a number of 'indirect effects' were also observed. Regulatory changes and uncertainties had material effects in relation to company identification of both customer and cost opportunities and threats. However, as evident from this study, uncertainty around climate change regulations hinders long-term actions, such as investments in emission management.

Limitations include the relatively small sample size, use of self-reported information and the potential for changes in perceptions of threats and opportunities since 2009. Nevertheless, institutional investors have been instrumental in CDP's success in eliciting climate change information from respondents (Kolk, Levy, & Pinkse, 2008) and are likely to have their own perspectives on climate change implications facing individual organisations, especially since they can interrogate firm management through forums such as private meetings (see Solomon et al., 2011). This suggests a level of correspondence between disclosed CDP information and actual perceptions and accounting practices. Future research could examine more recent CDP data, and compare companies' annual responses over time with their actual emissions performance, where this is available.

REFERENCES

Adams, C. A., Larrinaga-Gonzalez, C. (2007). Engaging with organisation improved sustainability accounting and performance. *Accounting, Auditing & Accountability Journal, 20*(3), 333–355. https://doi.org/10.1108/09513570710748535

Barberis, N. C. (2013). Thirty years of prospect theory in economics: A review and assessment. *The Journal of Economic Perspectives*, *27*(1), 173–195. https://doi.org/10.1257/jep.27.1.173

Bebbington, J., Larrinaga, C., & Moneva, J. M. (2008). Corporate social reporting and reputation risk management. *Accounting, Auditing & Accounting Journal*, *21*(3), 337 – 361.

Bromiley, P., Miller, K. D., & Rau, D. (2001). Risk in strategic management research. In M. A. Hitt, R. E. Freeman, & J. S. Harrison (Eds.), *The Blackwell handbook of strategic management* (pp. 259–288)*,* Malden, MA: Blackwell.

Burritt, R. L, Schaltegger, S., & Zvezdov, D. (2011). Carbon management accounting: Explaining practice in leading German companies. *Australian Accounting Review*, *21*(1), 80–98. https://doi.org/10.1111/j.1835-2561.2010.00121.x

Carbon Disclosure Project (CDP). (2009). Carbon disclosure project report 2009 Australia and New Zealand. Retrieved from http://www.boral.com.au/Images/common/pdfs/CDP_2009_Australia_New_Zealand_Report.pdf

Chow, C. W., Kohlmeyer, J. M., & Wu, A. (2007). Performance standards and managers' adoption of risky projects. *Advances in Management Accounting*, *16*, 63–105. https://doi.org/10.1016/S1474-7871(07)16002-0

Church, B. K., Libby, T., & Zhang, P. (2008). Contract framing and individual behaviour: Experimental evidence. *Journal of Management Accounting Research*, *20*, 153–168. https://doi.org/10.2308/jmar.2008.20.1.153

Dutton, J. E., & Jackson, S. E. (1987). Categorizing strategic issues: Links to organisational actions. *Academy of Management Review*, *2*(1), 79–90.

Engau, C., & Hoffmann, V. H. (2011). Corporate response strategies to regulatory uncertainty: Evidence from uncertainty about post-Kyoto regulation. *Policy Science*, *44*(1), 53–80. https://doi.org/10.1007/s11077-010-9116-0

Garnaut, R. (2008). *The Garnaut climate change review: Final report*. Cambridge: Cambridge University Press.

Hannan, L., Hoffman, V., & Moser, D. (2005). Bonus versus penalty: Does contract frame affect employee effort? *Experimental Business Research*, *2*, 151–169. https://doi.org/10.1007/0-387-24243-0_8

Hartmann, F., Perego, P., & Young, A. (2013). Carbon accounting: Challenges for research in management control and performance measurement. *Abacus*, *49*(4), 539–563. https://doi.org/10.1111/abac.12018

Henri, J. F., & Journeault, M. (2010). Eco-control: The influence of management control systems on environmental and economic performance. *Accounting, Organizations and Society*, *35*(1), 63–80. https://doi.org/10.1016/j.aos.2009.02.001

Hoffmann, V. H., Sprengel, D. C., Ziegler, A., Kolb, M., & Abegg, B. (2009). Determinants of corporate adaptation to climate change in winter tourism: An econometric analysis. *Global Environmental Change*, *19*(2), 256–264. https://doi.org/10.1016/j.gloenvcha.2008.12.002

Hopwood, A. G. (2009). Accounting and the environment. *Accounting Organizations and Society, 34*(3-4), 433–439. https://doi.org/10.1016/j.aos.2009.03.002

Jackson, S. E., & Dutton, J. E. (1988). Discerning threats and opportunities. *Administrative Science Quarterly*, *33*(3), 370–387. https://doi.org/10.2307/2392714

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*(2), 263–292. https://doi.org/10.2307/1914185

Kahneman, D., & Tversky, A. (Eds.). (2000). *Choices, values and frames*. New York: Cambridge University Press and the Russell Sage Foundation.

Kolk, A., Levy, D., & Pinkse, J. (2008). Corporate responses in an emerging climate regime: The institutionalization and commensuration of carbon disclosure. *European Accounting Review*, *17*(4), 719–745. https://doi.org/10.1080/09638180802489121

Lee, S. Y., & Klassen, R. S. (2015). Firms' response to climate change: The interplay of business uncertainty and organizational capabilities. *Business Strategy and the Environment, 25*(8), 577–592.

Lodhia, S., & Jacobs, K. (2013). The practice turn in environmental reporting: A study into current practices in two Australian Commonwealth departments. *Accounting, Auditing & Accountability Journal, 26*(4), 595–615. https://doi.org/10.1108/09513571311327471

Milne, M. J., & Adler, R. W. (1999). Exploring the reliability of social and environmental disclosures content analysis. *Accounting, Auditing & Accountability Journal*, *12*(2), 237–256. https://doi.org/10.1108/09513579910270138

Milne, M. J., & Grubnic, S. (2011). Climate change accounting research: Keeping it interesting and different. *Accounting, Auditing & Accountability Journal*, *24*(8), 948–977. https://doi.org/10.1108/09513571111184715

Perez, E. A., Ruiz, C. C., & Fenech, F. C. (2007). Environmental management systems as an embedding mechanism: A research note. *Accounting, Auditing & Accountability Journal*, *20*(3), 403–422. https://doi.org/10.1108/09513570710748562

Rankin, M., Windsor, C., & Wahyuni, D. (2011). An investigation of voluntary corporate greenhouse gas emissions reporting in a market governance system Australian evidence. *Accounting, Auditing & Accountability Journal, 24*(8), 1037–1070. https://doi.org/10.1108/09513571111184751

Rietbergen, M. G., van Rheede, A., & Blok, K. (2015). The target-setting process in the CO2 performance ladder: Does it lead to ambitious goals for carbon dioxide emission reduction? *Journal of Cleaner Production*, *103*, 549–561. https://doi.org/10.1016/j.jclepro.2014.09.046

Sebora, T. C., & Cornwall J. R. (1995). Expected utility theory vs. prospect theory: Implications for strategic decision makers. *Journal of Managerial Issues, 7*(1), 41–61.

Shimizu K. (2007). Prospect theory, behavioural theory, and threat-rigidity thesis: Combinative effects on organizational divestiture decisions of a formerly acquired unit. *Academy of Management Journal, 50*(6), 1495–1514. https://doi.org/10.5465/AMJ.2007.28226158

Solomon, J. F., Solomon, A., Norton, S. D., & Joseph, N. L. (2011). Private climate change reporting: An emerging discourse of risk and opportunity? *Accounting, Auditing & Accountability Journal, 24*(8), 1119–1148. https://doi.org/10.1108/09513571111184788

Sprengel, D. C., & Busch, T. (2011). Stakeholder engagement and environmental strategy: The case of climate change. *Business Strategy and the Environment*, *20*(6), 351–364.

Stern, N. (2007). *The economics of climate change: The Stern review.* Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511817434

Subramaniam, N., Wahyuni, D., Cooper, B. J., Leung, P., & Wines, G. (2015). Integration of carbon risks and opportunities in enterprise risk management systems: Evidence from Australian firms. *Journal of Cleaner Production*, *96*, 407–417. https://doi.org/10.1016/j.jclepro.2014.02.013

Talberg, A., Hui, S., & Loynes, K. (2013). *Australian climate change policy: A chronology*. Australia: Parliamentary Library.

Wahyuni, D., & Ratnatunga, J. (2015). Carbon strategies and management practices in an uncertain carbonomic environment: Lessons learned from the coal-face. *Journal of Cleaner Production, 96*, 397–406.

Widener, S. K. (2007). An empirical analysis of the levers of control framework. *Accounting, Organizations and Society*, *32*(7–8), 757–788. https://doi.org/10.1016/j.aos.2007.01.001

Winn, M., Kirchgeorg, M., Griffiths, A., Linnenluecke, K. M., & Günther, E. (2011). Impacts from climate change on organizations: A conceptual foundation. *Business Strategy and the Environment*, *20*(3)*,* 157–173. https://doi.org/10.1002/bse.679

APPENDIX A

Relevant Questions from the CDP (2009) survey

Climate Change Perceptions

1.1. Is your company exposed to regulatory risks related to climate change?

2.1. Is your company exposed to physical risks from climate change?

3.1. Is your company exposed to other risks as a result of climate change?

4.1. Do regulatory requirements on climate change present opportunities for your company?

5.1. Do physical changes resulting from climate change present opportunities for your company?

6.1. Does climate change present other opportunities for your company?

Use of Planning and Target Setting

23.1. Does your company have a GHG emissions and/or energy reduction plan in place?

23.2. Please explain why.

23.3. Do you have an emissions and/or energy reduction target(s)?

23.4 What is the baseline year for the target(s)?

23.5. What is the emissions and/or energy reduction target(s)?

23.6. What are the sources or activities to which the target(s) applies?

23.7. Over what period/timescale does the target(s) extend?

Use of Performance Measurement

23.9. What benchmarks or key performance indicators do you use to assess progress against the emissions/energy reduction goals you have set?

Use of Incentivisation

26.1. Do you provide incentives for individual management of climate change issues including attainment of GHG targets?

26.2. Are those incentives linked to monetary rewards?

26.3. Who is entitled to benefit from those incentives?

APPENDIX B

Analysis of CDP (2009) survey responses

Participating companies are requested to identify risks (threats)/opportunities driven by:

1. Changes in **regulations** (Questions 1 and 4).
2. Changes in **physica**l climate parameters (Questions 2 and 5).
3. Changes in **other** climate-related developments (Questions 3 and 6).

The following two aspects were taken into consideration:

(a) Multiple identifications of the same opportunity or threat category in responses to each question were counted as separate occurrences.

(b) If respondents mentioned the same issue more than once under Question 1, it was counted as "1".

Example *Climate Change Perception* Analysis for AGL Group Ltd

						Total
	Regulatory Risk (CDP Q.1)					
	Compliance	Cost	Customer	Infrastructure	Reputation	
AGL	1	1	1	0	0	3
	Physical Risk (CDPQ. 2)					
	Compliance	Cost	Customer	Infrastructure	Reputation	
AGL	0	1	1	1	0	3
	Other Risk (CDP Q. 3)					
	Compliance	Cost	Customer	Infrastructure	Reputation	
AGL	0	0	1	0	1	2
	Total Risk					**8**
	Regulatory Opportunities(CDP Q. 4)					
	Compliance	Cost	Customer	Infrastructure	Reputation	
AGL	1	1	1	1	0	4
	Physical Opportunities (CDP Q. 5)					
	Compliance	Cost	Customer	Infrastructure	Reputation	
AGL	0	0	0	0	0	0
	Other Opportunities (CDP Q. 6)					
	Compliance	Cost	Customer	Infrastructure	Reputation	
AGL	0	1	1	0	0	2
	Total Opportunities					**6**
Climate Change Perception (Total Threats [Risk]−Total Opportunities)= (8−6)						**2**

Asian Academy of Management Journal of Accounting and Finance

AAMJAF Vol. 13, No. 2, 69–94, 2017

DIVIDEND CAPTURE ON THE EX-DIVIDEND DAY: EVIDENCE FROM VIETNAMESE STOCK MARKET

Quoc Trung Tran[1,2]

[1]*Foreign Trade University, Ho Chi Minh City Campus, 15 D5 Street, Ward 25, Binh Thanh District, Ho Chi Minh City, Vietnam*
[2]*Faculty of Finance, Banking and Accounting, Lille 2 University, 2 Rue de Mulhouse, 59000 Lille, France*

E-mail: tranquoctrung.cs2@ftu.edu.vn

ABSTRACT

Vietnamese stock market is a promising laboratory to investigate the ex-day behaviour of stock price due to its special features: Firstly, the market uses periodic call auction mechanism for determining both opening and closing prices and there is no market maker. Secondly, tick size is much smaller than dividend amount. These imply that market microstructure theories are not applicable explanations. Thirdly, unlike many markets' taxation of capital gains and dividends, there is no considerably preferential treatment of capital gains to dividends. Finally, short-selling is prohibited. Comparing the observed values of price drop to dividend ratio and their expected values under the impact of tax policy, we find that tax treatment fails to explain the anomaly in the research framework. The research findings show that abnormal returns are significantly positive and negative in the pre- and the post ex-dividend day periods, respectively. Moreover, regression results and relevant analysis show supporting evidence for dividend capture theory.

Keywords: dividend capture, ex-dividend, stock price, Vietnam, event study

Publication date: 28 February 2018

To cite this article: Tran, Q. T. (2017). Dividend capture on the ex-dividend day: Evidence from Vietnamese stock market. *Asian Academy of Management Journal of Accounting and Finance, 13*(2), 69–94. https://doi.org/10.21315/aamjaf2017.13.2.4

To link to this article: https://doi.org/10.21315/aamjaf2017.13.2.4

INTRODUCTION

Ex-dividend day anomaly of stock price is one of the most debatable issues in corporate finance with several theoretical and empirical studies in various institutional environments. Miller and Modigliani (1961) posit that in a perfect stock market without taxes, transaction costs and risk, stock prices should drop precisely by dividend amount on the ex-dividend day. However, many prior studies conducted in both developed and emerging markets show that the price drop is different from the dividend magnitude. There are three categories of theory on ex-dividend behavior of stock price. Firstly, tax clientele theory explains the difference between the stock price drop on the ex-day and the dividend paid only by tax treatment of capital gains to dividends. Secondly, short-term trading theory argues that tax indifferent arbitrageurs are marginal investors in the market; therefore, profit opportunities are exploited until the difference is equal to transaction costs. Thirdly, market microstructure theories explain ex-day price behaviour with non-tax market frictions including limit order adjustment, price discreteness and bid-ask bounce. The explanatory power of these theories significantly relies on the institutional environment of a stock market.

Although Vietnamese stock market is small and emerging, it is a promising laboratory to examine ex-day behaviour of stock price because of its institutional environment regarding trading regulations and tax policy. Firstly, the market uses periodic call auction mechanism for determining both opening and closing prices and there is no market maker. Secondly, unlike many markets' taxation of capital gains and dividends, there is no considerably preferential treatment of capital gains to dividends. Finally, short-selling is prohibited. Therefore, tax-induced hypothesis and dividend capture hypothesis are possible to explain the ex-day behaviour of stock price. However, after comparing the observed values of price drop to dividend ratio and their expected values under the impact of tax policy, we conclude that tax treatment fails to explain the anomaly in the research frame work and only dividend capture hypothesis is applicable.

LITERATURE REVIEW

Elton and Gruber (1970) initially proposed tax clientele theory stating that ex-day behaviour of a firm's common stock should be associated with its marginal stockholders' tax rates. An investor selling his stocks before the ex-day loses the right of receiving dividends. However, if he holds them until they go ex-dividend he should expect to sell them at lower price due to his dividend retention. This stockholder is indifferent to the time of selling his stocks only if the benefits from

two cases are equal. Accordingly, Elton and Gruber (1970) develop the following expression:

$$\frac{P_c - P_e}{D} = \frac{1 - t_d}{1 - t_g} \quad (1)$$

Where P_c is stock price on the last cum-day, P_e is expected stock price on the ex-day, t_d is the marginal tax rate on dividends, t_g is the marginal tax rate on capital gains and D is the magnitude of dividend.

Subject to this analysis, the ratio of price drop to dividend $(P_c - P_e)/D$ always reflects the comparative marginal tax rates on stockholders' dividends and capital gains. Elton and Gruber (1970) posit that the relative marginal tax rates can be inferred by studying the stock price drop to dividend ratio on the ex-dividend day. In their model, marginal investors are long-term investors whose decisions of buying or selling are irrelevant to dividends.

However, Kalay (1982) argues that in the absence of the tax clientele effect (i.e. tax rates on dividends and capital gains are equal), there are investors who are different to the timing of sale and trade due to dividends. In this case, transaction costs become relevant to the price drop to dividend ratio. If the expected price drop on the ex-day exceeds the dividend per share by more than the costs of buying and selling stocks, investors could short-sell their stocks on cum-dividend days and buy them back when they go ex-dividend to make a profit. This can be presented as follows:

$$(1 - t_o)(P_c - P_e - D - \alpha P) > 0 \quad (2)$$

Where t_o is tax rate on ordinary income. α is transactions costs of a round-trip transaction. $P = (P_c + P_e)/2$

On the other hand, if the expected price drop on the ex-day is less than dividend per share by more than transaction costs, investors tend to buy stocks on cum-dividend days and sell them on ex-dividend days to gain a profit. This can be expressed as follows:

$$(1 - t_o)[D - (P_c - P_e) - \alpha P] > 0 \quad (3)$$

According to Kalay (1982), a profit is realised only if it is not exploited by arbitrage activities. As a result, the condition of non-profit opportunities is presented as follows:

$$| D - (P_c - P_e) | \leq \alpha P \quad (4)$$

Rearrange (4) we get

$$1 - \frac{\alpha P}{D} \leq \frac{P_c - P_e}{D} \leq 1 + \frac{\alpha P}{D} \quad (5)$$

Accordingly, stockholders' marginal tax rates cannot be estimated from the price drop to dividend ratio. If transaction costs are zero, the value of $(P_c - P_e)/D$ will be limited to unity.

Eades, Hess and Kim (1984) investigate the ex-dividend day behaviour of stock price on New York Stock Exchange from 2 July 1962 to 31 December 1980 and find that the preferential treatment of capital gains to dividends cannot explain completely abnormal returns on ex-dividend days. Consequently, one cannot infer marginal tax rates on dividends and capital gains from the ratio of stock price drop to dividend.

Moreover, ex-day stock price behaviour is also explained by market microstructure. Based on Rule 118 of New York Stock Exchange, Dubofsky (1992; 1997) argues that rounding down the price of existing limit buy orders to a multiple of a tick leads to less-than-one price drop to dividend ratio on the ex-dividend day. In addition, Frank and Jagannathan (1998) posit that investors consider dividends as a nuisance due to costs arising from dividend collection whilst market makers with lower collection costs tend to purchase stocks before ex-dividend days and resell them on ex-dividend days. Therefore, most trades are conducted at bid prices on cum-dividend days and at ask prices on ex-dividend days. These bid-ask spreads imply that price drops on ex-days are lower than dividend amounts. Furthermore, Bali and Hite (1998) argue that stock price behaviour on ex-dividend days is determined by price discreteness. If stock prices are restricted to discrete ticks and dividends are continuous, dividend amounts are always rounded down to ticks next to dividends. This adjustment makes in ex-day price drops less than dividend amounts in most cases. If tick size is larger, price drop ratio will be higher.

INSTITUTIONAL ENVIRONMENT

Vietnam stock market was established in July 2000 with Ho Chi Minh City Stock Exchange (HSX). Over the first five years from 2000 to 2005, financial activities in the market were not remarkable with only about 30 listed stocks; however, since 2006 more firms were listed and the market started to grow rapidly. In two years of booming, VN-INDEX increased dramatically from January 2006 to reach their peaks in March 2007 and maintained at high levels until the end of

2007 (Figure 1). After that, the market plunged into recession during the year of 2008. Despite a slight recovery in 2009, Vietnamese stock market continued its downward trend in the two following years. Until 31 December 2011 there were 301 firms listed in HSX and their market capitalisation is equal to about 17% GDP.

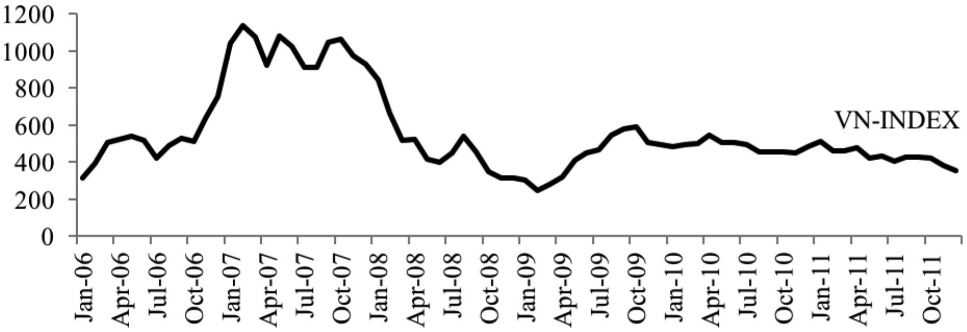

Figure 1. Performance of VN-INDEX from 2006 to 2011

Although Vietnamese stock market is small and emerging, it is a promising laboratory to investigate ex-dividend day behaviour of stock price due to its special characteristics concerning trading regulations and taxation of dividends and capital gains.

Trading Regulation

According to Vietnam Enterprise Law, dividend payment is not mandatory and there is no regulation on number of payment per year. Firms can retain 100% earnings or distribute their earnings in various forms including cash dividends, stock dividends and share repurchases. Like other emerging markets, Vietnamese stock market witnessed a high percentage of dividend payers which is over 80% from 2006 to 2011. Moreover, like in the U.S. market firms listed in Vietnamese stock market can pay cash dividends more than once a year (i.e. semi-annually, three times a year or quarterly).

Vietnamese stock market is a pure auction market in which trading activities are conducted via securities companies. Apart from playing the role of brokers, securities companies can buy and sell stocks on their accounts. Unlike in the U.S. market, securities companies are considered as normal investors and there is no market maker in Vietnamese stock market. Orders are initiated from securities companies through computer terminals on their premises or on the exchange floor. Brokerage fees for successful stock transactions depending total daily transaction value and transaction methods commonly vary from 0.15% to

0.35% of transaction value. In addtion, sellers and buyers are likely to pay other fees for legal service, consutlting service, portfolio management service, etc. as transaction costs.

Furthermore, short-selling is prohibited by Vietnam Securities Law. Settlement cycle on Ho Chi Minh City Stock Exchange is T+3. Buyers actually receive their stocks three days after the day of transaction. If stocks are sold on the ex-dividend day, seller receive dividends.

Table 1
Price range for buy and sell orders in Ho Chi Minh City Stock Exchange from 2006 to 2011

Period	Price range
From 1 January 2006 to 26 March 2008	P_r +/− 5%
From 27 March 2008 to 6 April 2008	P_r +/− 1%
From 7 April 2008 to 15 June 2008	P_r +/− 2%
From 16 June 2008 to 17 August 2008	P_r +/− 3%
From 18 June 2008 to 31 December 2011	P_r +/− 5%

P_r is reference price of day t which is equal to closing price of day $t - 1$ if day t is not an event day and adjusted closing price of day $t - 1$ otherwise. Event days include ex-right days and most recent trading days after stock split and reverse stock split.

Moreover, prices from buy and sell orders in a trading day t are constrainted to a price range from price floor to price ceiling based on reference price which is equal to closing price of day $t - 1$ if day t is not an event day (Table 1) and adjusted closing price of day $t - 1$ otherwise. The ex-dividend day is an event day and the reference price is equal to the last cum-day's closing price minus dividend amount. Unlike Hong Kong stock market where closing price is determined with continuous auction mechanism, Vietnamese stock market uses periodic call auction mechanism for determining both opening and closing prices. During the call auction, the price is set with the first priority of largest transaction volume and the second priority of closest with nearest matching order price. As a result, ask-bid spread is absent. The two features including no ask-bid spread and no market maker indicate that Frank and Jagannathan's microstructure hypothesis fails to explain behaviour of stock price on ex-dividend days in Vietnamese stock market. In addition, contrary to NYSE Rule 118, HSX trading rules state that all of limit orders shall be cancelled at the end of closing trading session. Thus, there is no limit order adjustment for the next trading day which implies Dubofsky's model is not applicable.

Like New York Stock Exchange, Ho Chi Minh City Stock Exchange adjusts reference price on the ex-dividend day by rounding it down to the next tick. There are three levels of tick size, namely 0.1, 0.5 and 1.0 coresponding to three classes of stock price (Table 2).

Table 2
Tick size in Ho Chi Minh City Stock Exchange

Stock prices (1000 VND)	0.0 < stock price ≤ 49.9	50 ≤ stock price ≤ 99.5	stock price ≥ 100
Tick size (1000 VND)	0.1	0.5	1.0

Taxation of Dividends and Capital Gains

Although Vietnam's tax policy on dividends and capital gains is complicated and adjusted four times during the period from 2006 to 2011, it shows that generally there is no significantly preferential treatment of capital gains to dividends which is evident in several markets examined by prior studies (Table 3). In the first sub-period from 2006 to 2009, both dividends and capital gains earned by individual investors were exempt from tax while Vietnamese institutional investors' capital gains are charged 28% between January 2006 and December 2009. In the second sub-period, Vietnamese institutional investors' capital gains are taxed at 25%. Individual investors' dividends were taxed at the rate of 5% and they could choose to pay 20% of capital gains or 0.1% of selling price during the period from January 2010 to July 2011. Although individual investors registered to pay 20% of capital gains, they had to pay 0.1% of selling price at the time of transaction as a temporary tax payment and they would finalise their tax payment with the registered rate at the end of each year. From August 2011, in order to support and encourage investment from invidual investors in economic recession, Vietnamese government decreased tax rates for their dividends and capital gains to 0% and by 50% respectively. Remarkably, over the whole research period, foreign institutional investors only paid a flat tax rate of 0.1% of selling price. Unlike in the U.S. market, dividends are not charged any taxes after taxed at such rates. In all cases, the flat tax rate on selling price can be considered as transaction cost.

RESEARCH DESIGN

In line with prior studies, we investigate both stock price behaviour and trading volume around the ex-dividend day with the event study methodology to determine whether short-term traders are marginal investors on the ex-day. The former is

initially and commonly used but not enough to find marginal investors due to other factors (e.g. taxes, market liquidity), thus the latter is employed (Lakonishok & Vermaelen, 1986). Furthermore, OLS regression analysis investigating the relationship between dividend yield and abnormal return on the ex-day is also used to find evidence of marginal traders.

Table 3
Expected price drop to dividend ratios under the impact of tax policy from 2006 to 2011

Single marginal investors	Tax rate for dividends	Tax rate for capital gain	Expected price drop to dividend ratios
1st sub-period			
Individual investors	0%	0%	1.00
Vietnamese institutional investors	0%	28%[A] and 25%[B]	1.39[A] and 1.33[B]
Foreign institutional investors	0%	0.1% of selling price	1.00
2nd sub-period			
Individual investors	5%[C] and 0%[D]	20% or 0.1% of selling price[C] and 10% or 0.05% of selling price[D]	1.19 if investors register to pay 20% capital gains, otherwise 0.95[C] and 1.01 if investors register to pay 20% capital gains, otherwise 1.00[D]
Vietnamese institutional investors	0%	25%	1.33
Foreign institutional investors	0%	0.1% of selling price	1.00

Notes: 1st sub-period is from January 2006 to December 2009; 2nd sub-period is from January 2010 to December 2011; [A] is from to January 2006 to December 2009; [B] is from January 2010 to December 2011; [C] is from January 2010 to July 2011; [D] is from August 2011 to December 2011.

Source: Circular No. 100/2004/TT-BTC, Law No. 09/2003/QH11, Law No. 14/2008/QH12, Law No. 04/2007/QH12, Circular No. 134/2008/TT-BTC, Decree No. 101/2011/ND-CP and Circular 160/2009/TT-BTC.

Ex-dividend Stock Price Behaviour

When making decisions of selling stocks on cum-dividend days or on ex-dividend days, investors face trade-off between the right to collect dividend payment and a decrease in stock price. If they sell stocks on cum-days, they lose the right. However, if they sell stocks on ex-days, they have to accept lower price (Elton & Gruber, 1970). In a perfect market without market frictions including taxes, transaction costs and risk, the difference between stock price on the last cum-day and the ex-day should be equal to dividend amount (Miller & Modigliani, 1961). This argument is presented in the following equation:

$$P_c - P_e = D \tag{6}$$

Where P_c is closing price on the last cum-day and P_e is expected closing price on the ex-day.

Dividing both sides of the equation by dividend amount (D), we get the original definition of ex-day price drop ratio denoted as PDR_1:

$$PDR_1 = \frac{P_c - P_e}{D} \tag{7}$$

According to Kalay (1982) and Naranjo, Nimalendran and Ryngaert (2000), closing price of a stock is significantly impacted by its daily normal return; therefore, this price should be adjusted. The most commonly used measure to adjust ex-day closing price in prior studies is daily market return (R_m). In this study, daily return of VN-INDEX is used as a proxy for daily market return. The market-adjusted ratio ($APDR_1$) is as follows:

$$APDR_1 = \frac{P_c - [P_e/(1 + R_m)]}{D} \tag{8}$$

Moreover, it is more likely that using the price drop to dividend ratio leads to heteroscedasticity (Boyd & Jagannathan, 1994; Eades et al., 1984; Michaely, 1991). When dividend amount is used as a deflator, the weight allocated to changes in observations which have low dividends is extremely large. In line with Milonas, Travlos, Xiao and Tan (2006), we scale the ex-dividend day price drop by the stock price on the last cum-day and obtain the new ratio as follows:

$$PDR_2 = \frac{P_c - P_e}{P_c} \tag{9}$$

Similarly, market-adjusted price drop is deflated by cum-day price.

$$APDR_2 = \frac{P_c - [P_e/(1 + R_m)]}{D} \tag{10}$$

Moreover, following prior studies, we also investigate behaviour of stock price around ex-dividend days with event-study methodology proposed by Brown and Warner (1985). Event window to examine stock price behaviour is 21 days from Day –10 to Day +10 where the ex-day is considered as Day 0. Abnormal returns (AR) and cumulative abnormal returns (CAR) are computed based on an estimation window of 120 days starting from Day –130 and ending on Day –11. Estimation methods include market-adjusted return model and market model where VN-INDEX is used to measure daily market return.

According to Miller and Modigliani (1961), the price drop is equal to dividend amount in a perfect market. Therefore, the theoretical value of price drop ratios scaled by dividend amount is one, theoretical value of those deflated by cum-day price is dividend yield and theoretical value of abnormal returns is zero. In case the observed value of these measures are no equal to the theoretical ones, two theories including tax-induced clientele theory and transaction cost theory can explain behaviour of stock price due to the trading regulations of Vietnamese stock market presented. Firstly, if the stock price behaviour is affected by different taxation of dividends and capital gains, in consistence with Elton and Gruber's model illustrated in Equation (1), price drop to dividend ratios with corresponding single marginal investors are demonstrated in Table 3. In addition, although according to Elton and Gruber's original theory abnormal returns (ARs) on ex-days and cumulative abnormal returns (CARs) in the pre and the post ex-day period should be constrained to zero, the extensive analysis developed by Green (1980) shows that abnormal returns may be present on and around ex-days. Green (1980) argues that when delaying or advancing a transaction due to tax policy is expensive, investors charged with high tax rates tend to sell stocks on the last cum-day and buy stocks on the ex-day. This leads to positive abnormal returns and negative abnormal returns in the pre- and the post ex-dividend periods, respectively.

Secondly, if the stock price behaviour is impacted by transaction costs, possible marginal investors whose dividends and capital gains are charged at the same tax rate are individual investors (except over the period from January 2010 to July 2011) and foreign institutional investors due to tax policy. Moreover, most arbitrage trading activities are conducted to capture dividends (i.e. buying shares before ex-days and selling shares after ex-days) since short-selling is prohibited. This indicates that abnormal returns (ARs) and cumulative abnormal returns (CARs) are positive over the period before stocks go ex-dividend and negative after stocks go ex-dividend (Lakonishok & Vermaelen, 1986).

Moreover, when investors purchase shares before the ex-day and sell them after the ex-day, we have the following equation:

$$1 - \frac{\alpha P}{D} = \frac{P_c - P_e}{D} \tag{11}$$

Rearranging Equation (11), we obtain:

$$\alpha = \left(1 - \frac{P_c - P_e}{D}\right) \frac{D}{P} \tag{12}$$

In Vietnamese stock market, a seller pays brokerage fee from 0.15% to 0.35%, a flat tax rate of 0.1% (if any) and other fees for legal service, consutlting service, portfolio management service, etc. Therefore, the minimum value of a round-trip transaction cost α is from 0.3% and the maximum value is equal to 0.9% plus other fees. If the value of α calculated with Equation (12) is consistent with this range, it is also evidence of dividend capture.

Ex-dividend Trading Volume Behaviour

Lakonishok and Vermaelen (1986) posit that examining the reaction of stock price around ex-dividend days is not applicable to recognise whether ex-dividend day behaviour of stock price is explained by long-term or short-term trading theories. Therefore, they propose using trading volume as a new evidence to point out marginal investors affecting stock prices on ex-dividend days. If excessive trading volume is found around ex-dividend days, the stock market is dominated by short-term traders. However, if abnormal trading volume is found positive before and on ex-days but negative after ex-days, long-term traders are marginal investors (Green, 1980). In line with prior studies, this study uses the methodology of event study to calculate abnormal trading volume (AV) around ex-days mean-adjusted model (Kato, Kato, Loewenstein, & Loewenstein, 1995; Lakonishok & Vermaelen, 1986). Event window is 21 days from Day –10 to Day +10 and estimation window contains 30 observations from Day –40 to Day –11. Trading volume (%) is proxied by daily share turnover measured by total trading volume each day divided by number of shares outstanding.

The Relationship between Dividend Yield and Abnormal Return

Prior studies show that relationship between dividend yield and abnormal return is also evidence to clarify whether ex-dividend stock price anomaly is present and which group of investors dominates the market on ex-dividend days (Al-Yahyaee, 2007; Kato et al., 1995; Michaely & Vila, 1996; Naranjo et al., 2000).

Where long-term investors are marginal traders on the ex-day, rearranging Equation (1) we calculate the ex-day return (R_e) by the following equation:

$$R_e = \frac{P_e - P_c + D}{P_c} = \frac{D}{P_c}\left(\frac{t_d - t_g}{1 - t_g}\right) \tag{13}$$

Return and abnormal return have the same relationship with dividend yield. Hence, Equation (13) implies that the relationship between dividend yield and abnormal return relies on the difference between the tax rate on dividends (t_d) and the tax rate on capital gains (t_g) with three possible cases. Firstly, if there is no

different taxation between dividends and capital gains, the abnormal return is zero. Secondly, if the difference is positive, dividend yield is positively correlated to abnormal return. Thirdly, if the difference is negative, dividend yield is negatively related to abnormal return.

However, determination of the relationship between dividend yield and abnormal return is more complicated if marginal traders are short-term traders. In Vietnamese stock market, t_0 is equal to zero, rearranging Equation (3) we get:

$$R_e = \frac{P_e - P_c + D}{P_c} \leq \frac{\alpha P}{P_c} \equiv R_c \tag{14}$$

Where R_c is the maximum ex-day return in line with equilibrium when dividend capture investors are present.

When dividend capture investors determine the ex-day return, $P_e = (1 + R_c)P_c - D$. In line with Karpoff and Walkling (1990), substituting for P_e in Equation (14) and differentiating R_c with respect to dividend yield (D/P_c) we obtain:

$$\frac{\partial R_c}{\partial (D/P_c)} = - \frac{2\alpha}{1 - 2\alpha} \tag{15}$$

Equation (15) indicates three cases for the relationship between dividend yield and abnormal return on the ex-day. Firstly, if $\alpha < 1/2$, there is a negative relationship between dividend yield and the value of R_c. Consequently, stocks with higher dividend yields have higher abnormal returns. Secondly, if $\alpha > 1/2$, dividend yield is positively related to the value of R_c. This leads to a negative relationship between dividend yield and abnormal return. Thirdly, if $\alpha = 1/2$, dividend yield and abnormal return have no association. However, according to Vietnamese institutional environment, the transaction costs include brokerage fees for successful stock varing from 0.15% to 0.35% of transaction value and flat tax rate of selling price (if any). Hence, α is less than 50%. This indicates that if dividend capture investors are marginal traders on the ex-day, dividend yield is negatively related to abnormal return on the ex-day.

In consistence with Al-Yahyaee (2007), Dasilas and Leventis (2011), Kato et al. (1995), Michaely and Vila (1996), and Naranjo et al. (2000), we develop a regression model to investigate the relationship between dividend yield and abnormal return while controlling for the effects of stock liquidity, abnormal trading volume, firm size and dividend payment frequency. The regression model is presented as follows:

$$AR_0 = \beta_0 + \beta_1 DY + \beta_2 AVV + \beta_3 AV_0 + \beta_4 SIZ + \beta_5 YEA + \beta_6 SEM \tag{16}$$

Where: AR_0 is the abnormal return on the ex-day. *DY* is dividend yield. *AVV* is average trading volume calculated from the estimation window of 30 observations from Day –40 to Day –11. AV_0 is the abnormal trading volume on the ex-day. *SIZ* is firm size measured by natural logarithm of market capitalisation. *YEA* is a dummy variable assigned 1 if the dividend is paid annually and 0 otherwise. *SEM* is a dummy variable assigned 1 if the dividend is paid semi-annually and 0 otherwise.

RESEARCH DATA

Sample Selection

Database for this study is provided by Tan Viet Securities Company (www.tvsi.com.vn) and cross-checked with Stockbiz's (www.stockbiz.vn). The sample period is from 1 January 2006 to 31 December 2011. To avoid bias in the research findings, observations are eliminated from the research sample if they meet the following criteria:

1. Observations experiencing events, namely stock splits, stock dividends, share repurchases and right issues within 21 days from Day –10 to Day +10;
2. Observations with missing or incomplete information including price data, trading volume data and dividends;
3. Observations without transactions for more than 10 days in the estimation period.

After the above elimination, the research sample contains 781 observations. Following Milonas et al. (2006), we remove 3% of outliers including 1.5% of highest and 1.5% of lowest values of raw day price drop ratio (PDR_1). As a result, the final research sample includes 757 observations from 277 firms.

Descriptive Statistics

Table 4 presents the descriptive statistics of dividend, dividend yield, price drop and four price drop ratios for the full sample of 757 observations (Panel A), the first sub-sample of 332 observations over the period from 2006 to 2009 (Panel B) and the second sub-sample of 425 observations during the period from 2010 to 2011 (Panel C). Panel A shows that the mean and the median of dividend are 1.056 and 1.000 while the corresponding measures of price drop on the ex-dividend day are lower at 0.755 and 0.600, respectively. In addition, the mean (median) of

price drop to dividend ratios raw and adjusted by daily market return (i.e. PDR_1 and $APDR_1$) which are 0.659 (0.667) and 0.635 (0.749), respectively, also implies that price drop is smaller than dividend on the ex-day. The average value of price drop to dividend ratio in Vietnamese stock market is lower than that in the U.S. market which is 0.788 (Jakob & Ma, 2007) and higher than that in Hong Kong stock market which is 0.432 (Frank & Jagannathan, 1998). Moreover, the location measures of unadjusted ex-dividend day price drop to the last cum-day stock price ratio (PDR_2) and market-adjusted ex-dividend day price drop to the last cum-day stock price ratio ($APDR_2$) are smaller than those of dividend yield. This is consistent with the findings in Hong Kong stock market although average ex-dividend day price drop to the last cum-day stock price ratio and dividend yield in Vietnamese stock market are higher (Frank & Jagannathan, 1998).

Table 4
Descriptive statistics of dividend, dividend yield, price drop and price drop ratio

	DIV	DY	$P_c - P_e$	PDR_1	$APDR_1$	PDR_2	$APDR_2$
Panel A: Full sample, N = 757							
Mean	1.056	0.043	0.755	0.659	0.635	0.034	0.034
Median	1.000	0.036	0.600	0.667	0.749	0.028	0.027
St. deviation	0.566	0.029	1.288	1.204	1.051	0.043	0.040
1st-quartile	0.700	0.021	0.000	0.000	0.228	0.000	0.006
3rd-quartile	1.200	0.057	1.300	1.200	1.113	0.059	0.053
Panel B: Sub-sample 2006−2009, N = 332							
Mean	0.991	0.032	0.702	0.683	0.649	0.025	0.025
Median	0.900	0.024	0.600	0.667	0.810	0.021	0.021
St. deviation	0.535	0.022	1.585	1.505	1.260	0.039	0.033
1st-quartile	0.600	0.016	−0.100	−0.134	0.166	−0.005	0.004
3rd-quartile	1.200	0.042	1.500	1.500	1.204	0.050	0.041
Panel C: Sub-sample 2010−2011, N = 425							
Mean	1.107	0.052	0.796	0.641	0.624	0.041	0.040
Median	1.000	0.047	0.600	0.667	0.723	0.033	0.034
St. deviation	0.584	0.031	0.997	0.903	0.854	0.044	0.043
1st-quartile	0.700	0.029	0.200	0.250	0.263	0.009	0.010
3rd-quartile	1.347	0.066	1.200	1.083	1.075	0.066	0.061

Notes: DIV is dividend per share in 1000 VND. DY is dividend yield calculated by dividend per share divided by cum-day price. $P_c - P_e$ is the difference between cum-day price (P_c) and ex-day price (P_e). PDR_1 is unadjusted price drop to dividend ratio. $APDR_1$ is market-adjusted price drop to dividend ratio. PDR_2 is unadjusted price drop to cum-day price ratio. $APDR_2$ is market-adjusted price drop to cum-day price ratio.

Panel B and Panel C also illustrates that price drop is less than dividend in the two sub-samples. The price drop to dividend ratios namely PDR_1 and $APDR_1$ are lower but the price drop to cum-day price ratios including PDR_2 and $APDR_2$ are higher in the period from 2010 to 2011. One explanation is that stock prices are much lower in the period from 2010 to 2011 as shown in Figure 1.

EMPIRICAL FINDINGS

Ex-dividend Stock Price Behaviour

Table 5 shows the reaction of stock price on the ex-dividend day by comparing theoretical and observed values of mean and median for four variables including PDR_1, $APDR_1$, PDR_2 and $APDR_2$. Theoretical values of price drop to dividend ratios (i.e. PDR_1 and $APDR_1$) are one and those of price drop to cum-day price ratios (i.e. PDR_2 and $APDR_2$) are corresponding dividend yields. The differences between mean values of theoretical and observed values are tested by *t*-test whilst the differences between median values are tested by the non-parametric Wilcoxon signed rank test.[1] It is clear that the observed values of mean PDR_1, $APDR_1$, PDR_2 and $APDR_2$ are less than their theoretical values at the significant level of 1% in the full sample and two sub-samples. In addition, the non-parametric test also illustrates that there are significant differences between the theoretical mean values of price drop ratios and that their observed median values at 1%. The high consistence in the results of *t*-test and Wilcoxon signed rank test indicates that contrary to Miller and Modigliani's perfect market argument supporting the indifference between dividend payment and price drop on the ex-day, in this case investors are not indifferent between dividends and capital gains.

However, Table 3 shows that most of the expected price drop to dividend ratios under the impact of tax policy from 2006 to 2011 are equal to or greater that one. Only when individual investors who pay 0.1% of selling price without registering to pay 20% of capital gains are marginal traders from January 2010 to July 2011, the expected price drop to dividend ratio is equal to 95% whilst the mean price drop to dividend ratios (i.e. PDR_1 and $APDR_1$) varies from 60% to 70% in the full sample and two sub-samples. Therefore, we find that the tax treatment of dividends and capital gains is unable to explain the ex-dividend day stock price behaviour in Vietnamese stock market. In this case, only the dividend capture hypothesis is possible for explanation of this ex-day stock price anomaly. In addtion, we find that there are only 5.8% of observations with which dividend amounts are rounded down to next ticks. The average price drop to dividend ratio on ex-dividend days of these observations decreases only 0.07 under the impact of price adjusment while the mean and median values of PDR_1 and $APDR_1$ are

lower than 0.75. This implies that the price discreteness hypothesis suggested by Bali and Hite (1998) also fails to explain this anomaly significantly. Thus, we continue to investigate effects of dividend capture trading on ex-day returns by examining stock price behaviour around ex-dividend days.

Table 5
Ex-dividend day stock price behaviour

	Mean			Median		
	Theoretical value	Observed value	*t*-statistic	Theoretical value	Observed value	*p*-value
Panel A: Full sample, N = 757						
PDR_1	1.000	0.659***	−7.782	1.000	0.667***	0.000
$APDR_1$	1.000	0.635***	−9.553	1.000	0.749***	0.000
PDR_2	0.043	0.034***	−8.811	0.036	0.028***	0.000
$APDR_2$	0.043	0.034***	−11.547	0.036	0.027***	0.000
Panel B: Sub-sample 2006 – 2009, N = 332						
PDR_1	1.000	0.683***	−3.841	1.000	0.667***	0.000
$APDR_1$	1.000	0.649***	−5.078	1.000	0.81***	0.000
PDR_2	0.032	0.025***	−3.913	0.024	0.021***	0.000
$APDR_2$	0.032	0.025***	−5.792	0.024	0.021***	0.000
Panel C: Sub-sample 2010 – 2011, N = 425						
PDR_1	1.000	0.641***	−8.186	1.000	0.667***	0.000
$APDR_1$	1.000	0.624***	−9.068	1.000	0.723***	0.000
PDR_2	0.052	0.041***	−8.582	0.047	0.033***	0.000
$APDR_2$	0.052	0.040***	−10.227	0.047	0.034***	0.000

Notes: PDR_1 is unadjusted price drop to dividend ratio. $APDR_1$ is market-adjusted price drop to dividend ratio. PDR_2 is unadjusted price drop to cum-day price ratio. $APDR_1$ is market-adjusted price drop to cum-day price ratio. *A significant difference from the theoretical value at the 10% level. ** A significant difference from the theoretical value at the 5% level. *** A significant difference from the theoretical value at the 1% level.

Table 6 presents abnormal returns and cumulative abnormal returns around ex-dividend days calculated by both market model and mean adjusted model for the full sample and for two sub-samples. Panel A shows that in the full sample, abnormal returns are significantly positive on many days in the pre ex-day period and significantly negative on Day +1. In the sub-sample from 2006 to 2009, abnormal returns are positive at 1% of significance for both models on Day –5; however, abnormal returns in the post ex-dividend day period are not significantly different from zero despite their negative average values from Day +1 to Day +8. The sub-sample for the period between 2010 and 2011 gives similar

Table 6
Abnormal returns (%) and cumulative abnormal returns (%) around ex-dividend day

Day	Full sample (N = 757)		Sub-sample 2006–2009 (N = 332)		Sub-sample 2010–2011 (N = 425)	
	Market model	Mean adjusted	Market model	Mean adjusted	Market model	Mean adjusted
Panel A: Abnormal return (%)						
−10	−0.002	−0.005	0.010	0.062	−0.012	−0.057
−9	0.170**	0.215**	0.143	0.157	0.190*	0.261**
−8	0.176*	0.115	0.117	0.057	0.222*	0.161
−7	0.255***	0.243**	0.198	0.166	0.300***	0.303**
−6	0.251***	0.269***	0.212	0.304*	0.283**	0.242**
−5	0.393***	0.512***	0.491***	0.678***	0.317***	0.382***
−4	0.299***	0.220**	0.287**	0.192	0.308***	0.242**
−3	0.144	0.163	0.127	0.251	0.157	0.095
−2	0.182**	0.093	0.014	−0.027	0.313***	0.187
−1	0.014	0.018	−0.128	−0.029	0.125	0.054
0	0.934***	0.900***	0.520***	0.556***	1.257***	1.168***
1	−0.176**	−0.203*	−0.101	−0.085	−0.234**	−0.295**
2	−0.058	0.032	−0.108	0.038	−0.019	0.028
3	−0.134	−0.205*	−0.012	−0.041	−0.229**	−0.334***
4	−0.109	−0.115	−0.093	−0.092	−0.121	−0.132
5	−0.053	−0.096	−0.058	−0.060	−0.048	−0.125
6	−0.022	0.067	0.041	0.190	−0.072	−0.028
7	−0.037	−0.036	−0.109	−0.062	0.020	−0.016
8	0.037	0.007	−0.159	−0.207	0.191	0.174
9	0.009	−0.028	0.134	0.187	−0.089	−0.196
10	0.010	0.041	0.007	0.112	0.012	−0.015
Panel B: Cumulative abnormal return (%)						
CAR (−10 −1)	1.882***	1.844***	1.473***	1.812**	2.020***	1.868***
CAR (−4 −1)	0.639***	0.494**	0.301	0.388	0.090***	0.578**
CAR (−2 −1)	0.196	0.111	−0.113	−0.055	0.044***	0.241
CAR (+1 +2)	−0.234*	−0.171	−0.209	−0.048	−0.025	−0.267
CAR (+1 +4)	−0.477**	−0.491**	−0.315	−0.181	−0.060**	−0.733***
CAR (+1 +10)	−0.532*	−0.536	−0.460	−0.021	−0.059	−0.939**

Note: CAV is cumulative abnormal returns. *A significant difference from zero at the 10% level. **A significant difference from zero at the 5% level. ***A significant difference from zero at the 1% level.

results as shown in the full sample. Overall, these findings indicate that abnormal returns are positive before the ex-day and negative after the ex-day. Moreover, Panel A also illustrates that abnormal returns on the ex-day are highest in the event period and statistically significant at 1% for two measurement techniques in the full samples and both sub-samples. These results are in line with the findings presented in Table 5, which show that price drop is much lower than dividend payment on the ex-dividend day.

In line with the findings presented in Panel A, Panel B shows that cumulative abnormal returns in the pre ex-day period namely CAR (–10 –1) and CAR (–4 –1) are statistically different from zero with the significant levels from 1% to 5% for the entire sample and for two sub-samples in both models. Cumulative abnormal returns are negative but not different from zero in the first sub-sample whilst cumulative abnormal return from Day +1 to Day +4 for both market model and mean-adjusted model is significantly negative in the second sub-sample.

Table 7
Estimated mean and median of round-trip transaction cost α (%)

Full sample (N = 757)				Sub-sample 2006−2009 (N = 332)				Sub-sample 2010−2011 (N = 425)			
Unadjusted P_e		Adjusted P_e		Unadjusted P_e		Adjusted P_e		Unadjusted P_e		Adjusted P_e	
Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
0.88	1.24	0.97	0.95	1.09	1.41	1.20	1.30	0.61	0.91	0.68	0.57

However, positive abnormal returns in the pre ex-day period and negative abnormal returns in the post ex-day period are not sufficient to conclude that the ex-day behaviour of stock price is consistent with dividend capture trading since stock abnormal returns are also determined by market liquidity. If market liquidity causes abnormal buying pressure before the ex-day, abnormal returns are positive and if it causes abnormal selling pressure after the ex-day, abnormal returns become negative. Therefore, we continue to investigate the applicability of dividend capture trading with trading volume behaviour around the ex-day.

Moreover, in accordance with Equation (12), we calculate the mean and the median value of round-trip transaction cost α with unadjusted and adjusted stock price on the ex-dividend day. Table 7 shows that both the mean and the median value are from about 0.6% to 1.4%. This range is consistent with transaction costs which sellers are likely to pay in Vietnamese stock market. Furthermore, transaction costs are lower from 2010 to 2011. This can be explained that the stock market is more developed and the market of supporting services is more competitive in this period.

Ex-dividend Trading Volume Behaviour

Lakonishok and Vermaelen (1986) assert that trading volume is evidence to identify marginal investors affecting stock prices on ex-dividend days. Significantly positive abnormal trading volume both before and after the ex-dividend day is evidence-supporting dividend captures trading activities and dividend capture traders are marginal investors in the stock market on the ex-day.

Table 8 illustrates abnormal trading volume and cumulative abnormal trading around ex-dividend days. Panel A shows that in the full sample, significantly positive abnormal trading volume is present in the ten trading days before the ex-day and in two particular days after the ex-day (i.e. Day +4 and Day +5). Similarly, in the first sub-sample, there are seven days within pre ex-dividend period and three days in the post ex-dividend period experiencing significantly positive abnormal trading volume. In the second sub-sample, the evidence of abnormal trading volume in the period prior to the ex-day is consistent with buying pressure; however, the evidence abnormal trading volume of selling pressure in the post ex-day period appears mixed.

One of explanations for the differences in ex-dividend trading volume behaviour and stock price behaviour in the two sub-samples is market liquidity which is measured by average trading volume calculated from the estimation window of 30 observations from Day –40 to Day –11. Table 8 shows that the mean of average trading volume of over the second period between 2010 and 2011 is lower than in the first period from 2006 to 2009 (0.358% vs. 0.503%) and their difference is statistically significant at 1% with *t*-test. Therefore, short-term investors who buy stocks before the ex-day find it more difficult to sell them after they go ex-dividend in the second period. This leads to insignificantly positive abnormal trading and considerably lower and significantly less than zero abnormal returns after the ex-day (as showed in Table 6).

Panel B, Table 8 presents cumulative abnormal trading volume calculated by mean adjusted model around ex-dividend days. Consistent with Panel A, cumulative abnormal trading volume before the ex-dividend day is positive at the significant level of 1% and CAV (–1 +1) is also significantly different from zero in both the full sample and two sub-samples. For the post ex-day period, CAV (+1 +6) is positive at the significant level of 10% in the full sample and CAV (+1 +2) and CAV (+1 +6) are positive at the significant levels of 1% and 10%, respectively in the first sub-sample. These results support the hypothesis of short-term trading activities around the ex-dividend day.

Table 8
Abnormal trading volume and cumulative abnormal trading volume around ex-dividend days

Day	Full sample (N = 757)	Sub-sample 2006 – 2009 (N = 332)	Sub-ample 2010 – 2011 (N = 425)
Panel A: Abnormal trading volume (%)			
–10	0.082***	0.107**	0.063*
–9	0.043**	0.037	0.047*
–8	0.054**	0.051	0.056*
–7	0.060**	0.105**	0.025
–6	0.090**	0.113	0.072**
–5	0.098***	0.072*	0.118***
−4	0.092***	0.115***	0.075**
–3	0.098***	0.139***	0.066**
–2	0.112***	0.123**	0.103**
–1	0.140***	0.140***	0.141***
0	0.052**	0.035	0.066**
1	0.023	0.040	0.010
2	0.027	0.009	0.040
3	0.021	0.014	0.028
4	0.070*	0.107**	0.042
5	0.059**	0.072*	0.049
6	0.042	0.083	0.010
7	0.033	0.039	0.029
8	−0.011	0.025	0.000
9	0.027	0.033	0.022
10	0.047	0.097*	0.008
Panel B: Cumulative abnormal trading volume (%)			
CAV (−10 −1)	0.868***	1.000***	0.766***
CAV (−6 −1)	0.630***	0.701***	0.574***
CAV (−2 −1)	0.252***	0.262***	0.243***
CAV (−1 +1)	0.215***	0.214**	0.216**
CAV (+1 +2)	0.049	0.049***	0.050
CAV (+1 +6)	0.242*	0.324*	0.178
CAV (+1 +10)	0.338	0.467	0.237

Notes: Abnormal trading volume is measured by mean adjusted model with the estimation window of 30 observations from Day −40 to Day −11. CAV is cumulative abnormal trading volume. *A significant difference from zero at the 10% level. **A significant difference from zero at the 5% level. ***A significant difference from zero at the 1% level.

The relationship between dividend yield and abnormal return

Table 9 shows summary statistics of variables in the regression model for full sample and both sub-samples. Panel A illustrates that mean and median ex-day abnormal returns (AR_0) of the full sample are 0.934% and 0.999%, respectively and the standard deviation is extremely large, at 2.485%. This implies that the distribution of ex-day abnormal return witnesses an approximate symmetry but large variability. The average values of dividend yield (DY), average trading

Table 9
Descriptive statistics for regression analysis

Variables	Median	Mean	Standard deviation	1st quartile	3rd quartile
Panel A: Full sample, N = 757					
AR0 (%)	0.999	0.934	2.485	−0.515	2.618
DY (%)	3.650	4.336	2.943	2.110	5.686
AVV (%)	0.219	0.422	0.591	0.094	0.521
AV0 (%)	−0.024	0.052	0.651	−0.141	0.113
SIZ	19.742	20.030	1.360	19.067	20.733
YEA	1.000	0.597	0.491	0.000	1.000
SEM	0.000	0.316	0.465	0.000	1.000
Panel B: Sub-sample 2006−2009, N = 332					
AR0 (%)	0.511	0.520	2.298	−0.955	1.982
DY (%)	2.390	3.194	2.182	1.626	4.167
AVV (%)	0.269	0.503	0.675	0.142	0.570
AV0 (%)	−0.026	0.035	0.643	−0.174	0.159
SIZ	19.741	20.007	1.394	19.007	20.722
YEA	1.000	0.539	0.499	0.000	1.000
SEM	0.000	0.328	0.470	0.000	1.000
Panel C: Sub-sample 2010−2011, N = 425					
AR0 (%)	1.402	1.257	2.579	−0.248	2.955
DY (%)	4.651	5.229	3.148	2.950	6.604
AVV (%)	0.171	0.358	0.508	0.066	0.433
AV0 (%)	−0.022	0.066	0.657	−0.116	0.073
SIZ	19.751	20.048	1.335	19.120	20.742
YEA	1.000	0.642	0.480	0.000	1.000
SEM	0.000	0.306	0.461	0.000	1.000

Notes: AR_0 is the abnormal return on the ex-day. DY is dividend yield. AVV is average trading volume calculated from the estimation window of 30 observations from Day −40 to Day −11. AV_0 is the abnormal trading volume on the ex-day. SIZ is firm size measured by natural logarithm of market capitalisation. YEA is a dummy variable assigned 1 if dividends are paid annually. SEM is a dummy variable assigned 1 if the dividends are paid semi-annually.

volume (AVV) and ex-day abnormal trading volume (AV_0) are 0.043, 0.422% and 0.052%, respectively and their distribution is highly skewed and of considerable variability. Firm size's distribution has moderate skewness due to small difference between its mean and median (i.e. 20.030 and 19.742) and remarkably small standard deviation. Moreover, descriptive statistics illustrate that the first period constitutes 43.9% observations of the full sample. Like in the U.S and Japan, number of dividend payment per year in Vietnam is not limited. Table 9 illustrates that there are 59.7% and 31.6% of observations paying dividends annually and semi-annually, respectively and 8.7% paying dividends more than two times per year. The percentage of observations with semi-annually basis in Vietnam is approximately half of that in Japan at 69% (Kato et al., 1995).

Panel B and Panel C show that average abnormal return and abnormal trading volume on the ex-day in the period from 2006 to 2009 are about half of those in the period from 2010 to 2011. This is consistent with Dasilas and Leventis (2011) positing that when the ex-day return is impacted by dividend capture traders, short-term trading exists on and around the ex-day and abnormal trading volume tends to be positively related to abnormal return on the ex-day. Moreover, the means values of average trading volume (AVV) and dividend yield (DY) in the first period (i.e. 0.503% and 3.194%) are respectively higher and lower than corresponding measures in the second period (i.e. 0.358% and 5.229%).

Table 10
Regression results

Explanatory variables	Full sample		Sub-sample 2006 – 2009		Sub-sample 2010 – 2011	
	Coefficients	*t*-statistics	Coefficients	*t*-statistics	Coefficients	*t*-statistics
Intercept	2.332	1.550	0.158	0.080	6.999***	3.170
DY	−8.143**	−2.440	−12.538**	−1.990	−16.189***	−3.710
AVV	−0.194	−1.260	0.011	0.060	−0.309	−1.240
AV0	0.266*	1.920	0.400**	2.020	0.143	0.750
SIZ	−0.082	−1.150	0.016	0.170	−0.265***	−2.600
YEA	0.674**	2.040	0.469	1.210	0.520	0.910
SEM	0.800**	2.320	0.500	1.210	0.634	1.080
Adj. R-squared	0.013		0.015		0.028	
F-statistics	2.68**		1.86*		3.07***	
Number of observations	757		332		425	

Notes: The dependent variable is abnormal return on the ex-day (AR_0) measured by market model. DY is dividend yield. AVV is average trading volume calculated from the estimation window of 30 observations from Day −40 to Day −11. AV_0 is the abnormal trading volume on the ex-day. SIZ is firm size measured by natural logarithm of market capitalization. YEA is a dummy variable assigned 1 if dividends are paid annually. SEM is a dummy variable assigned 1 if the dividends are paid semi-annually. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Table 10 presents OLS regression results for the entire sample and for two sub-samples. The dependent variable is ex-day abnormal return calculated by the market model. Dividend yield is negatively related to ex-day abnormal return at the significant level from 1% to 5% in the findings for the full sample and both sub-samples. These findings are contrary to the expected positive relationship between dividend yield and abnormal return on the ex-dividend day under the impact of taxation. In line with ex-dividend price and trading volume behaviour, the significantly negative relationship between dividend yield and abnormal return implies that dividend capture investors are marginal traders on the ex-day and the round-trip transaction cost α is smaller than 1/2 which is consistent with institutional environment of Vietnamese stock market and Table 7. In addition, in line with Dasilas and Leventis (2011); Lakonishok and Vermaelen (1986), the

Table 11
Abnormal returns and abnormal trading volume around ex-dividend days by dividend yield

Day	Abnormal returns (%)				Abnormal trading volume (%)			
	1st quartile	2nd quartile	3rd quartile	4th quartile	1st quartile	2nd quartile	3rd quartile	4th quartile
–10	−0.297*	0.031	0.089	0.159	–0.119	–0.026	0.046	0.083
–9	−0.112	0.099	0.114	0.495**	–0.090	0.321	0.204	0.432**
–8	−0.084	0.026	0.291*	0.416**	–0.271	0.017	0.285	0.436*
–7	0.030	0.006	−0.010	0.890***	0.053	–0.034	0.130	0.829***
–6	0.034	0.168	0.277	0.364*	0.256	–0.077	0.467**	0.418**
–5	0.175	0.333*	0.108	0.941***	0.222	0.754***	0.189	0.871***
–4	−0.125	0.142	0.427**	0.661***	–0.252	0.123	0.389*	0.610***
–3	−0.082	0.376**	0.251	0.065	–0.055	0.455**	0.233	0.009
–2	0.095	0.059	0.323*	0.272	–0.005	0.070	0.261	0.033
–1	−0.087	−0.069	0.107	0.023	–0.022	–0.124	0.271	–0.065
0	0.761***	1.150***	1.376***	0.636***	0.670***	1.101***	1.325***	0.512**
1	0.149	–0.218	–0.274	–0.400**	0.169	–0.388*	–0.107	–0.476**
2	0.116	–0.007	–0.109	–0.188	0.275	0.025	0.095	–0.256
3	–0.055	–0.064	−0.091	−0.402**	–0.071	–0.244	–0.251	–0.275
4	–0.271	0.281*	−0.193	−0.149	–0.389*	0.192	0.019	–0.300
5	–0.239	0.022	0.032	0.043	–0.392*	–0.042	0.129	–0.099
6	–0.163	–0.022	−0.005	0.017	–0.018	–0.013	0.248	0.037
7	–0.256	0.241	−0.244	0.042	–0.363*	0.172	–0.136	0.163
8	–0.343**	0.101	0.169	0.121	–0.666***	0.175	0.223	0.279
9	–0.057	−0.038	0.129	−0.022	–0.285	–0.116	0.210	0.060
10	0.126	−0.046	0.066	−0.113	–0.014	0.076	0.241	–0.160

Note: Abnormal return is measured by market model. Abnormal trading volume is measured by mean adjusted model. *A significant difference from zero at the 10% level. **A significant difference from zero at the 5% level. ***A significant difference from zero at the 1% level.

ex-day abnormal trading volume is significantly associated with ex-day abnormal returns on the ex-dividend day at 10% and 5% in the results for the full sample and the first sub-sample respectively.

Moreover, the dividend capture theory also posits that short-term trading is more prevalent with high-yield stocks. We divide the full sample by quartiles of dividend yield and investigate abnormal returns and abnormal trading volume around ex-dividend days for each quartile. Table 11 indicates that abnormal returns before and after the ex-day are more prevalent in the 4th quartile. Abnormal trading volume in the pre ex-day period is also more prevalent in the 4th quartile.

CONCLUSION

This study investigates both abnormal returns and abnormal trading volume around the ex-dividend day in Vietnamese stock market that appears a promising laboratory due to its trading regulation and taxation based on the full sample of 757 observations. With the event study methodology, we are able to determine whether short-term traders are marginal investors in the ex-day. The findings show that although abnormal trading volume is not significant after stocks go ex-dividend, abnormal returns are significantly positive and negative in the pre and the post ex-dividend day period. Furthermore, the estimated value of mean and median of round-trip transaction cost α and the negative relationship between dividend yield and the ex-day abnormal return in OLS regression analysis are consistent with the institutional environment of the round trip transaction cost under Vietnamese institutional environment. Dividing the full sample by quartiles of dividend yield, we also find that abnormal returns before and after the ex-day are more prevalent in the last quartile. These results are supporting evidence for dividend capture theory.

NOTES

1. Using both parametric and non-parametric tests can avoid the problems of heteroscedasticity and lack of independence pointed out by Eades et al. (1984).

REFERENCES

Al-Yahyaee, K. H. (2007). Stock dividend ex-day effect and market microstructure in a unique environment. *International Economics*, *139*(October), 71–79. https://doi.org/10.1016/j.inteco.2014.04.002

Bali, R., & Hite, G. L. (1998). Ex dividend day stock price behavior: discreteness or tax-induced clienteles? *Journal of Financial Economics, 47*(2), 127–159. https://doi.org/10.1016/S0304-405X(97)00041-X

Boyd, J. H., & Jagannathan, R. (1994). Ex-dividend price behavior of common stocks. *Review of Financial Studies, 7*(4), 711–741. https://doi.org/10.1093/rfs/7.4.711

Brown, S. J., & Warner, J. B. (1985). Using daily stock returns: The case of event studies. *Journal of Financial Economics, 14*(1), 3–31. https://doi.org/10.1016/0304-405X(85)90042-X

Dasilas, A., & Leventis, S. (2011). Stock market reaction to dividend announcements: Evidence from the Greek stock market. *International Review of Economics & Finance, 20*(2), 302–311. https://doi.org/10.1016/j.iref.2010.06.003

Dubofsky, D. A. (1992). A market microstructure explanation of ex-day abnormal returns. *FM: The Journal of the Financial Management Association, 21*(4), 32.

Dubofsky, D. A. (1997). Limit orders and ex-dividend day return distributions. *Journal of Empirical Finance, 4*(1), 47–65. https://doi.org/10.1016/S0927-5398(96)00012-6

Eades, K. M., Hess, P. J., & Kim, E. H. (1984). On interpreting security returns during the ex-dividend period. *Journal of Financial Economics, 13*(1), 3–34. https://doi.org/10.1016/0304-405X(84)90030-8

Elton, E. J., & Gruber, M. J. (1970). Marginal stockholder tax rates and the clientele effect. *Review of Economics & Statistics, 52*(1), 68–74.

Frank, M., & Jagannathan, R. (1998). Why do stock prices drop by less than the value of the dividend? Evidence from a country without taxes. *Journal of Financial Economics, 47*(2), 161–188. https://doi.org/10.1016/S0304-405X(97)80053-0

Green, J. R. (1980). *Taxation and the ex-dividend day behavior of common stock prices.* NBER Working Paper No. 496. Retrieved from http://www.nber.org/papers/w0496

Jakob, K. J., & Ma, T. (2007). Are ex-day dividend clientele effects dead? Dividend yield versus dividend size. *Journal of Empirical Finance, 14*(5), 718–735. https://doi.org/10.1016/j.jempfin.2006.09.001

Kalay, A. (1982). Stockholder-bondholder conflict and dividend constraints. *Journal of Financial Economics, 10*(2), 211–233. https://doi.org/10.1016/0304-405X(82)90014-9

Karpoff, J. M., & Walkling, R. A. (1990). Dividend capture in NASDAQ stocks. *Journal of Financial Economics, 28*(1–2), 39–65. https://doi.org/10.1016/0304-405X(90)90047-4

Kato, K., Kato, K., Loewenstein, U., & Loewenstein, U. (1995). The ex-dividend-day behavior of stock prices: The case of Japan. *Review of Financial Studies, 8*(3), 817–847.

Lakonishok, J., & Vermaelen, T. (1986). Tax-induced trading around ex-dividend days. *Journal of Financial Economics, 16*(3), 287–319. https://doi.org/10.1016/0304-405X(86)90032-2

Michaely, R. (1991). Ex-dividend day stock price behavior: The case of the 1986 Tax Reform Act. *Journal of Finance, 46*(3), 845–859.

Michaely, R., & Vila, J. (1996). Trading volume with private valuation: Evidence from the ex-dividend day. *The Review of Financial Studies*, *9*(2), 471–509. https://doi.org/10.1093/rfs/9.2.471

Miller, M. H., & Modigliani, F. (1961). Dividend policy, growth, and the valuation of shares. In H. R. Vane & C. Mulhearn (Eds.), *Harry M. Markowitz, Merton H. Miller, William F. Sharpe, Robert C. Merton and Myrin S. Scholes*: *Elgar Reference Collection. Pioneering Papers of the Nobel Memorial Laureates in Economics* (pp. 113–135). vol. 2. Cheltenham, U.K. and Northampton, MA: Elgar.

Milonas, N. T., Travlos, N. G., Xiao, J. Z., & Tan, C. (2006). The ex-dividend day stock price behavior in the Chinese stock market. *Pacific-Basin Finance Journal, 14*(2), 155–174. https://doi.org/10.1016/j.pacfin.2005.06.004

Naranjo, A., Nimalendran, M., & Ryngaert, M. (2000). Time variation of ex-dividend day stock returns and corporate dividend capture: A reexamination. *Journal of Finance, 55*(5), 2357–2372.

Asian Academy of Management Journal of Accounting and Finance

AAMJAF Vol. 13, No. 2, 95–108, 2017

DOES HOT MONEY IMPACT STOCK AND EXCHANGE RATE MARKETS ON CHINA?

Lee Yen-Hsien[1], Huang Ya-Ling[2*] and Chen Tsu-Hui[3]

[1] Department of Finance, Chung Yuan Christian University, 200 Chung Pei Road. Chung Li 32023, Taiwan, R.O.C.
[2]Department of Golden-Ager Industry Management, Chaoyang University of Technology, 168 Jifong E. R., Wufong Township, Taichung County 41349, Taiwan, R.O.C.
[3]International Master of Business Administration, Chung Yuan Christian University, 200 Chung Pei Road. Chung Li 32023, Taiwan, R.O.C.

[*]Corresponding author: ylhuang@cyut.edu.tw

ABSTRACT

This study investigates the impact of hot money on stock and exchange rate markets and the returns and volatility spillover between the stock and exchange rate market in China by using the monthly data covering the period from July 2005 to June 2013. This paper also uses the quantile approach to determine whether the hot money influences the stock and exchange rate markets. The results first reveal the long-run equilibrium relationship that is exhibited between the stock and exchange rate market. Second, hot money has an impact on the stock market but has no effect on the exchange rate market, according to the VECM-BEKK model. Third, regarding the volatility spillover effects on the stock and exchange rate markets, there is a spillover effect on the Shanghai stock and exchange rate markets. Hot money has an impact on the stock and exchange rate markets. Finally, we apply the quantile regression to determine the impact of hot money on low quantiles of the exchange rate and high quantiles of the Shanghai and Shenzhen stock market.

Keywords: hot money, stock market, foreign exchange rate, BEKK model, quantile approach

Publication date: 28 February 2018

To cite this article: Lee, Y. H., Huang, Y. L., & Chen, T. H. (2017). Does hot money impact stock and exchange rate markets on China? *Asian Academy of Management Journal of Accounting and Finance, 13*(2), 95–108. https://doi.org/10.21315/aamjaf2017.13.2.5

To link to this article: https://doi.org/10.21315/aamjaf2017.13.2.5

INTRODUCTION

As the financial markets have become liberalised and international, the relationship between the stock market and the exchange rate market has become a popular issue for the economic literature to investigate and discuss. Currently, the analysis of the relationship between the stock market and the exchange rate market is more interesting and important in emerging markets such as the Chinese market. The Chinese government implemented the fixed peg exchange rate policy before 2005. As the financial markets were liberalised, the Chinese government released the exchange rate policy reform in July 2005, abolishing the fixed nominal exchange rate system for the U.S. dollar. Foreign governments had pressured the Chinese government to make their exchange rate more flexible and floating. As a result, the Chinese government shifted their system to a version of a currency basket system.

Over the past several decades, numerous studies have investigated the relationship between the stock market and the exchange rate market. These two markets are essential to the financial market. Prior studies often used the Johansen cointegration test to identify the relationship between the stock and exchange rate markets. Pan, Fok and Liu (2007) utilised the Johansen cointegration test to find the long-run equilibrium relationship between exchange rates and stock prices for the East Asian markets and found the long-run relationship between the markets was at least at a 10% level for Hong Kong, in the two sub-periods before the Asian financial crisis. Some studies have indicated that the linkage between the stock and exchange rates is a short-run relationship; Zhao (2010) used the Johansen cointegration method to determine the relationship between the stock and exchange rate market and used the GARCH method to study a short-term dynamic relationship between stock prices and exchange rates in China. Nevertheless, few studies have explored the relationship between Chinese stock prices and the exchange rates. One of the aims of our study is to investigate this relation in the Chinese market. Our finding is that there is a long-run equilibrium relationship between the markets.

To investigate the relationship between stock prices and exchange rates, there are two models for examining the casualty relationship of both markets. The international trading effect theory was formulated by Dornbusch and Fisher (1980), in reference to the goods market. The fluctuations of exchange rates have a direct influence on the profitability of a business and a firm's international competitiveness. The appreciation of exchange rates will decrease the exporters' sales, earnings, and stock prices, and vice versa. The portfolio balance effect (Frankel, 1983) was necessary for investors for hedging and the diversification

of portfolios. Because the previous relationship was changed, it provided a unidirectional causality from stock prices to exchange rates.

The hot money issue is quite an interesting topic in the financial market currently (Kim & Iwasawa, 2017; Fuertes, Phylaktis, & Yan, 2016; Tsai, Chiang, Tsai, & Liou, 2014). Because of globalisation, hot money[1] can spread around the world, especially in emerging markets. This study focused on the Chinese market, which is the biggest emerging market, and investigated their flow of hot money. After 2005, the Chinese government began the exchange rate policy reform, and the inflow and outflow of hot money became more frequent, as shown in Figure 1. Few papers have investigated how hot money has affected the stock and real estate markets (Guo & Huang, 2010; Xu & Chen, 2012). This paper investigates the impact on the stock and exchange rate markets as hot money flows into the Chinese market. A few studies have investigated the impact of hot money on the exchange rate and stock market. This study further examines the influence of hot money on the stock and exchange rate market after China implemented financial liberalisation in 2005.

Figure 1. The inflow and outflow of hot money

The quantile regression model is used to estimate the relation of these two markets under different market conditions (different quantiles of exchange rates, stock prices, and hot money). In this research, using the quantile regression method, we observe the impact of hot money on markets under various conditions. This study tests the impact of hot money on both the stock and exchange rate markets under different quantiles to determine the effect of hot money on both markets in declining or in rising markets.

This study has three objectives. First, this paper uses the cointegration method based on the Johansen cointegration model to identify the long-run relationship between the stock and exchange rate markets. Second, this study further examines the influence of hot money on the return and volatility on the stock and exchange rate markets. Finally, there is a lack of literature on the use of

quantile regression methods; therefore, this paper is intended to provide evidence of the impact of hot money on two markets in different quantiles.

DATA AND METHODOLOGY

This research mainly examines the impact of hot money on the stock and exchange rate markets in China. Our empirical data are from the monthly frequency time series dataset of the stock and foreign exchange markets in China covering the period from July 2005 to June 2013.[2] The information is collected from several resources:

1. Indices in China, including the Shanghai composite index and the Shenzhen composite index (hereafter, SH and SZ);
2. the foreign exchange rate in China and foreign direct investment monthly data from the *China Statistical Yearbooks Database*;
3. foreign exchange reserves and trade surplus in China from TEJ (Taiwan Economic Journal Database).

Following the studies from Zhang and Fung (2006) and Guo and Huang (2010), this paper defines the calculation of hot money (HM) as follows:

$$\mathrm{HM} = \mathrm{FER} - \mathrm{TSB} - \mathrm{FDI} \tag{1}$$

where FER, TSB and FDI denote the change in foreign exchange reserves, trade and service balance and foreign direct investment. The rates of change of the data series are calculated as:

$$R_{i,t} = \ln\left(\frac{P_{i,t}}{P_{i,t-1}}\right) \tag{2}$$

where $P_{i,t}$ is the price level of the market i ($i = e$ for exchange rate, $i = s$ for stock price) at the time, t. $R_{e,t}$ denotes the change of exchange rate; $R_{s,t}$ denotes the return on stock prices.

Johansen (1988) noted that the cointegration procedure is based on an unrestricted vector autoregressive (VAR) model for the ($n \times 1$) vector Y_t:[3]

$$\Delta Y_t = \prod Y_{t-1} + \sum_{i=1}^{k-1} \Gamma \Delta X_{t-\mathrm{i}} + \Phi D_t + \varepsilon_t \tag{3}$$

where Y_t explores the vectors of all the economic variables, the model (~I(1)) includes n variables, the Π, Γ, and Φ are parameter matrices to be estimated, D_t

contains deterministic terms (constant, trend, seasonal dummy) and ε_t denotes the white noise, which is the variable of I(0). There are two tests for the reduced rank of Π, which are the trace test and the maximum eigenvalue test and are shown as follows:

$$\lambda_{trace} = -T\sum_{i=r+1}^{n} \ln\left(1-\hat{\lambda}_i\right) \tag{4}$$

$$\lambda_{max}\left(r, r+1\right) = -T\ln\left(1-\hat{\lambda}_{r+1}\right) \tag{5}$$

where λ_i denotes the characteristic estimation values, and T is the number of the effective observations after the lag adjustment. The trace test illustrates the existence of any vector of cointegration, $r = 0$, implies that $\lambda_1 = \lambda_2 = \ldots = \lambda_n = 0$, that is, $\lambda_{\text{trace}} = 0$; if there are a number of distinct cointegrating vectors (r),$\lambda_1 \neq 0$, $\lambda_2 \neq 0$, …, $\lambda_r \neq 0$, but $\lambda_{r+1} = \lambda_{r+2} = \ldots = \lambda_n = 0$, then the value of $\lambda_{trace} = -T\sum_{i=r+1}^{n} \ln\left(1-\hat{\lambda}_i\right)$ is nearly equal to zero. The maximum eigenvalue tests the null hypothesis that the cointegration vector is r, against the alternative of $r+1$ cointegrating vectors.

This section introduces the VECM-BEKK model that incorporates spillover volatility effects and enables us to examine the relationship between stock indices and exchange rates. This research utilises a bivariate conditional mean equation of the VECM-BEKK model, i.e., the VECM process:

$$R_{e,t} = \alpha_{e,0} + \sum_{i=1}^{n} \alpha_{e,i} R_{e,t-i} + \sum_{i=1}^{n} \alpha_{s,n+j} R_{s,t-i} + \varphi_e hm_t + \pi_e Z_{t-1} + \varepsilon_{e,t} \tag{7}$$

$$R_{s,t} = \alpha_{s,0} + \sum_{i=1}^{n} \alpha_{s,i} R_{s,t-i} + \sum_{i=1}^{n} \alpha_{s,n+j} R_{e,t-i} + \varphi_s hm_t + \pi_s Z_{t-1} + \varepsilon_{s,t} \tag{6}$$

where $R_{e,t}$ is the change of exchange rates and $R_{s,t}$ is the return on stock index. $Z_{t-1} = (S_{t-1} - \alpha - \beta EX_{t-1})$ is error correction term. S_{t-1} and EX_{t-1} are the prices of the stock index and the exchange rate, respectively. $\varepsilon_t = [\varepsilon_{e,t}, \varepsilon_{s,t}]$ represents a vector of the random error at time t, which indicates that the market has been affected at that time, $\varepsilon_t | I_t - 1 \sim N(0, H_t)$, H_t is a 2 × 2 variance-covariance matrix, and I_{t-1} is the information collection of time $t-1$. The 2 × 1 vectors $\alpha = [\alpha_{e,0}, \alpha_{s,0}]$ are the long-run float coefficients. The parameter $\alpha_{e,n+j}$ and $\alpha_{s,n+j}$ denote the mean spillovers effect, $\alpha_{e,i}$ ($\alpha_{s,i}$) indicates the exchange rate (stock return) is affected by its lag value, $\alpha_{e,n+j}$ is the mean of the spillovers from the stock indices to the RMB exchange rate, $\alpha_{s,n+j}$ is the mean of the spillovers from the RMB exchange rate to the stock indices, and hm_t denotes the influence of hot money between the stock

and the exchange rate. According to the MGARCH model by Engle and Kroner (1995), the conditional variance equation of VECM-BEKK model is

$$\varepsilon_t = H_t^{1/2} v_t \tag{8}$$

$$H_t = A'A + \mathrm{B}'\varepsilon_{t-1}\varepsilon'_{t-1}B + C'H_{t-1}C + D'DHM_t \tag{9}$$

where v_t denotes the white noise process and A and D represent the 2 × 2 triangular matrix. B_{ij} is the 2 × 2 matrix B and reveals the ARCH effect of volatility, which is the volatility impact of market i on market j; the element C_{ij} indicates the impact of volatility persistent between market i and market j.

$$\begin{aligned} H_t = \begin{pmatrix} h_{ee,t} & h_{es,t} \\ h_{se,t} & h_{ss,t} \end{pmatrix} = \begin{pmatrix} a_{11} & 0 \\ a_{21} & a_{22} \end{pmatrix}' \begin{pmatrix} a_{11} & 0 \\ a_{21} & a_{22} \end{pmatrix} + \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix} \varepsilon_{t-1} \varepsilon'_{t-1} \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix} \\ + \begin{pmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{pmatrix} H_{t-1} \begin{pmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{pmatrix} + \begin{pmatrix} d_{11} & 0 \\ d_{21} & d_{22} \end{pmatrix}' \begin{pmatrix} d_{11} & 0 \\ d_{21} & d_{22} \end{pmatrix} hm_t \end{aligned} \tag{10}$$

The Equation (10) for H_t, further expanded by matrix multiplication, takes the following form:

$$\begin{aligned} h_{ee,t} = {} & a^2_{11} + b^2_{11}\varepsilon^2_{e,t-1} + 2b_{11}b_{21}\varepsilon_{e,t-1}\varepsilon_{s,t-1} + b^2_{21}\varepsilon^2_{s,t-1} + c^2_{11}h_{ee,t-1} \\ & + 2c^2_{11}c_{21}h_{es,t-1} + c^2_{21}h_{ss,t-1} + d^2_{11}hm_t \end{aligned} \tag{11}$$

$$\begin{aligned} h_{es,t} = {} & a_{11}a_{21} + b_{11}b_{12}\varepsilon^2_{e,t-1} + (b_{21}b_{12} + b_{11}b_{22})\varepsilon_{e,t-1}\varepsilon_{s,t-1} + b_{21}b_{22}\varepsilon^2_{s,t-1} \\ & + c_{11}c_{12}h_{ee,t-1} + (c_{21}c_{12} + c_{11}c_{22})h_{es,t-1} + c_{21}c_{22}h_{ss,t-1} + d_{11}d_{21}hm_t \end{aligned} \tag{12}$$

$$\begin{aligned} h_{ss,t} = {} & a^2_{21} + a^2_{22} + b^2_{12}\varepsilon^2_{e,t-1} + 2b_{12}b_{22}\varepsilon_{e,t-1}\varepsilon_{s,t-1} + b^2_{22}\varepsilon^2_{s,t-1} + c^2_{12}h_{ee,t-1} \\ & + 2c_{12}c_{22}h_{es,t-1} + c^2_{22}h_{ss,t-1} + (d^2_{11} + d^2_{22})hm_t \end{aligned} \tag{13}$$

where the $h_{ee,t}$ variable symbolises the change of RMB's exchange rate; $h_{es,t}$ represents the covariance combined with the change rate of the RMB exchange rate and the stock price return; and $h_{ss,t}$ stands for the variance of the stock return. This study tests the coefficients b_{12} and c_{12} to determine if there are significant effects based on the volatility of spillover from the exchange rate market to the stock market (H_0: $b_{21} = c_{21} = 0$) and investigates the coefficients b_{21} and c_{21} (H_0: $b_{12} = c_{12} = 0$) to determine if there are significant effects based on the volatility of the spillover from the stock market to the exchange rate market. If there is no volatility spillover effect between two markets, the elements of b_{21}, c_{21}, b_{12} and c_{12} of matrices B and C have insignificant effects (H_0: $b_{21} = c_{21} = b_{12} = c_{12} = 0$). H_0: $\varphi_e = \varphi_s = 0$ and H_0: $d_{11} = d_{21} = 0$ test the hot money impact on the stock and exchange rate markets in the mean and volatility equations, respectively.

Several studies have used the quantile approach to analyse the conduct of dependent variables, given the information contained in a set of explanatory variables. In this section, this paper use quantile regression approach to investigate the impact of hot money on the stock market and exchange rate markets, from different quantiles. First, this paper use the quantile regressions of $R_{s,t}$ and $R_{e,t}$,

$$R_{e,t,\tau} = \alpha_{e,\tau} + \beta_{e,\tau} hm_{t,\tau} + \varepsilon_{e,t,\tau} \quad (14)$$

$$R_{s,t,\tau} = \alpha_{s,\tau} + \beta_{s,\tau} hm_{t,\tau} + \varepsilon_{s,t,\tau} \quad (15)$$

where $R_{e,t,\tau}$ is the change of the RMB exchange rate at the τ quantile and $R_{s,t,\tau}$ is the stock return at the τ quantile on the Shanghai and the Shenzhen composite indices. $\beta_{e,\tau}$ and $\beta_{s,\tau}$ are the coefficients of the model that this paper estimated. The model estimates $\beta_{e,\tau}$ and $\beta_{s,\tau}$ for different conditional quantile functions, and $\varepsilon_{s,t}$ and $\varepsilon_{e,t}$ are error terms. The variable HM_t denotes the impact of hot money on the stock and the exchange rate markets. Then, this paper assumes the conditional mean of R is $\mu(X) = X'\beta$, and the ordinary least squares approach suggests the mean, $\min_{\beta \in R} \sum_{t=1}^{n} (E_t - \mu)^2$, which can be showed as $\min_{\beta \in R^p} \sum_{t=1}^{n} (E_t - X'_t\beta)^2$.

EMPIRICAL RESULTS

Table 1 presents the summary statistics of the returns on the stock indices and the change of foreign exchange rates and hot money for the sample period from July 2005 to June 2013. The means of the returns on the stock indices and hot money are greater than 0. The means of the returns on $R_{SH,t}$ and $R_{SZ,t}$ are 0.6347 and 1.3152, and the standard deviation of $R_{SH,t}$ and $R_{SZ,t}$ are 9.4459 and 10.3365, respectively. A higher return on stock indices indicates a higher risk, which suggests that the Shenzhen composite index has a higher risk in the market. The average change of exchange rates is negative, which means that the currency depreciates during the sample period. The exchange rates and SH stock returns of Jarque-Bera statistic show the significant results for the null hypothesis of normal distribution.

To examine the degree of the integration of the variables, this paper applied the unit root test to ensure the stationarity of the time-series data. The variables should be conducted for each level and for the first difference if the variables are significant by using the unit root test. The Phillips-Perron (PP) test is used to search for the existence of unit roots. The results for the Phillip-Perron test, as shown in Table 2, illustrates that the change of the foreign exchange rate and the returns on the stock market are non-stationary, with the exception of hot money. The variables that are non-stationary data become stationary in the first difference at the 1% level. After the first difference degree, this paper found that all

of the variables are significant. Then, this paper is going to test the cointegration method to investigate the long-run equilibrium.

Table 1
Summary statistics

	$R_{e,t}$	HM_t	$R_{SH,t}$	$R_{SZ,t}$
Mean	−0.2933	37.7681	0.6347	1.3152
Maximum	0.8898	814.8607	24.2526	25.4171
Minimum	−1.7419	−1202.1900	−28.2779	−26.8091
Standard Deviation	0.4619	384.2920	9.4459	10.3365
Skewness	−0.9456**	−0.4462	−0.6549*	−0.5495*
Kurtosis	1.4379**	0.7619	1.0587	0.3317
Jarque-Bera	22.3416**	5.5079	11.2069**	5.2163

Notes: $R_{SH,t}$, $R_{SZ,t}$ represent the return of variables at time t. $R_{e,t}$ denotes the exchange rates of RMB; HM_t denotes variables of the hot money. $R^{m}_{SH,t}$ and $R^{m}_{SZ,t}$ denote the equally weighted sum of each stock return on Shanghai and Shenzhen stock markets. This table indicates the descriptive statistics for the change of RMB foreign exchange rate, hot money, stock index return for SH and SZ during the period from July 2005 to June 2013. * and ** signify the significant level at 5% and 1% respectively.

Table 2
Unit root test

Variables	Index level		First difference	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
EX	−0.9976	−1.3946	−8.2296**	−8.2407**
HM	−7.8825**	−7.9047**	−20.436**	−20.325**
SH	−2.3758	−2.0721	−9.1427**	−9.3176**
SZ	−2.5177	−2.0119	−9.1437**	−9.2866**

Notes: This table shows the results of unit root test for stationary of the individual time series of hot money (HM), RMB exchange rate (EX), Shanghai composite indices and Shenzhen composite indices (SH and SZ). Intercept denotes the test of unit root only for intercept term. Trend & Intercept denote the unit root test for trend term and intercept term. ** denotes the significant at the 1%.

The result of the Johansen trace and maximum eigenvalue cointegration tests in Table 3 display evidence of a cointegration system.[4] The test results show that the exchange rates and the stock prices are cointegrated. At the 5% confidence level, the results show that cointegration exists between the prices of the stock indices and the exchange rates, as the trace and maximum eigenvalue tests are statistically significant. Consequently, based on the evidence in Table 3, this paper concludes that there exists a cointegration relationship between the stock prices and the exchange rates.

Table 3
Johansen cointegration approach

Variables	SH		SZ	
	Trace	Max-Eigen	Trace	Max-Eigen
H_0: $r = 0$	43.2670**	42.5671**	42.5671**	34.6513**
H_1: $r = 1$	8.5760	7.0329	7.0329	8.5785

Notes: r denotes the number of cointegrating vectors. This table shows the Johansen cointegration test for the trace test and the maximum eigenvalue test on Shanghai composite index and Shenzhen composite index (SH and SZ). The model of trace and eigenvalue test were showed as $\lambda_{trace} = -T\sum_{i+r+1}^{n} \ln\left(1-\hat{\lambda}_i^2\right)$ and $\lambda_{max}(r,r+1) = -T\ln(1-\lambda_{r+1})$. ** denotes the significant at the 5%.

This section applies the VECM-BEKK model to explore the dynamic relationship between the RMB foreign exchange rates and stock prices, as shown in Table 4. On panel A in Table 4, the coefficients of the stock return, $\alpha_{s,1}$ and $\alpha_{s,2}$, are not significant on the SH and the SZ stock markets, but the coefficients of the change of the exchange rate $\alpha_{e,2}$ are significant. This finding shows that the stock market is an efficient market, but the exchange rate market is not an efficient market. In term of the return spillover effect between the stock and exchange rate markets, we can find the results of $\beta_{e,1}$, $\beta_{e,2}$, $\beta_{s,1}$ and $\beta_{s,2}$ are not significant. The results of Panel D in Table 4 investigates the monthly return and volatility spillover effects between stock and exchange rate markets and hot money effect on two markets. The statistics show H_0: $\beta_{e,1}$, = $\beta_{e,2}$ = $\beta_{s,1}$ = $\beta_{s,2}$ = 0 is 4.110 (5.6680) between the SH (SZ) stock and exchange rate markets and the insignificant return spillovers.

The error correction coefficients of π_e and π_s measure the speed of adjustment in response to deviations from the long-run equilibrium, and we found that the two coefficients are significant negatively on panel A of Table 4. We generally expect $\pi_e < 0$ and $\pi_s > 0$, but it is also possible that the error correction coefficient of the two markets have the same negative sign (Bohl, Salm and Schuppli, 2011). Bohl, Salm and Schuppli (2011) suggest that $|\pi_e| > |\pi_s|$ is only required to restore the long-run equilibrium, and our result is $|\pi_e| > |\pi_s|$

On Panel A of Table 4, the results of φ_e and φ_s are significant for the effect of hot money on the stock and exchange rate markets, indicating the hot money impact on the stock return and the change of exchange rate markets in China.

In Panel B of Table 4, a_{11}, b_{12}, b_{22}, c_{11}, c_{21}, c_{22} and d_{11} (a_{11}, b_{11}, b_{21}, b_{22}, c_{21}, c_{22}, d_{11} and d_{21}) are significant in the volatility equations between SH (SZ) stock and exchange rate markets. The estimated parameters of b_{22}, c_{11} an d c_{22} (b_{11}, b_{22} and c_{22}) are all statistically significant, which indicates a strong GARCH (1, 1)

process between the SH (SZ) stock market and the exchange rate markets. The results of d_{11} and d_{21} are significant in the volatility equation, indicating the hot money impact on the volatility of the stock and exchange rate markets in China.

The results in Panel D of Table 4 investigate the monthly volatility spillover effects between the stock and the exchange rate markets. The value of H_0: $b_{21} = c_{21} = b_{12} = c_{12} = 0$ is 30.2700 (26.0900) between the SH (SZ) stock and the exchange rate markets and the significant volatility spillovers. We further test the volatility spillovers from the stock market to the exchange market (H_0: $b_{12} = c_{12} = 0$) and the volatility spillovers from the exchange market to the stock market (H_0: $b_{21} = c_{21} = 0$). The values of H_0: $b_{12} = c_{12} = 0$ and (H_0: $b_{21} = c_{21} = 0$) are 10.9550 and 17.8400, respectively, and they are significant on the SH stock and exchange rate markets, indicating the volatility spillover shows a bi-causality effect between the Shanghai stock and exchange rate markets. However, the value of H_0: $b_{21} = c_{21} = 0$ is 20.3610 and significant for the SZ stock market, indicating the volatility spillovers from exchange market to Shenzhen stock market.

Finally, we investigate hot money impact on the stock and exchange rate markets on the mean of H_0: $\varphi_e = \varphi_s = 0$ and the volatility equation H_0: $d_{11} = d_{21} = 0$ by the VECM-BEK model in Panel D of Table 4. The values of H_0: $\varphi_e = \varphi_s = 0$ and H_0: $d_{11} = d_{21} = 0$) are 98.4610 and 13.5000 (17.0980 and 32.1660) and are significant on the SH (SZ) and exchange rate markets, indicating that hot money has a significant impact on the change of exchange rates and stock returns.

Examining the standardised residuals and square standardized residuals using the Ljung-Box Q statistic as shown in Table 4 on Panel C, the Ljung-Box Q statistics of the standardised residuals of the SH and the SZ are 3.5310 and 3.8390, respectively, denoting that there is no autocorrelation to the standardised residuals in the SH and the SZ; the Ljung-Box Q statistics of the standardised residuals exchange rate is 8.6320, denoting that there is no significant autocorrelation with the standardised residuals in the exchange rate. Consequently, the Ljung-Box Q^2 statistic shows no evidence of linear and non-linear dependence in the square standardises residuals; thus, the VECM-BEKK models can sufficiently describe the dynamic relationship.

The quantile regression method is used to examine the influence of hot money on the exchange rate and the Shanghai and Shenzhen composite stock markets. The result illustrates the impact of hot money on the SH and SZ markets under different quantile regressions, as shown in Table 5. The coefficients acquired from the different quantiles are clearly shown. The coefficients of the impact of hot money on the exchange rate market are negative and are significantly evident in the higher quantiles. In other words, the estimated statistics suggest statistical

Table 4
VECM-BEKK Model

SH				SZ			
Exchange rate		Stock market		Exchange rate		Stock market	
Panel A: Mean equations							
Constant	−0.1830**	Constant	−1.8183**	Constant	−0.1709**	Constant	0.1941
	0.2241		0.9650		0.4044**		3.7733
	0.2010**		−1.1096		0.2041**		−2.4815
	0.0038		−0.0039		0.0027		0.0046
	−0.0041		0.0496		0.0014		0.1804
	−0.2469**		−12.5419**		−0.1908**		−8.3179**
	−0.0001		0.0080**		0.0001		0.0090**
Panel B: Variance equations							
	0.0962**	c_{11}	0.7272**		0.1530**	c_{11}	0.2243
	−0.2731	c_{12}	−0.3432		−0.4191	c_{12}	−4.6213
	0.0000	c_{21}	0.0072**		−1.3863	c_{21}	0.0066*
	0.1114	c_{22}	0.7888**		−0.3030**	c_{22}	0.9261**
	3.9235**	d_{11}	−0.0006**		−2.9647	d_{11}	−0.0009**
	0.0065	d_{21}	−0.0015		−0.0155**	d_{21}	−0.0074*
	−0.7028**	d_{22}	0.0000		0.3277**	d_{22}	0.0008
Panel C: Model Diagnostics							
LQ(5)	8.6320	LQ(5)	3.5310	LQ(5)	10.8300	LQ(5)	3.8390
$LQ^2(5)$	2.3710	$LQ^2(5)$	0.5460	$LQ^2(5)$	1.0570	$LQ^2(5)$	1.8780
Panel D: Test							
		Return	Volatility			Return	Volatility
Spillover effect		4.1100	30.2700**	Spillover effect		5.6680	26.0900**
Stock market spillover to exchange rate		1.6970	10.9550**	Stock market spillover to exchange rate		0.8330	3.2320
Exchange rate spillover to stock market		1.9440	17.8400**	Exchange rate spillover to stock market		5.1490	20.3610**
Hot money impact on exchange rate and stock markets		98.4610**	13.5000**	Hot money impact on exchange rate and stock markets		17.0980**	32.1660**

Notes: ** and * denote the significant at the 1%, 5% level, respectively. LQ (n) and LQ^2 (n) denote the Ljung-Box Q statistic for the standardised residuals and square standardised residuals (lag = 5). The mean equations are shown as below:

$R_{e,t} = \alpha_{e,0} + \sum_{i=1}^{n} \alpha_{e,i} R_{e,t-i} + \sum_{i=1}^{n} \beta_{e,i} R_{s,t-i} + \varphi_e hm_t + \pi_e Z_{t-1} + \varepsilon_{e,t}$

and $R_{s,t} = \alpha_{s,0} + \sum_{i=1}^{n} \alpha_{s,i} R_{s,t-i} + \sum_{i=1}^{n} \beta_{s,i} R_{e,t-i} + \varphi_s hm_t + \pi_s Z_{t-1} + \varepsilon_{s,t}$.

The variance equations are exposed as below:

$h_{11,t} = a^2_{11} + b^2_{11}\varepsilon^2_{1,t-1} + 2b_{11}b_{21}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + b^2_{21}\varepsilon^2_{2,t-1} + c^2_{11}h_{11,t-1} + 2c_{11}c_{21}h_{12,t-1} + c^2_{21}h_{22,t-1} + d^2_{11}hm_t$,

$h_{12,t} = a_{11}a_{11} + b_{11}b_{12}\varepsilon^2_{1,t-1} + (b_{21}b_{12} + b_{11}b_{22})\varepsilon_{1,t-1}\varepsilon_{2,t-1} + b_{21}b_{22}\varepsilon^2_{2,t-1} + c_{11}c_{12}h_{11,t-1} + (c_{21}c_{12} + c_{11}c_{22})h_{12,t-1} + c_{21}c_{22}h_{22,t-1} + d_{11}d_{21}hm_t$

and

$h_{12,t} = a^2_{21} + a^2_{22} + b^2_{12}\varepsilon^2_{1,t-1} + 2b_{12}b_{22}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + b^2_{22}\varepsilon^2_{2,t-1} + c^2_{12}h_{11,t-1} + 2c_{12}c_{22}h_{12,t-1} + c^2_{22}h_{22,t-1} + (d^2_{21} + d^2_{22})\, hm_t$

Test of volatility spillover effects: H_0: $b_{21} = c_{21} = b_{12} = c_{12} = 0$ test the volatility spillovers between stock and exchange rate markets by the VECM-BEKK model; H_0: $b_{12} = c_{12} = 0$ test the volatility spillovers from stock market to exchange market; H_0: $b_{21} = c_{21} = 0$ test the volatility spillovers from exchange market to stock market. H_0: $\varphi_e = \varphi_s = 0$ and H_0: $d_{11} = d_{21} = 0$ test hot money impact on stock and exchange rate markets on mean and volatility equations, respectively.

significance of the coefficients in the higher quantiles and impacts to the exchange rate market from −0.0003 to −0.0005. The coefficients of the SH and the SZ are all positive and are statistically significant in the lower quantiles (from 0.05th to 0.5th). The results of quantile regression methods denote that hot money has an impact on the growth of the exchange rate market. In contrast, the impact of hot money on the stock returns is low or declining. According to the results, the findings show the negative significant evidence on exchange rate market in the higher quantiles and positive significant evidence on the Shanghai and Shenzhen stock markets in the lower quantiles.

Table 5
Quantile regression results from Chinese stock and RMB exchange rate

Quantile	EX	SH	SZ
0.05	−0.0004	0.0112*	0.0155***
0.1	−0.0003	0.0099***	0.0074*
0.25	−0.0005***	0.0061**	0.0081**
0.5	−0.0003**	0.0062**	0.0068**
0.75	−0.0003*	0.0024	0.0049
0.9	−0.0004**	0.0027	0.0002
0.95	−0.0004**	0.0011	0.0067

Notes: ***, ** and * denote the significant at the 1%, 5% and 10% level, respectively. This table denotes the quantile regression test for exchange rates and Shanghai composite index and Shenzhen composite index (EX, SH, and SZ). The equations of quantile regression can be showed as $R_{s,t} = \alpha_s + \beta_s hm_t + \varepsilon_{s,t}$ and $R_{e,t} = \alpha_e + \beta_e hm_t + \varepsilon_{e,t}$.

CONCLUSIONS

There have been enormous inflows and outflows of "hot money" to the Chinese market in recent years. As the biggest emerging country, China has become an interesting issue to investigate. Using our sample period from July 2005 to June 2013, this paper utilises monthly frequency data to explore the impact of hot money on the stock and exchange rate market. First, using the cointegration method, this paper explores a long-run equilibrium relationship between the stock and exchange rate markets. Second, the paper applies the VECM-BEKK model to identify the impact of hot money on the stock and exchange rate markets and examines the volatility of the spillover between the stock and the exchange rate market. Finally, this study uses the quantile approach to determine the influence of hot money on the stock and exchange rate markets.

To summarise the results, first this paper finds a long-run equilibrium relationship between the stock and exchange rate market based on the cointegration model. Second, hot money has an impact on the stock and exchange rate markets. Finally, the results of the quantile regression showed that hot money has an impact on the exchange rate market in the low quantiles and on the Shanghai and Shenzhen stock markets in the high quantiles. The quantile regression clarifies the impact of hot money on stock and exchange rate markets in the difference quantile regions. This finding could be very useful in investment decisions and policymaking.

ACKNOWLEDGEMENTS

The authors acknowledge editor and anonymous reviewers for their constructive and thorough comments that greatly improved the quality of this paper.

NOTES

1. Hot money is defined as the flow of funds (or capital) from one country to another in order to earn a short-term profit.
2. RMB exchange rate has changed its regime in 2005 after china release the financial liberalisation. China implemented a managed floating exchange rate regime in July 2005. Because of the monthly data of foreign direct investment, this study takes the same frequency data for all variables.
3. Because the non-stationary time-series data is uncertainly, this paper firstly examines the stationary by using the time-series data at the level and at their first differences to test the significant evidence of the relationship. If there is a significant relationship between the non-stationary variables, it will imply that the variables have the characteristics of the equilibrium in the long-run after the first differences adjustment. In other words, because of non-stationary time-series data of the stock indices and exchange rate in our data, cointegration method identifies the variables become the stationary variables after using the first difference. Consequently, after the cointegration test of the time-series data, this study can apply the time series data to examine.
4. This study utilises Johansen cointegration method to examine the cointegration between stock prices and exchange rates. Johansen (1988) suggested that the cointegration analysis and the consistent the causal relationship are analysed by estimating a vector error-correction model (VECM). Seeing as the time series data are integrated on the same order, cointegration methods can be used to clarify whether a stable long-run relationship exists between each variable.

REFERENCES

Bohl, M., Salm, C. A., & Schuppli, M. (2011). Price discovery and investor structure in stock index futures. *The Journal of Futures Markets, 31*(3), 282–306. https://doi.org/10.1002/fut.20469

Dornbusch, R., & Fisher, S. (1980). Exchange rates and current account. *American Economic Review, 70*, 960–971.

Engle, R. F., & Kroner, K. F. (1995). Multivariate simultaneous generalized ARCH. *Econometric Theory, 11*, 122–150. https://doi.org/10.1017/S0266466600009063

Frankel, J. A. (1983). Monetary and portfolio balance models of exchange rate determination. In J. S. Bhandari, B. H. Putman, & J. H. Levin (Eds.), *Economic interdependence and flexible exchange* (pp. 84–115). Cambridge: MIT Press.

Fuertes, A. M., Phylaktis, K., & Yan, C. (2016). Hot money in bank credit flows to emerging markets during the banking globalization era. *Journal of International Money and Finance, 60*, 29–52. https://doi.org/10.1016/j.jimonfin.2014.10.002

Guo, F., & Huang, Y. S. (2010). Does "hot money" drive China's real estate and stock markets? *International Review of Economics and Finance, 19*(3), 452–466. https://doi.org/10.1016/j.iref.2009.10.014

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control, 12*(2–3), 231–254. https://doi.org/10.1016/0165-1889(88)90041-3

Kim, D., & Iwasawa, S. (2017). Hot money and cross-section of stock returns during the global financial crisis. *International Review of Economics and Finance, 50*, 8–22. https://doi.org/10.1016/j.iref.2017.03.022

Pan, M. S., Fok, R. C. W., & Liu, Y. A. (2007). Dynamic linkages between exchange rates and stock prices: Evidence from East Asian markets. *International Review of Economics and Finance, 16*(4), 503–520. https://doi.org/10.1016/j.iref.2005.09.003

Tsai, I. C., Chiang, M. C., Tsai, H. C., & Liou, C. H. (2014). Hot money effect or foreign exchange exposure? Investigation of the exchange rate exposures of Taiwanese industries. *Journal of International Financial Markets, Institutions & Money, 31*, 75–96. https://doi.org/10.1016/j.intfin.2014.03.008

Xu, X. E., & Chen, T. (2012). The effect of monetary policy on real estate price growth in China. *Pacific-Basin Finance Journal, 20*(1), 62–77. https://doi.org/10.1016/j.pacfin.2011.08.001

Zhang, G., & Fung, H. G. (2006). On the imbalance between the real estate market and stock markets in China. *Chinese Economy, 39*(2), 26–39. https://doi.org/10.2753/CES1097-1475390203

Zhao, H. (2010). Dynamic relationship between exchange rate and stock price: Evidence from China. *Research in International Business and Finance, 24*(2), 103–112. https://doi.org/10.1016/j.ribaf.2009.09.001

Asian Academy of Management Journal of Accounting and Finance

AAMJAF Vol. 13, No. 2, 109–133, 2017

SOCIALLY RESPONSIBLE INVESTMENT, INTERNAL FINANCING SOURCES AND ACCESS TO BANK FINANCING: EVIDENCE FROM INDIAN SURVEY DATA

Amarjit Gill[1*], Harvinder S. Mand[2], Afshin Amiraslany[3] and Neil Mathur[4]

[1]Edwards School of Business, The University of Saskatchewan,
25 Campus Drive, Saskatoon, SK, S7N-5A7, Canada
[2]Department of Commerce, University College, Benra (Dhuri),
Sangrur, East Punjab, Pin Code 148024, India
[3]Department of Finance and Management Science,
Edwards School of Business, The University of Saskatchewan
25 Campus Drive, Saskatoon, SK, S7N-5A7, Canada
[4]College of Management & Technology
Walden University, 100 Washington Avenue South
Minneapolis, MN, USA 55401

*Corresponding author: gill@edwards.usask.ca

ABSTRACT

We investigated the association between socially responsible investment, internal financing sources, and access to bank financing in the production industry of India. Using a survey research design, owners of small production firms were asked about their perceptions regarding socially responsible investment, internal financing sources, and access to bank financing. We found that socially responsible investment and internal financing sources help owners of small production firms improve access to bank financing. This study contributes to the literature on the relationship between socially responsible investment, internal financing sources, and access to bank financing. The findings may be useful for financial managers, production firm owners, investors, consultants, and other stakeholders.

Keywords: Socially responsible investment, internal financing sources, access to bank financing, production industry, India

Publication date: 28 February 2018

To cite this article: Gill, A., Mand, H. S., Amiraslany, A., & Mathur, N. (2017). Socially responsible investment, internal financing sources and access to bank financing: Evidence from Indian survey data. *Asian Academy of Management Journal of Accounting and Finance, 13*(2), 109–133. https://doi.org/10.21315/aamjaf2017.13.2.6

To link to this article: https://doi.org/10.21315/aamjaf2017.13.2.6

INTRODUCTION

Indian production firms face numerous conflicts with government and society including, but not limited to, pollution, environmental degradation, child and other labor exploitation, gambling, tobacco, alcohol and other social and environmental issues (Nambiar & Chitty, 2014; Bengtsson, 2008; Star, 2008; Arjalies, 2010; Brimble, Vyvyan & Ng, 2013). Agricultural production firms face conflicts related to negative externalities of food production, moral concerns, alcohol abuse and other health-related issues, the use of genetically modified organisms which society considers an unethical practice, animal welfare, pesticide residues, corruption, poor corporate governance, poor working conditions in the meat industry and meat scandals (Heyder & Theuvsen, 2012). These conflicts cause agency problems between the firm (agent) and stakeholders such as the government and society (principal).

Because retail banks (banks that deals with small business financing) are controlled by the central bank and the government (The Economist, 2013), agency problems create barriers to bank financing. Considering the negative impact of conflicts with government and society on the firm, modern firms in various industries have become increasingly active in improving corporate social performance by increasing socially responsible investment (Wang & Berens, 2015). Socially responsible investment is a part of corporate social responsibility (CSR) of the firm. Chen (2011) described four components of CSR as corporate accountability (i.e., the firm is accountable for its own actions under a social structure), openness (i.e., the firm should have open communication with stakeholders about its actions), transparency (i.e., the firm should minimize information asymmetry about its actions), and competitiveness (i.e., the firm should compete honestly in the market). All these components minimize agency problems between the firm and its stakeholders. Ethical investing, health, safety, and pollution prevention are among the most important components of socially responsible investment (Mill, 2006; Tsai, Chou, & Hsu, 2009). Following the above components, we define socially responsible investment, in the context of this study, as the extent to which owners of small production firms avoid investing in new ventures that produce alcohol, tobacco, and weapons; make well-planned investments to avoid environmental degradation; and make socially responsible investment to create a better life for future generations. Lahiri (2012, p. 4) classified micro, small, and medium enterprises (MMSEs) based on their limits for investment in plant, machinery and equipment for manufacturing and production enterprises in India (Table 1).

Small business firms are financially constrained (Joeveer, 2013) and encounter barriers to accessing bank credit (Sandhu, Hussain & Matlay, 2012).

Because the Central Bank of India is risk averse and controls Indian retail banks (The Economist, 2013), production firms tend to borrow from private financial institutions that have more relaxed requirements but charge very high interest rates (Gill, Mand, Obradovich & Mathur, 2015). For example, banks offer crop production loans for the agricultural industry at 7% annually, while private moneylenders charge between 20% to 30% (Ghosal & Ray, 2015).

Table 1
Classification of micro, small and medium enterprises in India.

Enterprise	Investment in Plant and Equipment
Micro Enterprises	Does not exceed twenty five lakh (2.5 million) rupees.
Small Enterprises	More than twenty five lakh (2.5 million) rupees but does not exceed five crore rupees.
Medium Enterprises	More than five crore (50 million) rupees but does not exceed ten crore (100 million) rupees.

Note: For the simplicity, we considered all the firms (micro and small) with investment in plant and equipment less than five crore rupees (50 million rupees) in the manufacturing industry as small business firms.

Since the world financial crisis and economic difficulties of 2008–2009, credit access has been increasingly restricted to firms that are relatively stronger financially with low debt to equity ratios (Wu, Guan & Myers, 2014). The higher chances of bankruptcy in the small business industry make Indian banks risk averse. Internal financing sources reduce the chances of bankruptcy (Philosophov & Philosophov, 2005) and thus, improve access to bank financing. To examine the associations between the socially responsible investment, internal financing sources, and access to bank financing, this study posited the following research questions:

> Do owners of small production firms perceive socially responsible investment to be associated with improved access to bank financing?
>
> Do owners of small production firms perceive internal financing sources to be associated with improved access to bank financing?

A previous study by Cheng, Ioannou and Serafeim (2014) concentrated on publicly traded firms to test the relationship between corporate social responsibility and access to financing in China and found that corporate social responsibility performance reduces capital constraints. We find that socially responsible investment and internal financing sources help owners of small production firms improve access to bank financing in the production industry of

India. Thus, by lending some support to the findings of Cheng et al. (2014) related to publicly traded firms, this study contributes to the literature on the relationship between socially responsible investment, internal financing sources, and access to bank financing.

Socially responsible investment indeed increases cognitive legitimacy (Scott, 1994) of production firms (i.e., perceptions that actions of the production firms are appropriate) in the eyes of lending institutions and thus, improves an access to bank financing. We also find that production firms can attain normative legitimacy (Scott, 1995) by increasing socially responsible investment to signal corporate social responsibility, assuming banks value it to make lending decisions in the small business industry. Since socially responsible investment improves access to bank financing by reducing agency problems between the firm and its stakeholders, we strongly recommend to have a written corporate policy for socially responsible investment.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

It is commonly agreed that corporate social performance (i.e., social welfare actions taken by corporations) improves the reputation of firms; therefore, modern firms in various industries have become increasingly engaged in activities aimed at doing good for society (Wang & Berens, 2015). For example, socially responsible investment helps reduce environmental degradation, gambling problems, issues related to tobacco and alcohol, and other social and environmental problems that a society faces (Bengtsson, 2008; Star, 2008; Arjalies, 2010; Brimble et al., 2013).

Socially responsible investment can reduce agency problems between borrowers and lending institutions. Renneboog, Horst, and Zhang (2008) described that socially responsible investors select firms with sound social and environmental records and expect companies to focus on social welfare. However, it is difficult for the principal (i.e., banks) to monitor the actions of the agents (i.e., firms) where there exists information asymmetry (Zinga, Augusto, & Ramos, 2013). In the context of this study, small business firms (agents) have better information about their actions related to investments which can lead conflict. In such circumstances, agency costs arise representing the cost of all activities and operating systems designed to align the interests and/or actions of small business firms (agents) with the interests of banks (principals) to avoid unethical activities and to increase socially responsible investment.

It is well known that small businesses are financially constrained (Joeveer, 2013). These constraints cause an inability of the firm to obtain financing from

banks and issue equity to raise capital (Lamont, Polk, & Saa-Requejo, 2001). Stein (2003) found that capital constraints play an important role in affecting the firm's ability to undertake major investment decisions. Cheng et al. (2014) found that firms with better corporate social responsibility performance face significantly lower capital constraints. Since socially responsible investment is part of corporate social performance, it can lower capital constraints by providing access to bank credit for small businesses in the production industry.

Previous studies also showed that superior corporate social responsibility performance engages stakeholders to minimize opportunistic behaviour of the firm (Benabou & Tirole, 2010) and motivates firms to disclose their corporate social responsibility activities to the market (Dhaliwal, Li, Tsang, & Yang, 2011). This demonstrates their long-term focus and thus, allows them to differentiate themselves from firms without superior corporate social responsibility performance (Benabou & Tirole, 2010).

Cheng et al. (2014) showed that increased availability of data related to corporate social responsibility performance reduces informational asymmetry between the firm and investors, which in turn lowers capital constraints. Thus, reporting superior corporate social responsibility performance (socially responsible investment in the context of this study) lowers agency costs through stakeholder engagement and increased transparency, which in turn improves access to bank financing. In summary, the literature review indicates that socially responsible investment positively affects access to bank financing; therefore, it is hypothesised that:

> H1: Owners of small production firms perceive socially responsible investment to be associated with improved access to bank financing.

Internal financing sources play an important role in improving access to bank financing by reducing the chances of bankruptcy. Pecking order theory of Myers (1984) and Myers and Majluf (1984) showed that firms use internally generated funds in the form of retained earnings. These internal financing sources reduce risk of bankruptcy by requiring less debt in the capital structure. Thus, pecking order theory is particularly relevant for small businesses that typically have more difficulty obtaining external financing (Ang, 1991). Uyar and Guzelyurt (2015) found that small-to-medium enterprise (SMEs) primarily prefer internal funding sources over external ones and short-term debt over long-term debt in Turkey. Authors also found that during general economic conditions, debt-paying ability of the firm and financial distress risk play the most important role in outside financing decisions.

Small firms are usually riskier than larger corporate borrowers (Jacobson, Linde, & Roszbach, 2005) and face external financing challenges. Therefore, initially small business firms use internal funding generated through profitable operations to finance operations and investments. After internal funds are exhausted, firms use debt financing before resorting to external capital (Bhaird Mac an & Lucey, 2010). The findings of Wahyudi (2014) suggest that cash flow, capacity, and leverage are the major determinants of default in the micro, small, and medium sized firms.

While new enterprises are likely to prefer low cost and less risky or less formal financing such as internal financing (Osei-Assibey, Bokpin, & Twerefou, 2012), firms with greater internal financing are likely to have lower leverage, higher cash ratios, and suffer a lower impact from a crisis on their business operations (Bancel & Mittoo, 2011). Since internal financing sources reduce the chances of bankruptcy (Philosophov & Philosophov, 2005), they increase chances of access to bank financing. The findings of Coco and Pignataro (2012) showed that less wealthy borrowers face greater difficulty in obtaining loans. In summary, internal financing sources reduce the chances of bankruptcy. Hence the following hypothesis:

H2: Owners of small production firms perceive internal financing sources to be associated with improved access to bank financing.

METHODOLOGY

Research Design

This study utilises survey research (a non-experimental field study design) and interview data collection methods. The questionnaire used in the survey is shown in Appendix A.

Variables and Their Measurement

To remain consistent with previous research, the measurement of socially responsible investment was adopted from Turker (2008) and the evaluation of small production firm performance was adopted from Zehir, Acar, and Tanriverdi (2006). Note that to reduce heteroscedasticity (i.e., stabilize variance), the natural logarithm (ln) was calculated (Bowerman, Schermer, Johnson, O'Connell, & Murphee, 2014, p. 422) for: Firm size, firm age, owner age, and owner experience variables.

Bank financing. Bank financing (*BF*) is measured as a categorical variable. If the owner of small production firm borrowed from a bank, *BF* is given the value of 1; otherwise *BF* equals 0.

Socially responsible investment. Socially responsible investment (*SRI*) is the general perception of the owners of small production firms about the extent to which they invest in socially responsible small production firms. Following the definition, we selected five separate components to measure the *SRI* index. In the survey, all participants were asked to rate the extent to which they (i) avoid investing in new ventures that produce alcohol, (ii) avoid investing in new ventures that produce tobacco, (iii) avoid investing in new ventures that produce weapons, (iv) make well-planned investments to avoid environmental degradation, and (v) make socially responsible investment to create a better life for future generations. Their responses were categorised on a five-point Likert Scale assigning 5 as "Strongly Agree" and 1 as "Strongly Disagree". Responses were initially collected for each of the above five sources of *SRI*. The five measures are highly correlated with correlation values ranging from 0.66 to 0.92. Therefore, we constructed a new index by using principal component analysis (PCA). The *SRI* index is constructed using the first component, which explains approximately 84.73% of the variation.

Internal financing sources. Internal financing sources (*IFS*) measure small production firm owner's capacity to invest his or her personal and family assets in his or her own small production firm. *IFS* is measured as a dummy variable where *IFS* = 1 if the owner of small production firm has adequate internal (personal and family) financing sources to invest in a small production firm. Alternatively, *IFS* = 0 if the owner of small production firm does not have adequate internal (personal and family) financing sources to invest in a small production firm.

Firm size. Firm size (*F_SIZE*) is a categorical variable. In the survey, we identified five different firm sizes as follows: (i) INR 0 – INR 500,000, (ii) INR 500,001 – INR1,000,000, (iii) INR1,000,001 – INR2,000,000, (iv) INR2,000,001 – INR3,000,000, and (v) more than INR3,000,001. During the survey, respondents chose only one category to which the average sales of their business belong. For empirical analyses, the natural logarithm (ln) of average sales was calculated. To calculate the natural logarithm (ln) for category five, INR3,000,001 was used.

Firm age. Firm age (*F_AGE*) is measured as the actual age of a small production firm. For empirical analyses, the natural logarithm (ln) of actual age of small production firms was calculated.

Duality. Duality (*DUAL*) is a dummy variable with assigned value of 1 if the owner of small production firm is both CEO and Chair of the Board of Directors in the same company, 0 otherwise.

Small production firm performance. The definition of small production firm performance (*SPFP*) for the purposes of this study is the general perception of the owners of small production firms about the changes in net profit margin (ΔNPM), return on investment (ΔROI), and cash flow from operations (ΔCFO) of their small production firms. Following the definition, we selected three separate components to measure the *SPFP* index. In the survey, we asked all participants to rate the extent to which they believe there are changes in (i) net profit margin, (ii) return on investment, and (iii) cash flow from operations of their small production firms. Their responses were categorized on a five-point Likert Scale assigning 5 as "Highest" and 1 as "Lowest". Responses were initially collected for each of the above three sources of small production firm performance. The three measures are highly correlated with correlation values ranging from 0.82 to 0.91. Therefore, we constructed a new index by using PCA. The *SPFP* index is constructed using the first component, which explains approximately 90.96% of the variation.

Owner age. Owner age (*O_AGE*) is measured as the actual age of the owner of small production firm. For empirical analyses, the natural logarithm (ln) of actual age of the owners of small production firms was calculated.

Owner education. The education of the owner of small production firm (*O_EDU*) is a categorical variable with an assigned value of 1 = High school or less, 2 = College diploma, 3 = Bachelor's degree, 4 = Master's degree, and 5 = PhD degree or more.

Owner experience. Owner's years of experience (*O_EXP*) is measured as the actual number of years of owner experience. For empirical analyses, the natural logarithm (ln) of average number of years' experience was calculated.

Female gender. Owner female gender (*FEM*) is a dummy variable indicating whether the owners of small production firms report that they are female.

Sampling

We targeted the owners of small production firms from Punjab, Haryana, Rajasthan, and other states of India to ask about their perceptions regarding socially responsible investment, internal financing sources, and access to bank financing. Telephone directories and referrals from friends, family members,

religious places such as temples, and relatives were used to prepare an extensive list of names of the owners of small production firms and their telephone numbers to distribute surveys and to conduct telephone interviews.

Given that the population is "abstract" [i.e., it is not possible to obtain a list of all members of the focal population] (Huck, 2008, p. 101), a non-probability (purposive) sample was obtained. In a purposive sample, participants are screened for inclusion based on criteria associated with members of the focal population. We chose this method because Indian owners of the small production firms were reluctant to participate in the research because of the lack of time due to their personal and business responsibilities. Therefore, there was the possibility of sampling bias (the threat to representational ability of a sample). To avoid sampling bias, we chose research participants who were indeed representative of the population for the study.

Although we targeted Haryana, Rajasthan, and other states of India, the majority of surveys came from the Punjab state of India because of the lack of cooperation from the other research participants. The sample included approximately 1,100 research participants. A total of 322 surveys were completed over the telephone, through personal visits, or received by e-mail and three of them were non-usable. Thus, the response rate was roughly 29%. We assumed the remaining cases similar to the selected research participants. Out of 322 surveys, only three surveys came from Haryana and six surveys came from Rajasthan; therefore, surveys from Haryana and Rajasthan were included in surveys that came from Punjab state.

Common method bias does not appear to be a problem because variables used in this study, although self-reported, are largely measured objectively. Nevertheless, a factor analysis (e.g., Podsakoff & Organ, 1986) indicated that common method bias does not seem to be a concern for this study.

Confidentiality

To solve confidentiality issues, we assured all subjects that their personal identification including names would not be disclosed during the analysis, interpretation, and publication of data. Before conducting the telephone interviews, all subjects received instruction regarding the purpose of the research, and asked for their permission to use the data provided. Any information obtained in connection with this study and that can identify specific respondents is confidential and will be disclosed only with subjects' permission or as required by law.

EMPIRICAL MODELS, ANALYSIS AND DISCUSSION

Empirical Models

The socially responsible investment (*SRI*) and internal financing sources (*IFS*) affect access to bank financing. Socially responsible investment helps mitigate an agency and asymmetric information problem between the firm and stakeholders such as banks, governments, and society. Internal financing sources help reduce the chances of bankruptcy. Therefore, we consider *SRI* and *IFS* as main explanatory variables in access to bank financing, and all other variables are considered individual control variables in the following main regression model:

$$BF_i = \alpha_0 + \alpha_1.SRI_i + \alpha_2.IFS_i + \sum \beta_i X_i + \varepsilon_i \quad (1)$$

In the Equation (1), i refers to individual small business production firm, BF_i is access to bank financing of small business production firm i, and X_i represents individual control variables corresponding to firm i. ε_i is a normally distributed disturbance term. In the estimated model, α_1 and α_2 measure the magnitude at which *SRI* and *IFS* affect access to bank financing. We extend the above model by considering different set of control variables one at a time. The coefficients of variables of Model (1) are estimated by applying logistic regression method. We used firm size (*F_SIZE*), firm age (*F_AGE*), CEO duality (*DUAL*), small business performance (Δ*SPFP*), owner age (*O_AGE*), owner education (*O_EDU*), owner experience (*O_EXP*), and female gender (*FEM*) as control variables. Equation (1) is relevant for testing H1 and H2.

Descriptive Statistics

Table 2 shows a series of descriptive statistics. In the dataset, some of the variables, except *SRI* and Δ*SPFP* indices, are individual dummy/categorical variables. The data exhibits that the distribution of *SRI* and Δ*SPFP* is almost symmetrical around their mean values and thus there is no outlier present in either of the indices. Value of skewness for all the scales used in this study are within the range of −0.752 to −1.153, which is an excellent range. According to Mason, Lind, and Marchal (1991), values of skewness usually ranges from −3 to +3 when the data are normally distributed.

Table 2 also shows the differences in variables among individual firms with bank financing and with private financing. Findings show that i) internal financing sources for the small production firms with bank financing are significantly higher compared to those with private financing (mean 0.84 versus 0.32); (ii) *SRI* is significantly higher among small production firms with bank

Table 2
Descriptive statistics

	Mean	SD	Min	Median	Max	BF = 1	PF= 0	Compare –Mean t-test
BF	0.71	0.45	0	1	1			
IFS	0.69	0.46	0	1	1	0.84	0.32	0.52**
SRI	0.00	1.00	−2.48	0.17	1.05	0.22	−0.53	−0.75**
SRI1) Avoids investing in new ventures that lead to alcohol production.	3.69	1.26	1	4	5	3.90	3.17	0.73**
SRI3) Avoids investing in new ventures that lead to weapons production.	3.67	1.32	1	4	5	3.90	3.11	0.79**
SRI4) Makes well-planned investments to avoid environmental degradation.	3.93	1.14	1	4	5	4.20	3.27	0.93**
SRI5) Makes SRI to create a better life for future generations.	4.00	1.14	1	4	5	4.28	3.29	0.99**
ΔSPFP	0.00	1.00	−2.86	0.17	1.18	0.23	−0.57	−0.34**
ΔSPFP1) Change in net profit margin	3.77	1.02	1	4	5	4.00	3.22	0.78**
ΔSPFP2) Change in return on investment	3.84	1.03	1	4	5	4.07	3.27	0.80**
ΔSPFP3) Change in operating cash flow	3.88	1.07	1	4	5	4.11	3.30	0.81**
F_SIZE	14.41	0.74	12.43	14.73	14.91	14.53	14.11	0.42**
F_AGE	2.59	1.04	0.00	2.83	4.38	2.47	2.91	−0.44*
DUAL	0.68	0.47	0	1	1	0.73	0.57	0.16*
O_AGE	3.85	0.26	2.71	3.87	4.38	3.84	3.85	−0.01
O_EDU	2.02	1.06	1	2	4	2.24	1.47	0.77**
O_EXP	2.95	0.65	0.00	2.99	4.09	2.92	3.01	−0.18
FEM	0.86	0.35	0	1	1	0.89	0.80	0.09†

Notes: † $p < 0.10$, * $p < 0.05$, and ** $p < 0.01$; Variables include access to bank financing (*BF*), socially responsible investment (*SRI*), internal financing sources (*IFS*), firm size (*F_SIZE*), firm age (*F_AGE*), CEO duality (*DUEL*), change in small production firm performance (Δ*SPFP*) owner age (*O_AGE*), owner education (*O_EDU*), owner experience (*O_EXP*), and owner is female (*FEM*). Standard deviation (*SD*), Minimum (*Min*), Maximum (*Max*), and Private financing (*PF*).

financing compared to those with private financing (mean 0.22 versus −0.53); (iii) financial performance of the small production firms with bank financing is significantly higher compared to those with private financing (mean 0.23 versus −0.57); (iv) firm size of the small production firms with bank financing is larger than those with private financing; and (v) education level of the owners of the small production firms with bank financing is much higher than those with private financing, all differences are significant at the 1% level. Similarly, *t*-test results show that (i) firm age of the small production firms with bank financing is slightly lower compared to those with private financing (mean 2.47 versus 2.91); and (ii) the CEO duality in the small production firms with bank financing is slightly higher compared to those with private financing (mean 0.73 versus 0.57), all differences are significant at the five percent level. Likewise, higher number of small production firms with bank financing are managed by male owners compared to those with private financing (mean 0.89 versus 0.80), difference is significant at the five percent level.

Principal Component Analysis (PCA)

To reduce dimensionality (i.e., to reduce number of variables), we used principal component analysis. According to Pereira and Sassi (2012), principal component analysis is one of the most popular methods for dimensionality reduction of a feature set. As shown in Table 3, factor analysis extracts two factors (denoted as Component 1 and Component 2) and all the items loaded on the expected factors. This shows that common factor bias is not a concern. Varimax rotation explains 87.42% of the variance in the original scores. The test statistic for Kaiser-Meyer-Olkin (KMO), a Measure of Sampling Adequacy is 0.83. Kaiser (1974, p. 36) suggests accepting values greater than 0.50 as indicative of the validity of factor analysis.

We analyse each question subset to calculate the weighted factor scores. The variables constructed through factor analysis (*SRI* and Δ*SPFP*) are standardised, and therefore they all have mean 0 and standard deviation 1 by construction. The first principal component is strongly correlated with five of the original variables: *SRI1, SRI2, SRI3, SRI4,* and *SRI5*. The second principal component increases with only three of the values: Δ*SPFP1,* Δ*SPFP2,* and Δ*SPFP3*. We can conclude that principal component analysis allows using an aggregate variable for each factor. We also computed Cronbach alphas on the above indicated clusters of items: *SRI* 0.943; and Δ*SPFP* 0.965.

Table 3
Rotated component matrix [a, b]

	Component	
	1	2
SRI		
My firm…:		
SRI1)…Avoids investing in new ventures that lead to alcohol production.	**0.945**	0.116
SRI2)…Avoids investing in new ventures that lead to tobacco production.	**0.945**	0.098
SRI3)…Avoids investing in new ventures that lead to weapons production.	**0.926**	0.114
SRI4)…Makes well-planned investments to avoid environmental degradation.	**0.885**	0.254
SRI5)…Makes socially responsible investment to create a better life for future generations.	**0.819**	0.273
ΔSPFP		
On the average, over the past 3 years how much did the …?		
Δ*SPFP1)*…Net profit margin of your small business change?	0.192	**0.931**
Δ*SPFP2)*…Return on investment of your small business change?	0.177	**0.951**
Δ*SPFP3)*...Cash flow of your small business from operations change?	0.136	**0.930**

Notes: [a] Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalisation
Rotation converged in 3 iterations
[b] Varimax Rotation = 87.42%

Pearson Bivariate Correlation Analysis

The correlation coefficient matrix exhibits that *SRI, IFS, F_SIZE, DUAL,* Δ*SPFP,* and *O_EDU* ($\rho_{SRI,\ BF} = 0.339$; $\rho_{IFS,\ BF} = 0.510$; $\rho_{F\_SIZE,\ BF} = 0.257$; $\rho_{DUAL,\ BF} = 0.162$; $\rho_{\Delta SPFP,\ BF} = 0.364$; and $\rho_{O\_EDU,\ BF} = 0.333$) are positively and significantly correlated with *BF*, suggesting that socially responsible investment, internal financing sources, firm size, CEO duality, changes in small production firm performance, and owner education positively influence the access to bank financing in India. Likewise, the correlation coefficient matrix exhibits that *F_AGE* ($\rho_{FA,\ BF} = -0.193$) is negatively and significantly correlated with *BF*, implying that firm age negatively influence the access to bank financing in India (see Table 4).

Table 4
Correlation coefficient

	BF	*SRI*	*IFS*	*SIZE*	*FA*	*DUAL*	*ΔSPFP*	*AGE*	*EDU*	*EXP*	*FEM*
BF	1										
SRI	0.339**	1									
IFS	0.510**	0.357**	1								
F_SIZE	0.257**	0.180**	0.416**	1							
F_AGE	−0.193**	−0.172**	−0.152**	−0.090	1						
DUAL	0.162**	0.158**	0.107	0.096	−0.118*	1					
ΔSPFP	0.364**	0.353**	0.419**	0.278**	−0.107	0.117*	1				
O_AGE	−0.009	0.016	0.070	−0.040	0.333**	−0.162**	0.028	1			
O_EDU	0.333**	0.191**	0.333**	0.269**	−0.378**	0.070	0.292**	−0.344**	1		
O_EXP	−0.063	−0.017	0.064	0.091	0.499**	−0.110	0.032	0.687**	−0.320**	1	
FEM	0.107	0.029	0.180**	0.179**	−0.030	0.431**	−0.010	−0.123*	0.093	−0.026	1

Notes: * $p < 0.05$ and ** $p < 0.01$; Variables include access to bank financing (*BF*), socially responsible investment (*SRI*), internal financing sources (*IFS*), firm size (*F_SIZE*), firm age (*F_AGE*), CEO duality (*DUEL*), change in small production firm performance (*ΔSPFP*) owner age (*O_AGE*), owner education (*O_EDU*), owner experience (*O_EXP*), and owner is female (*FEM*).

Regression Results and Discussion

Socially responsible investment, internal financing sources, and access to bank financing

Table 5 reports the estimated coefficients of Equation (1). The findings show that *SRI, IFS,* Δ*SPFP,* and *O_EDU* positively affect the access to bank financing in the Indian small business production industry.

The coefficients of *SRI* in columns (1), (2), (3), (4), (9), (10), and (11) of *BF* are positive and significant at the 1%, 1%, 1%, 1%, 5%, 1%, and 5% level, respectively, implying that socially responsible investment positively affects the access to bank financing in the Indian small business production industry. Thus, H1 is supported.

Likewise, the coefficients of *IFS* in columns (5) to (11) of *BF* are positive and significant at the 1% level, suggesting that internal financing sources positively affects the access to bank financing in the Indian small business production industry. Thus H2 is supported.

Regardless of individual model specifications, we find significant and positive coefficients of *SRI* and *IFS* suggesting that socially responsible investment and internal financing sources improve the access to bank financing in the Indian small business production industry. This finding remains robust when we consider all control variables together (refer to model specification 11).

The coefficients of *F_SIZE* in columns (2) and (4) of *BF* are positive and significant at the 5% and 10% level, respectively, indicating that firm size positively affects the access to bank financing in the Indian small business production industry. The coefficients of *F_AGE* in columns (2), (6) and (9) of *BF* are negative and significant at the 5%, 5%, and 10% level, respectively, indicating that firm age negatively affects the access to bank financing in the Indian small business production industry. Likewise, the coefficients of *DUAL* in columns (6) and (8) of *BF* are positive and significant at the 10% level, indicating that CEO duality positively affects the access to bank financing in the Indian small business production industry. Similarly, the coefficients of Δ*SPFP* in columns (2), (4), (6), (8), (9) and (11) of *BF* are positive and significant at the 1%, 1%, 5%, 5%, 5% and 5% level, respectively, implying that positive change in small production firm performance positively affects the access to bank financing in the Indian small business production industry.

The coefficients of *O_AGE* in columns (3) and (4) of *BF* are positive and significant at the 10% level, suggesting that owner age positively affects the access to bank financing in the Indian small business production industry. Similarly, the coefficients of *O_EDU* in columns (3), (4), (7), (8), (10), and (11) of *BF* are positive and significant at the 1%, 1%, 1%, 5%, 1% and 5% level, respectively, implying that owner education positively affects the access to bank financing in the Indian small business production industry.

Summary of findings, discussion, conclusion, and recommendations

The results suggest that the access to bank financing is positively associated with socially responsible investment, internal financing sources, change in small production firm performance, and education. Thus, the findings of this study lend some support to the findings of Cheng et al. (2014) related to publicly traded firms in that socially responsible investment improves access to bank financing in the small business production industry. The findings also support the findings of Philosophov and Philosophov (2005) in that internal financing sources increase the chances of access to bank financing.

In summary, socially responsible investment and internal financing sources improve access to bank financing in the small business production industry of India. Socially responsible investment increases the chances of bank financing by $e^{0.752} - 1$, $e^{0.494} - 1$, $e^{0.674} - 1$, and $e^{0.459} - 1$, or 112.12%, 63.88%, 96.21%, and 63.23%, respectively in India. The improvement in the chances of bank financing may be because socially responsible investment reduces agency problems between the firm and its stakeholders such as shareholders, government, and society. The findings of Ramasamy, Ting, and Yeung (2007) also indicated that firms with socially responsible investment may outperform their counterparts when stakeholders value corporate social responsibility.

Internal financing sources reduce chances of bankruptcy; therefore, internal financing sources increase the chances of bank financing by $e^{2.412} - 1$, $e^{1.931} - 1$, $e^{2.116} - 1$, and $e^{1.781} - 1$, or 10.16 time, 5.90 times, 7.30 times, and 4.93 times, respectively in India (see Table 4). While firm size, firm performance, owner age, and owner education increases chances of bank financing, firm age decrease chances of bank financing. This may be because older firms do not pay much attention to the socially responsible investment.

The findings of this study provide a critical policy recommendation suggesting that socially responsible investment can be useful in emerging countries where agency problems between firm and stakeholders such as shareholders, government, and society are high. While the basis of the results rests on small

Table 5
Socially responsible investment, internal financing sources, and access to bank financing

Dependent variables = BF

Variables	BF(1)	BF(2)	BF(3)	BF(4)	BF(5)	BF(6)	BF(7)	BF(8)	BF(9)	BF(10)	BF(11)
SRI	0.752**	0.494**	0.674**	0.459**					0.347*	0.456**	0.329*
	(5.66)	(3.40)	(4.77)	(3.02)					(2.17)	(2.98)	(2.02)
IFS					2.412**	1.931**	2.116**	1.781**	1.795**	1.863**	1.659**
					(8.39)	(5.94)	(6.76)	(5.16)	(5.41)	(5.72)	(4.70)
F_SIZE		0.459*		0.324†		0.128		0.101	0.128		0.093
		(2.58)		(1.67)		(0.65)		(0.49)	(0.65)		(0.45)
F_AGE		−0.345*		−0.231		−0.340*		−0.175	−0.297†		−0.134
		(−2.34)		(−1.25)		(−2.21)		(−0.92)	(−1.90)		(−0.70)
DUAL		0.383		0.414		0.536†		0.664†	0.459		0.570
		(1.30)		(1.20)		(1.73)		(1.87)	(1.45)		(1.58)
ΔSPFP		0.602**		0.497**		0.488*		0.403*	0.415*		0.330*
		(4.08)		(3.17)		(3.12)		(2.51)	(2.59)		(2.00)
O_AGE			1.256†	1.389†			0.973	1.073		0.835	0.981
			(1.70)	(1.75)			(1.17)	(1.27)		(1.03)	(1.17)
O_EDU			0.848**	0.627**			0.594**	0.503*		0.563**	0.489*
			(5.01)	(3.41)			(3.30)	(2.60)		(3.08)	(2.52)
O_EXP			−0.150	−0.133			−0.389	−0.284		−0.334	−0.277
			(−0.52)	(−0.39)			(−1.20)	(−0.78)		(−1.05)	(−0.77)

(*continue on next page*)

Table 5: (*continued*)

Variables	BF(1)	BF(2)	BF(3)	BF(4)	BF(5)	BF(6)	BF(7)	BF(8)	BF(9)	BF(10)	BF(11)
FEM			0.585	0.354			0.133	−0.102		0.164	−0.065
			(1.52)	(0.78)			(0.33)	(−0.22)		(0.39)	(−0.14)
Constant	0.998**	−4.847†	−5.439*	−9.650*	−0.532*	−1.436	−4.151	−5.615	−1.390	−3.540	−5.136
	(7.42)	(−1.88)	(−2.13)	(−2.46)	(−2.57)	(−0.52)	(−1.47)	(−1.33)	(−0.50)	(−1.26)	(−1.22)
N	319	319	319	319	319	319	319	319	319	319	319
χ^2-test	35.93**	75.07**	71.29**	90.39**	80.22**	100.81*	96.45**	109.27**	105.47**	105.46**	113.34**
Pseudo R^2	0.094	0.196	0.186	0.236	0.209	0.263	0.252	0.285	0.275	0.275	0.296

Notes: † $p<0.10$, * $p<0.05$, and ** $p<0.01$; Dependent variable includes access to bank financing (*BF*). Dependent variable includes socially responsible investment (*SRI*), internal financing sources (*IFS*), firm size (*F_SIZE*), firm age (*F_AGE*), CEO duality (*DUEL*), change in small production firm performance (Δ*SPFP*) owner age (*O_AGE*), owner education (*O_EDU*), owner experience (*O_EXP*), and owner is female (*FEM*).

production firms located in India, the findings may also be applicable to similar entities of other emerging markets.

Since the findings of this study show that perceived socially responsible investment positively impacts the bank financing, socially responsible investment favors both the firm and stakeholders such as shareholders, government, and society. Since socially responsible investment helps reduce social concerns and at the same time helps improve the chances of growth and prosperity of small production firms, we strongly recommend to have a corporate policy for the socially responsible investment. Socially responsible investment should be increased by the small production firms. Indian government should also support socially responsible investment by granting low interest loans and by providing subsidies to the production firms.

MANAGERIAL IMPLICATIONS, LIMITATIONS, AND FUTURE RESEARCH

Managerial Implications

The higher level of perceived valuation of socially responsible investment and internal financing sources indicate a higher level of perceived access to bank financing and vice versa.

Limitations

This is a co-relational study that investigates the association between socially responsible investment and access to bank financing, and association between internal financing sources and access to bank financing. There is not necessarily a causal relationship between the two. The findings of this study may only be generalised to firms similar to those that were included in this research.

This study is limited to perceptions and judgments that asked for responses from fixed format, set-question survey tools. The respondents were unable to provide additional input because a survey questionnaire was used to collect data. The sample size is also small. A mail/drop-off survey data collection method contributed to a low response rate or response error. Some favorable techniques such as including postage-paid mail, sending a cover letter, providing a deadline for returning the survey, and promising anonymity were applied in order to increase the response rate.

Future Research

The generalisability of results and implications of this study also require further research of both a quantitative and qualitative nature, conducted not only in other Indian regions but also in other countries. Future study can improve the methodological focus and framework by collecting data from a larger number of firms.

NOTES

1. Agency theory was pioneered by Jensen and Meckling (1976).
2. The eigenvalues of the five principal components are 4.237, 0.525, 0.085, 0.079, and 0.074, and the corresponding variances are 84.730%, 10.509%, 1.709%, 1.577%, and 1.474%, respectively with Cronbach's alpha of 0.954. As a result, *SRI* index is constructed using the first component. Factors that have eigenvalues greater than one are included in the construction of the component (Kaiser, 1960).
3. The eigenvalues of the three principal components are 2.729, 0.189, and 0.083, and the corresponding variances are 90.961%, 6.286%, and 2.753%, respectively with Cronbach's alpha of 0.950. As a result, *SPFP* index is constructed using the first component. Factors that have eigenvalues greater than one are included in the construction of the component (Kaiser, 1960).
4. Production firms face numerous conflicts with society and government (Heyder & Theuvsen, 2012); therefore, we chose these firms for our study.
5. Bank financing is a binary variable; therefore, we used logistic regression method.
6. George and Mallery (2003) provide the following rules of thumb for Cronbach's alpha values: > 0.90 excellent, > 0.80 good, > 0.70 acceptable, > 0.60 questionable, > 0.50 poor, and < 0.50 unacceptable (p. 231).
7. The lowest tolerance is 0.422 and the highest VIF is 2.369 indicating that multicollinearity is not a serious issue.

REFERENCES

Ang, J. S. (1991). Small business uniqueness and the theory of financial management. *Journal of Small Business Finance, 1*(1), 1–13.

Arjalies, D. (2010). A social movement perspective on finance: How socially responsible investment mattered. *Journal of Business Ethics*, *92*(1), 57–78. https://doi.org/10.1007/s10551-010-0634-7

Bengtsson, E. (2008). A history of Scandinavian socially responsible investing. *Journal of Business Ethics*, *82*(4), 969–983. https://doi.org/10.1007/s10551-007-9606-y

Benabou, R., & Tirole, J. (2010). Individual and corporate social responsibility. *Economica, 77*(305), 1–19. https://doi.org/10.1111/j.1468-0335.2009.00843.x

Bancel, F., & Mittoo, U. R. (2011). Financial flexibility and the impact of the global financial crisis: Evidence from France. *International Journal of Managerial Finance*, *7*(2), 179–216. https://doi.org/10.1108/17439131111122157

Bhaird Mac an, C., & Lucey, B. M. (2010). Determinants of capital structure in Irish SMEs. *Small Business Economics*, *35*(3), 357–375. https://doi.org/10.1007/s11187-008-9162-6

Bowerman, B. L., Schermer, J. A., Johnson, A. M., O'Connell, R. T., & Murphee, E. S. (2014). *Business statistics in practice* (3rd edition). Ontario, Canada: McGraw-Hill Ryerson Limited.

Brimble, M., Vyvyan, V., & Ng, C. (2013). Belief and investing: Preferences and attitudes of the faithful. *Australasian Accounting Business and Finance Journal*, *7*(1), 23–41. https://doi.org/10.14453/aabfj.v7i1.3

Chen, C. H. (2011). The major components of corporate social responsibility. *Journal of Global Responsibility*, *2*(1), 85–99. https://doi.org/10.1108/20412561111128546

Cheng, B., Ioannou, I., & Serafeim, G. (2014). Corporate social responsibility and access to finance. *Strategic Management Journal*, *35*(1), 1–23. https://doi.org/10.1002/smj.2131

Coco, G., & Pignataro, G. (2012). Unfair credit allocations. *Small Business Economics, 41*(1), 241–251. https://doi.org/10.1007/s11187-012-9422-3

Dhaliwal, D., Li, O. Z., Tsang, A. H., & Yang, Y. G. (2011). Voluntary non-financial disclosure and the cost of equity capital: The case of corporate social responsibility reporting. *Accounting Review*, *86*(1), 59–100. https://doi.org/10.2308/accr.00000005

George, D. & Mallery, P. (2003). *SPSS for windows: A simple guide and reference*. 11.0 Update, (4th ed.). Boston: Allyn & Bacon.

Ghosal, S. & Ray, A. (2015). Farmers facing crop losses may end up in private moneylenders' grip. Retrieved 6 November 2016 from http://economictimes.indiatimes.com/news/economy/agriculture/farmers-facing-crop-losses-may-end-up-in-private-moneylenders-grip/articleshow/47622980.cms

Gill, A., Mand, H. S., Obradovich, J., & Mathur, N. (2015). Factors affecting ethical sources of external debt financing for Indian agribusiness firms. *Corporate Ownership and Control, 13*(1), 435–445. https://doi.org/10.22495/cocv13i1c4p2

Heyder, M. & Theuvsen, L. (2012). Determinants and effects of corporate social responsibility in German agribusiness: A PLS model. *Agribusiness*, *28*(4), 400–420. https://doi.org/10.1002/agr.21305

Huck, S. W. (2008). *Reading Statistics and Research* (5th ed.). Boston - New York: Pearson Educational Inc., Allyn and Bacon.

Jacobson, T., Linde, J., & Roszbach, K. (2005). Credit risk versus capital requirements under Basel II: Are SME loans and retail credit really different? *Journal of Financial Services Research, 28*(1–3), 43–75. https://doi.org/10.1007/s10693-005-4356-4

Jensen, M. & Meckling, W. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Joeveer, K. (2013). What do we know about the capital structure of small firms? *Small Business Economics, 41*(2), 479–501. https://doi.org/10.1007/s11187-012-9440-1

Kaiser, H. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20*(1), 141–151. https://doi.org/10.1177/001316446002000116

Kaiser, H. (1974). An index of factorial simplicity. *Psychometrika*, *39*(1), 31–36. https://doi.org/10.1007/BF02291575

Lahiri, R. (2012). Problems and prospects of micro, small and medium enterprises (MSMEs) in India in the era of globalization. *International Conference on Interplay of Economics, Politics and Society for Inclusive Growth organized by Royal College of Thimphu, Bhutan,* 15 and 16 October, pp. 1–11. Retrieved 27 February 2017 from https://www.rtc.bt/Conference/2012_10_15/6-RajibLahiri-MSMEs_in_India.pdf

Lamont, O., Polk, C., & Saa-Requejo, J. (2001). Financial constraints and stock returns. *Review of Financial Studies*, *14*(2), 529–554. https://doi.org/10.1093/rfs/14.2.529

Mason, R. D., Lind, D. A., & Marchal, W. G. (1991). *Statistics: An introduction* (3rd ed.). San Diego, CA: Harcourt Brace Jovanovich, Inc.

Mill, G. A. (2006). The maturing of socially responsible investment: A review of the developing link with corporate social responsibility. *Journal of Business Ethics*, *63*(2), 131–148. https://doi.org/10.1007/s10551-005-2410-7

Myers, S. C. (1984). The capital structure puzzle. *Journal of Finance*, *39*(3), 574–592. https://doi.org/10.1111/j.1540-6261.1984.tb03646.x

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics, 13*(2), 187–221. https://doi.org/10.1016/0304-405X(84)90023-0

Nambiar, P. & Chitty, N. (2014). Meaning making by managers: Corporate discourse on environment and sustainability in India. *Journal of Business Ethics*, *123*(3), 493–511. https://doi.org/10.1007/s10551-013-1848-2

Osei-Assibey, E., Bokpin, G. A., & Twerefou, T. K. (2012). Microenterprise financing preference: Testing POH within the context of Ghana's rural financial market. *Journal of Economic Studies*, *39*(1), 84–105. https://doi.org/10.1108/01443581211192125

Pereira, F. H. & Sassi, R. J. (2012). Rough sets and principal components analysis: A comparative study on customer database attributes selection. *African Journal of Business Management, 6*(1), 3822–3828.

Philosophov, L.V. & Philosophov, V. L. (2005). Optimization of a firm's capital structure: A quantitative approach based on a probabilistic prognosis of risk and time of bankruptcy. *International Review of Financial Analysis*, *14*(2), 191–209. https://doi.org/10.1016/j.irfa.2004.06.010

Podsakoff, P. & Organ, D. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management, 12*(4), 531–544. https://doi.org/10.1177/014920638601200408

Ramasamy, B., Ting, H. W., & Yeung, M. C. Y. (2007). Does it pay to be good in developing countries? The relationship between CSR and financial performance in Malaysia. *Asian Academy of Management Journal of Accounting & Finance, 3*(1), 21–36.

Renneboog, L., Horst, J. T., & Zhang, C. (2008). Socially responsible investments: Institutional aspects, performance, and investor behavior. *Journal of Banking & Finance*, *32*(9), 1723–1742. https://doi.org/10.1016/j.jbankfin.2007.12.039

Sandhu, N., Hussain, J., & Matlay, H. (2012). Barriers to finance experienced by female owner/managers of marginal farms in India. *Journal of Small Business and Enterprise Development*, *19*(4), 640–655. https://doi.org/10.1108/14626001211277442

Scott, W. R. (1994). Institutional analysis: Variance and process theory approaches. In W. R. Scott, & J. W. Meyer (Eds.), *Institutional environments and organizations: Structural complexity and individualism* (pp. 81–99). Thousand Oaks, CA: Sage.

Scott, W. R. (1995). *Institutions and organizations*. Thousand Oaks, CA: Sage.

Star, M. (2008). Socially responsible investment and pro-social change. *Journal of Economic Issues*, *42*(1), 51–73. https://doi.org/10.1080/00213624.2008.11507114

Stein, J. (2003). Agency, information, and corporate investment. In G. Constantinides, M. Harris, & R. Stulz, (eds). *Handbook of the economics of finance* (pp. 111–166) Amsterdam, The Netherlands: Elsevier. https://doi.org/10.1016/S1574-0102(03)01006-9

The Economist. (May, 2013). Lenders of the last resort; Indian banks. Retrieved 10 March 2017 from http://search.proquest.com/docview/1355931646?OpenUrlRefId=info:xri/sid:primo&accountid=14739

Tsai, W. H., Chou, W. C., & Hsu, W. (2009). The sustainability balanced scorecard as a framework for selecting socially responsible investment: An effective MCDM model. *Journal of the Operational Research Society*, *60*(10), 1396–1410. https://doi.org/10.1057/jors.2008.91

Turker, D. (2008). Measuring corporate social responsibility: A scale development study. *Journal of Business Ethics*, *85*(4), 411–427. https://doi.org/10.1007/s10551-008-9780-6

Uyar, A. & Guzelyurt, M. K. (2015). Impact of firm characteristics on capital structure choice of Turkish SMEs. *Managerial Finance*, *41*(3), 286–300. https://doi.org/10.1108/MF-01-2014-0016

Wahyudi, I. (2014). Default risk analysis in micro, small, and medium enterprises: Does debt overhang theory occur? *Asian Academy of Management Journal of Accounting & Finance*, *10*(1), 95–131.

Wang, Y. & Berens, G. (2015). The impact of four types of corporate social performance on reputation and financial performance. *Journal of Business Ethics*, *131*(2), 337–359. https://doi.org/10.1007/s10551-014-2280-y

Wu, F., Guan, Z., & Myers, R. (2014). Farm capital structure choice: Theory and an empirical test. *Agricultural Finance Review*, *74*(1), 115–132. https://doi.org/10.1108/AFR-08-2012-0041

Zehir, C., Acar, A. Z., & Tanriverdi, H. (2006). Identifying organizational capabilities as predictors of growth and business performance. *The Business Review, 5*(2), 109–116.

Zinga, M. T., Augusto, M. A., & Ramos, M. E. (2013). Family involvement, agency cost of debt financing, and small firm performance: research agenda. *Revista de Empresa Familiar*, *3*(1), 21–30.

APPENDIX A

Survey questionnaire

1) Where do you obtain financing from?
   ☐ Bank(s) ☐ Private lending institutions

2) Do you have adequate internal (personal and family) financing sources to invest in new venture?
   ☐ No ☐ Yes

3) Please indicate average sales (Rupees) of the firm per year:
   ☐ 0 – 500,000 ☐ 500,001 – 1,000,000 ☐ 1,000,001 – 2,000,000
   ☐ 2,000,001 – 3,000,000 ☐ 3,000,001 or more

4) Please indicate the age of your firm:
   Firm Age: _____ Years

5) Is the owner the chairperson of the directors (decision makers) in the firm?
   ☐ Yes ☐ No

6) Please indicate the age of the owner/director/CEO:
   Age of the Owner/Director/CEO: _____ Years

7) Please indicate the highest level of the owner's/director's/CEO's education:
   ☐ High school or less ☐ College diploma ☐ Bachelor's degree
   ☐ Master's degree ☐ PhD degree or more

8) Please indicate the number of years the owner/director/CEO has been involved in this business:
   Owner/Director/CEO Experience: _____ Years

9) Please indicate the gender of the owner/director of the firm:
   ☐ Male ☐ Female

10) Socially Responsible Investment

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
My firm avoids investing in the new ventures that produce alcohol.	☐	☐	☐	☐	☐
My firm avoids investing in the new ventures that produce tobacco.	☐	☐	☐	☐	☐
My firm avoids investing in the new ventures that produce weapons.	☐	☐	☐	☐	☐
My firm makes well-planned investments to avoid environmental degradation.	☐	☐	☐	☐	☐
My firm makes socially responsible investment to create a better life for future generations.	☐	☐	☐	☐	☐

11) Small Production Firm Performance

	Gone down a lot	Gone down a little	Stayed approximately the same	Gone up a little	Gone up a lot
On the average, over the last 3 years in what direction and to what degree do you perceive the net profit margin changed?	☐	☐	☐	☐	☐
On the average, over the last 3 years in what direction and to what degree do you perceive the return on investment changed?	☐	☐	☐	☐	☐
On the average, over the last 3 years in what direction and to what degree do you perceive the cash flow from operations changed?	☐	☐	☐	☐	☐

Asian Academy of Management Journal of Accounting and Finance

AAMJAF Vol. 13, No. 2, 135–154, 2017

CORPORATE GOVERNANCE, INSTITUTIONAL CHARACTERISTICS, AND DIRECTOR NETWORKS IN MALAYSIA

Mohd Faizal Jamaludin[1] and Fathyah Hashim[2*]

[1]Commerce Department, Politeknik Tuanku Sultanah Bahiyah, 09000 Kulim, Kedah, Malaysia
[2]Graduate School of Business, Universiti Sains Malaysia, 11800 USM Pulau Pinang, Malaysia

*Corresponding author: fathashim@usm.my

ABSTRACT

This study explores the structural relationship of director networks among boards of directors in publicly listed companies in Malaysia using social network analysis (SNA) techniques at both the director and company levels. This paper examines whether company corporate governance practices and institutional characteristics are associated with company network size and pattern. SNA performed using UCINET and NetDraw software shows that the directors and company in the networking are moderately connected. This suggests that there is a small group of directors or companies that are well-connected and well-positioned to exercise power, control, and influence over the network. This study also reveals the interconnectedness of board members and companies. The regression results also identify a group of the most well-connected and well-positioned directors and companies in Malaysia's corporate governance environment. The results suggest that board size, board meeting, and duality are the corporate governance practices, which most influence company network size and pattern. The presence of a Bumiputera or politically-connected director is an institutional characteristic, which especially determines the network of a company.

Keywords: Board of directors, corporate governance, director network, institutional characteristics, social network analysis.

Publication date: 28 February 2018

To cite this article: Jamaludin, M. F. & Hashim, F. (2017). Corporate governance, institutional characteristics and director network in Malaysia. *Asian Academy of Management Journal of Accounting and Finance, 13*(2), 135–154. https://doi.org/10.21315/aamjaf2017.13.2.7

To link to this article: https://doi.org/10.21315/aamjaf2017.13.2.7

INTRODUCTION

Director networks can be categorised as either social or professional. Networks established through academic background, specific interests such as sports, music or hobbies, or club memberships are examples of social networks. Meanwhile, professional networks are established through daily professional work or business life. Prior studies have shown that the economics and finance literature has begun to pay more attention to the influence of director networks on corporate decision making and monitoring.

In addition, social networks have been used in numerous studies of kinship structure, social mobility, science citations, contact among members of deviant groups, corporate power, international trade exploitation, class structure and many other areas (Burt, 1998; Flores-Yeffal & Zhang, 2012; Hoitash, 2010; Krishnan, Raman, Yang, & Yu, 2011; Scott, 1988). A study on corporate governance concerns for Petra-Perdana Berhad in 2010 is one example which demonstrates how director networks may impair company stakeholder interests if a necessary solution goes untaken (Bushon, 2010).

Differing from prior studies, this study explores the structural relationship among board of director networks in Malaysia, at both the director and company level. Then, this study attempt to determine whether there is an association between company internal governance, institutional characteristics and director's networks at company level. Commonly, the board of director composition in Malaysia publicly listed companies can be executive or nonexecutive, and independent or non-independent. However, the board must have majority of independent directors when the chairman of the board is not an independent director (Finance Committee on Corporate Governance, 2012).

RELATED LITERATURE

Prior studies shown that poor management decisions will be attributed, in part, to inadequate oversight by directors. This will damage prospects in the labour market for directors and managers (Carpenter & Westphal, 2001). Thus, the selection for competence directors is essential for companies in order to succeed. From here, board of director networks would influence how the company select and appoint their board members. Due to the financial crisis, scholars were challenged to establish causal inferences that the endogeneity of board of director's structure variables could determine various companies' outcome variables which could be determined through, among others, the unobservable board of director's characteristics (Dey & Liu, 2010).

Board of director networks is a vital aspect of board characteristics and call for further exploration. Companies with boards, which have strong social networks, tend to enhance company and shareholder value as well as individual director value (Horton, Millo, & Serafaim, 2012). It is understood that most of the time, directors choose not to perform studies or experiments, but prefer to rely on whatever information they have obtained through casual communication (Fracassi, 2012). A network between boards of directors from different companies may allow valuable information to flow through the network (Fracassi & Tate, 2012). It also increases value for shareholders. The positive aspects of board of director networks could also increase the sharing of market information best practices and information negotiation, while extending professional contacts (Larcker & Tayan, 2010).

Prior studies also have shown that board of director networks play a major role to provide an important source of information (Horton et al., 2012; Chenhall, Hall & Smith, 2010; Carpenter & Westphal, 2001). Eventually, this will support the company's strategic decisions and control direction (Durbach & Parker, 2009) and enhance the board's advising role (Stuart & Yim, 2010). In addition, effective networks also will lead to company efficacy. Board of director networks could be a medium for directors to learn the appropriate strategies for their companies through the sharing of experiences and knowledge from other companies (Horton et al., 2012; Chenhall et al., 2010; Durbach & Parker, 2009; Carpenter & Westphal, 2001). Furthermore, the information flows within the network are valuable information, as it is first-hand, up-to-date and timely (Carpenter & Westphal, 2001). This information will increase board effectiveness (Stuart & Yim, 2010).

As current business situations often involve a large fraction of board of directors on multiple boards (Stuart & Yim, 2010), this will influence the positioning of directors within the networks, as different boards will look into different networks (Horton et al., 2012). The selection of an appropriate director will provide indirect as well as direct strategic information or access to strategic resources (Carpenter & Westphal, 2001). The quality, costs, relevance and timeliness of information will be positively affected thus enhance the company's value (Horton et al., 2012).

Prior research and current practices show that the allocation of linked board of directors across companies is not random (Fracassi & Tate, 2012). Furthermore, the central part of corporate governance is the board of directors, specifically their networks (Pesämaa, Klaesson, & Haahti, 2011). Firms with powerful executive are likely to appoint more linked directors for reasons that are more pleasant and friendly from the perspective of shareholders. Horton et al.

(2012), shows that different board of directors will definitely will looking into different network positions due to the level of compensation offered. In addition, Kim and Lu (2011) found that CEOs might prefer someone with whom they are socially connected in order to strengthen the CEO connectedness.

Furthermore, there is a need to capture all possible avenues through which a director can obtain an information advantage, such as golf club memberships, religious activities, and political affiliations (Horton et al., 2012). Social networks consist of partially overlapping markets; therefore, no single board of directors is fully aware of the entire network (Horton et al., 2012). Having a strong social network for a local setting, in this study Malaysia, can be beneficial force for local companies (Pesämaa et al., 2011). Fracassi and Tate (2012) also found that the networks between team of management from different companies would increase shareholder value through the creation of conduits, which enable valuable information flows from one firm to another.

Social Network Theory

The social network approach originates from three schools of thought: sociology, anthropology and role theory (Tichy, Tushman, & Fombrun, 1979). From a sociology perspective, the approach emphasizes patterns of interaction and communications as the key to understanding social life (Simmel, 1971). As for anthropology, the integration of the Strauss, Malinowski and Frazer theories emphasizes the content of the relationships joining individuals, the conditions under which they would exits, and eventually the evolution of these bonds over time (Galaskiewicz & Wasserman, 1993). Finally, role theory refines the definition of organisation by Katz and Kahn in 1966 as a 'fish nets' of interrelated offices (Tichy et al., 1979). Thus implies the network concept but is limited to one-degree role sets, in which is an individual directly linked to a focal person. It also limited because of individual bias (Wasserman & Faust, 1994).

A social network is defined as any bounded set of connected social units (Streeter & Gillespie, 1993). This definition highlights three important characteristics of social networks. First, networks have boundaries. The second key element of the definition is "connectedness" in social networks. The third key aspect of this definition is the social unit. Scott (1988) describes a social network as a strange but surprisingly powerful image of social reality. Every individual is connected to one another by invisible bonds, which are knitted together into a crisscross mesh of networks. These networks can be considered analogous to fishing nets or a length of cloth made from intertwined fabrics. In the Malaysian business context, a social network may be defined as inter-company coordination that is characterised by organic of social systems (Abd. Hamid, 2011).

Social network theory suggests that the patterns and implications of relationships demonstrate specific behavioural principles and properties where the network theories require specification in terms of patterns of relations, characterising a group or social system as a whole (Galaskiewicz & Wasserman, 1993). The use of social network theory as a premise for predicting network behaviour, then, is expectedly lower than the application of such a methodology to analyse network structure and operations. To date, two prominent network properties have provided a framework for viewing network behaviour, and these properties provide the basis for articles invoking the use of social network theory (Schultz-Jones, 2009). Scott (1988) further simplified the social network concept as a set of points connected by lines. From this idea emerged the application of social network analysis to the mathematical theory of graphs, in the hope of discovering a formal model for the representation of network structure.

Nevertheless, the outcomes of a social network can be both positive and negative. The positive outcome consists of broad access to power, information and solidarity, which eventually lead to the achievement of companies' desired goals. However, negative outcomes include costliness, inward focus, as well as rivalry against one network to another (Chenhall et al., 2010). In addition, companies with strong group memberships as well as broad social network are likely to maintain their core cultural values and attracts others in assisting the operation processes (Chenhall et al., 2010). Furthermore, resources and advantages can be acquired only through individual networks and networks between individuals, rather than firm-level networks (Smith, 2009).

DATA AND METHODOLOGY

Sample and Data

The data on director's profiles was obtained from annual reports downloaded from Bursa Malaysia Berhad official website (Bursa Malaysia Berhad, 2012). The sample consists of boards of directors for publicly listed companies in 2011. Table 1 describe the samples.

Table 1 and Table 2 summarise the demographic profile of the sample. The final sample observed was 745 publicly listed companies. Companies categorised under industrial product and trading and services sector contribute more than 50% from the total sample. It is important to mention that companies listed under financial sector were excluded because it has a very rigid set of rules and regulations.

Table 1
Derivation of sample

	Total
Number of companies listed as at 31st December 2011	822
Less:	36
Company listed under Financial Sector	
Company with PN17 status	16
Companies with incomplete data (unavailable 2011 annual report)	23
Outliers	2
Final Sample	745

Table 2
Industries classifications

Sector	No.	%
Constructions	40	5.37
Consumer products	125	16.78
Hotel	4	0.54
Industrial products	237	31.81
Infrastructure	6	0.81
Mining	1	0.13
Plantations	41	5.50
Properties	90	12.08
Technology	27	3.62
Trading & Services	174	23.22
Total	745	100.00

The information provided in annual reports includes the name of directors, age, types of directorships, citizenship, academic and industrial background and professional affiliations. In some cases, the annual report also includes biographical information of directors, such as family members who are also board members in the same company. Shared directorates may form an undirected boardroom network. Shared directorates is defined as two companies are linked if they shared at least one director as board member, vice versa (Larcker, So & Wang, 2013).

Director Network

The study focuses on social network analysis at both director and company level. The analysis used UCINET version 6.532, a social network analysis tool developed by Borgatti, Everett and Freeman (2002). To examine the relationship between internal governance, institutional characteristics and director's networks, this study employs the following ordinary least squares (OLS) model:

$$\begin{aligned} NETWORK = {} & b_0 + b_1 BSIZE_i + b_2 BMEET_i + b_3 DUALITY_{i,} + b_4 BIND_i \\ & + b_6 ACIND_i + b_6 INSTINV_i + b_7 AUDQ_i + b_8 ETHNICITY_i \\ & + b_9 POLCON_i + b_{10} FAMFIRMS_i + b_{11} FIRMSIZE_i \\ & + b_{12} LEVERAGE_i + b_{13} INDUSTRIES_i + \mu_i \end{aligned} \quad (1)$$

where *NETWORK* is the director networks, *BSIZE* is the total number of directors on the board of the companies, *BMEET* is the total board meeting in a financial year. *DUALITY* take value of 1 if the firm has duality role of *CEO* and chairman and zero otherwise, *BIND* takes a value of 1 if proportion of independent directors on board is more than two-thirds, *ACIND* takes a value of 1 if all the audit committee members are independent, *INSTINV* is the percentage of shareholdings owned by top five largest institutional investor to the total number of shares issued, *AUDQ* take value of 1 if the firm is audited by Big 4 auditors and zero otherwise, *ETHNICITY* is the proportion of Bumiputera directors on the board to the total number of directors of the companies, *POLCON* takes a value of 1 if the firm is politically connected and zero otherwise, *FAMFIRMS* takes a value of 1 if the company is family-owned, *FIRMSIZE* is the natural log of total assets representing firm size, *LEVERAGE* is the total debt deflated by total equity.

The five network measures (DEGREE-I, DEGREE-E, EIGEN, BETWEENNESS and CLOSENESS) are discussed in the next section and regressed separately in the model. As for independent variables, this study employs common corporate governance variables used in prior studies (Al-dhamari & Ismail, 2013; Fauzi & Locke, 2012; Mohamad Nor, Shafie, & Wan Hussin, 2010).

Social Network Analysis

This section discusses the analysis employed in this study consists of a description of the Social Network Analysis (SNA) as well as company's corporate governance and institutional characteristics. Then, the correlation of all tested variables and the regressions for all network measures including DEGREE-IN, DEGREE-EX, EIGEN, BETWEENNESS and CLOSENESS are examined.

The SNA for this study is focused on current formal social network among directors. The SNA measurements were carried out using UCINET and NetDraw software packages developed by Borgatti et al. (2002). The network measurement computed by UCINET and the visualised by NetDraw. Table 3 shows the descriptive statistics for multiple centrality measurements at firm's level.

For instance, Tan Sri Datuk Asmat Bin Kamaludin has possible connections to other 81 directors in the sample where he secured through 10 company directorships. Hence, the number of directorships for this director could be interpreted as an indicator of director's credentials. He also is well-positioned in the entire network based on betweenness centrality value. He has position himself at possible 656325.125 paths to other director's connections. It is suggested that he is the director with the most access to another boardroom. He has eigenvector centrality value of 0.1060, and is 8th ranked among the top 20 directors. His direct connections with other directors also makes him well-connected to other directors. These indirect connections reflect the power and prestige he has gained throughout his tenure.

In order to visualise the network pattern for both at directors and companies level, network visualisation software NetDraw version 2.141 is used. The software is included in the UCINET software package. The software visualises a network using a spring-embedded application. This is to visualise the directors and companies connected by lines drawn closely together whereas unconnected directors or companies are pushed apart. The application treats network lines as springs with a particular elasticity and strength. The result is a graphical representation of the linkages between directors, as shown in Figure 1.

In Figure 1, the square shapes represent directors and lines represent connections between directors. The bigger the square shape is, the larger the connections the director has. The figure also shows that in the Malaysian stock market, the directors have created a network pattern of social relationships through directors' interlocks. The network pattern shows that relatively there are concentrations in the director's social networks. The level of concentration of director interlocks has severe consequences for maintaining the independence, transparency and accountability of corporate governance affairs to shareholders (Aviña-Vázquez & Uddin, 2013; Fracassi & Tate, 2012). Directors with a greater value of degree of centrality are considered as well-connected and positioned at the central of the network. The remaining directors will then be pushed apart from the network central accordingly based on the individual director's degree centrality value.

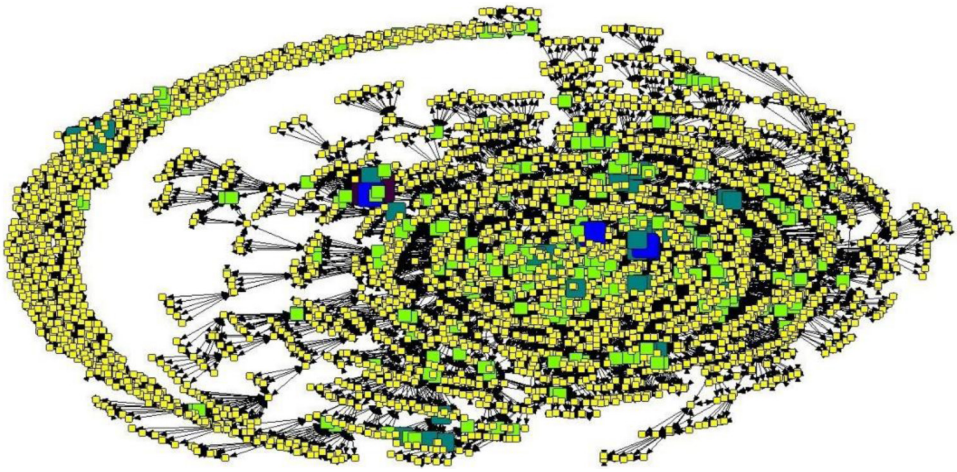

Figure 1. Network structure of board of directors for Malaysian publicly listed companies in 2011

RESULTS

It is important to note that the network structure at the company level showed 97 isolated companies. Isolated companies are those without any connections with the rest of the sample, as shown in Figure 2. Therefore, closeness centrality can only be used after whole network excludes isolated companies. Table 3 shows a description of all five network centrality measures.

Descriptive Statistics

At company level, the degree, which included all connection within and outside company, documented Network Centralisation Index (NCI) at 0.26%. This indicate the existence of small number of dominant personality in the network. The dominant individual director acquired 47 direct connections from multiple directorship appointments. The degree of external companies was documented NCI at 0.37%. A total of 283 companies (37.53%) have degree centrality valued above average. The remaining sample if 471 companies (62.47%) are valued below average. The highest degree centrality is 32 and the lowest is 0. The isolated 97 companies are valued at 0-degree centrality.

However, the eigenvector centrality values show relatively different results compared to degree centrality at the company level. The NCI is 78.20%. A total of 24 (3.22%) companies valued above average. The remaining sample 721 (96.68%) contributed to the majority companies valued below average. This

shows that not all well-connected companies have direct connections to otherwise unconnected companies. This also indicates the presence of an elite group with well connection with other well-connected companies. The network centralisation for betweenness centrality at company level is 5.08%. A total of 252 (33.42%) showed betweenness centrality valued above average. The remaining 502 companies (66.58%) valued below average. The maximum path from a company to other companies is 16125.363.

Table 3
Univariate statistics multiple centrality measurements at the company level

	Mean	Minimum	Maximum	Std. Dev.	NCI (%)
DEGREE-IN	12.117	4.000	47.000	5.680	0.26%
DEGREE-EX	5.404	1.000	32.000	4.817	0.37%
EIGEN	0.003	0.535	0.000	0.036	78.20%
BETWEENNESS	1124.751	0.000	15281.280	1819.042	5.08%
CLOSENESS	91.276	0.000	175.486	51.945	23.59%

In Figure 2, the networks structure shown is the network between companies. The company's network derived from the network analysis results at director level. This network consists of direct lines between any two companies if the company shared at least one director in both company boards. The calculation and visualisation for social networks at company's level is to examine the relational structure between companies. The square shape represents the individual company. As the number of direct connections between company increases, the large square shape. There are interconnections among companies in the Malaysian stock market for 2011. Worth mentioning that 92 companies have no direct connection with other companies in the network.

The results also suggest that there are opportunities for directors with lesser boardroom appointment, provided that they are able to exploit their own connections. A director's ability to fully utilise their own connection could improve his chances to be appointed at other company boardroom. The multiple directorships appointment could be seen as a proxy for director's reputation. Director with multiple directorships can be seen to have certain advantages over other such as resource exchange, control and influence over company's management (Renneboog & Zhao, 2011). Therefore, companies tend to appoint directors who are well-connected to other boardrooms (Barnea & Guedj, 2007). Appointment of well-connected directors' gives positive significant effects to company level of connectedness. It is suggested that the high degree centrality value for directors will contribute to high degree centrality of the company where

the directors appointed. A well-connected company will have greater access to information and communication channels.

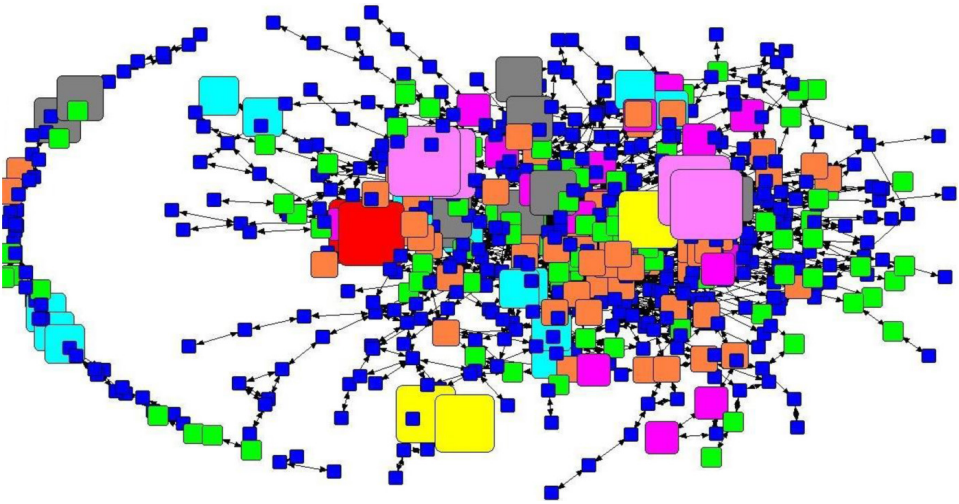

Figure 2. Network structure of Malaysian publicly listed companies in 2011

Table 4 describes the descriptive statistics of all variables in the model. Panel A shows all five network centrality measures namely DEGREE-IN, DEGREE-EX, EIGEN, BETWEENNESS and CLOSENESS. The 'n' indicate the normalised value of each network centrality. The normalised value will be using when comparing more than one set of networks for the same network centrality measures. In average, the DEGREE-IN shows that each company has 12 direct connections within and with external companies, ranging is between 11 and 47. The finding indicate that on average a company connected with other boards at 12, which includes the company itself, and with other companies. DEGREE-EX averages 4.69, which denotes the number of direct connections of the board outside the firm.

Panel B of Table 4 tabulates the descriptive statistics for the corporate governance variables. The average board has 7 directors, with a range of 3 to 18 directors. The average board meeting a company held is 5, with a range of 5 to 17. Only 27.7% of the sample companies combine the functions of CEO and chairperson (DUALITY), while 5.5% have boards that consist of more than two-thirds independent directors (BIND). About 62.4% of sample companies have an audit committee that consists entirely of independent directors. Institutional investors (INSTINV) average 2.89%, while just over half of sample companies are audited by a Big 4 accounting firm (BIG4).

Panel C tabulates the descriptive for remaining variables of this study. *Bumiputera* directors (ETHNICITY) make up on average 32.8% of the boards, whilst 50.2% of the sample companies are politically connected (Johnson & Mitton, 2003). About one-fifth of the sample are family companies (FAMFIRMS). The natural log of total assets (FIRMSIZE) averages 19.84, whilst the average ratio of debt to total equity (LEVEGRAGE) is 0.485. These figures are presented in Panel D of Table 4.

The correlations between the different network centrality measures are all above 0.50 and significant at the 1% level. This suggests that each network centrality measurement should not use in the same regression equation. The Spearman correlations between NDEGREE-IN and BIND are −0.065 at 1% level. The results are statistically significant but show a higher negative correlation for Pearson correlation. This is contrary to the expectation of the study that BIND decreases network centrality. FAMFIRMS, FIRMSIZE and LEVERAGE are significant at the 1% level with all network centrality measures for Spearman correlation. This is not surprising, since such companies tend to be managed by family members, and are well established with large company size. ETHNICITY and POLCON are also significantly positive with almost all network centrality measures. This suggests that firms with more *Bumiputera* or politically connected directors bring along their connections from other companies.

DEGREE-IN is a company's total internal and external direct links. DEGREE-EX is the total external direct links. EIGEN is the number of companies adjacent to a given company weighted by its degree centrality. BETWEENNESS is the proportion of all geodesic path from a firm to other pass through another firm. CLOSENESS is the sum of geodesic/shortest distances from a firm to all other companies. The normalised value for each network measurements is denoted by 'n'. BSIZE is the total number of directors on the board of the companies. BMEET is the total board meeting in a financial year. DUALITY take value of 1 if the firm has duality role of CEO and chairman and zero otherwise. BIND takes a value of 1 if proportion of independent directors on board is more than two-thirds. ACIND takes a value of 1 if all the audit committee members are independent. INSTINV is the percentage of shareholdings owned by top five largest institutional investor to the total number of shares issued. AUDQ take value of 1 if the firm is audited by Big 4 auditors and zero otherwise. ETHNICITY is the proportion of *Bumiputera* directors on the board to the total number of directors of the companies. POLCON takes a value of 1 if the firm is politically connected and zero otherwise. FAMFIRMS takes a value of 1 if the company is family-owned. FIRMSIZE is the natural log of total assets representing firm size. LEVERAGE is the total debt deflated by total equity.

Table 4
Descriptive statistics (N = 745)

	Mean	Median	Maximum	Minimum	Std. Dev.
Panel A: Network Centrality					
DEGREE-IN	12.117	11.000	47.000	4.000	5.680
DEGREE-EX	4.697	3.000	32.000	0.000	4.792
EIGEN	0.003	0.000	0.535	0.000	0.036
BETWEENNESS	1124.751	313.687	15281.280	0.000	1819.042
CLOSENESS	91.276	106.918	175.486	0.000	51.945
NDEGREE-IN	0.090	0.082	0.350	0.030	0.042
NDEGREE-EX	0.063	0.040	0.429	0.000	0.064
NEIGEN	0.483	0.000	75.718	0.000	5.162
NBETWEENNESS	0.405	0.113	5.499	0.000	0.655
NCLOSENESS	12.235	14.332	23.524	0.000	6.963
Panel B: Corporate Governance Variables					
BSIZE	7.416	7.000	18.000	3.000	1.935
BMEET	5.337	5.000	17.000	1.000	1.785
DUALITY	0.277	0.000	1.000	0.000	0.448
BIND	0.055	0.000	1.000	0.000	0.228
ACIND	0.624	1.000	1.000	0.000	0.485
INSTINV	2.899	0.000	72.630	0.000	7.081
AUDQ	0.544	1.000	1.000	0.000	0.498
Panel C: Institutional Variables					
ETHNICITY	0.328	0.250	1.000	0.000	0.265
POLCON	0.502	1.000	1.000	0.000	0.500
FAMFIRMS	0.213	0.222	0.714	0.000	0.215
Panel D: Control Variables					
FIRMSIZE	19.841	19.648	25.036	16.811	1.415
LEVERAGE	0.485	0.280	9.415	0.000	0.765

Multivariate Analysis

It is possible that the results demonstrate that a company may recognise the elite status of a newly appointed well-connected director into the company (Subrahmanyam, 2008). A well-connected director is appointed to allow the sharing of critical resources and information access from his connections (Johnson, Schnatterly, Bolton, & Tuggle, 2011). Table 5 presents the main regression of this

study based on a sample of 745 companies in 2011. The dependent variables from columns 1 to 5 include the network centrality measures, namely *DEGREE-IN*, *DEGREE-EX*, *EIGEN*, *BETWEENNESS* and *CLOSENESS*, respectively. The results found positive and significant association between board size and network centrality measures except for CLOSENESS. It is most likely that the additional appointment of new directors in a company establishes connections to the new company boardroom, hence increasing the direct connections of the company.

This study also found a significant negative association between board meeting and company direct connections. The increased number of board meetings may decrease the number of direct connections acquired from well-connected directors. Prior studies have documented that frequent board meetings are an indicator of board member response to poor company performance (Brick & Chidambaran, 2010; Vafeas, 1999). Thus, the results suggest that well-connected directors most likely to avoid being associated with company with poor performance. Being appointed as the director of poor performance company would damage a well-connected director.

As for duality, it is only significantly and negatively associated with closeness. Regardless the uncommon practices of duality in Malaysia publicly listed companies (Abdullah, 2004), the presence of duality in a company would decrease the ability the company to be closer to other companies. It is possibly due to the practice of duality commonly close related to companies managed by family members (Jaggi, Leung, & Gul, 2009). Consistent results are also shown for *FAMFIRMS*, which is significantly negatively associated with indirect network centrality measures, *BETWEENNESS* and *CLOSENESS*, respectively.

Further enhancing the understanding on influence of *Bumiputera* as well as politically-connected directors, this study found that both factors were significantly positively associated with all network centrality measurements, except in model 3. Consistent with prior studies, the presence of *Bumiputera* or politically-connected directors in a company in Malaysia has been one of the major elements since the establishment of the Malaysian capital market (Fung, Gul, & Radhakrishnan, 2015; Yatim, Kent, & Clarkson, 2006; Yunos, Ismail, & Smith, 2012). The presence of Bumiputera or politically-connected directors would increase both a company's direct and indirect connections. The embedded perception that *Bumiputera* or politically-connected directors are rich with critical resources and information access draws the attention of a company to appoint such directors for easy access to those critical resources (Fung et al., 2015; Smith, Halgin, Kidwell-Lopez, Labianca, Brass, & Borgatti, 2014).

Table 5
Main regression (N = 745)

Variable	(1)	(2)	(3)	(4)	(5)
C	−0.113	−0.203	−9.210	−1.860	−5.865
	−5.461* **	**−5.427*** **	**−1.609** **	**−4.614*** **	**−2.197*** **
BSIZE	0.011	0.006	0.306	0.031	0.017
	12.266* **	**3.832*** **	**1.484***	**2.320*** **	0.135
BMEET	−0.003	−0.005	−0.053	0.017	−0.083
	−3.812* **	**−3.797*** **	−1.047	1.121	−0.816
DUALITY	−0.002	−0.005	0.063	−0.052	−0.885
	−0.970	−1.030	0.149	−1.094	**−1.784** **
BIND	0.005	0.008	0.611	0.009	0.033
	0.970	0.939	1.174	0.085	0.030
ACIND	−0.001	−0.001	0.402	0.055	0.211
	−0.322	−0.326	**1.849** **	1.254	0.486
INSTINV	0.000	0.000	−0.017	0.006	0.014
	0.720	0.714	**−1.264***	**1.659** **	0.612
AUDQ	0.002	0.004	−0.377	−0.038	−0.260
	0.882	0.866	−0.970	−0.862	−0.635
ETHNICITY	0.020	0.035	0.055	0.290	1.863
	3.984***	3.992***	0.216	**2.692*** **	**1.870** **
POLCON	0.012	0.021	0.401	0.118	1.542
	4.826* **	**4.847*** **	**1.914** **	**2.627*** **	**3.445*** **
FAMFIRMS	−0.005	−0.010	2.312	−0.206	−1.721
	−0.931	−0.943	**1.753** **	**−1.746** **	**−1.700** **
FIRMSIZE	0.006	0.011	0.342	0.090	0.956
	6.341* **	**6.307*** **	**1.413***	**4.370*** **	**6.217*** **
LEVERAGE	0.003	0.005	0.181	0.087	0.459
	2.244* **	**2.208*** **	0.705	**2.388*** **	**2.820*** **
Industry Fixed	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.484	0.274	0.313	0.169	0.158
F-statistic	**44.637*** **	**18.564*** **	**22.183*** **	**10.451*** **	**8.656*** **
N	745	745	745	745	653
No. of Directors	4416	4416	4416	4416	3804

DEGREE-IN (1) is a company's total internal and external direct links. *DEGREE-EX (2)* is the total external direct links. *EIGEN (3)* is the number of companies adjacent to a given company weighted by its degree centrality. *BETWEENNESS (4)* is the proportion of all geodesic path from a firm to other pass through another firm. *CLOSENESS (5)* is the sum of geodesic/ shortest distances from a firm to all other companies. The normalised value for each network measurements is denoted by 'n'. *BSIZE* is the total number of directors on the board of the companies. *BMEET* is the total board meeting in a financial year. *DUALITY* take value of 1 if the firm has duality role of *CEO* and chairman and zero otherwise. *BIND* takes a value of 1 if proportion of independent directors on board is more than two-thirds. *ACIND* takes a value of 1 if all the audit committee members are independent. *INSTINV* is the percentage of shareholdings owned by top five largest institutional investor to the total number of shares issued. *AUDQ* take value of 1 if the firm is audited by Big 4 auditors and zero otherwise. *ETHNICITY* is the proportion of *Bumiputera* directors on the board to the total number of directors of the companies. *POLCON* take value of 1 if the firm is politically connected and zero otherwise. *FAMFIRMS* takes a value of 1 if the company is family-owned. *FIRMSIZE* is the natural log of total assets represent firm size. *LEVERAGE* is the total debt deflated by total equity. ***, ** and * denote significance at 1%, 5% and 10%.

Additionally, *Bumiputera* are generally characterised as team players that uphold Islamic values and beliefs, thus manifesting their ability to enhance company performance (Jamaludin & Abdul Wahab, 2016; Yunos et al., 2012). Finally, this study has documented a significant positive association between firm size and all network centrality measures. The larger the size of company, the more likely that better-connected directors are appointed in the company boardroom. Similarly, an increase of the leverage of a company indicates a need to appoint more or better-connected directors.

CONCLUSION

From the full account of the publicly listed companies in Malaysia, this study provides insight into the complex network structure of directors and companies. Prior studies in social network analysis emphasized the significant influence of network structure based on the selected companies sampled. This study has also explored the significant differences between director networks and company networks. The results of analysis provide evidence that a relatively moderate number of directors and company in Malaysia has the opportunity to enjoy a certain amount of power and influence. Corporate governance practices may be associated with the connections a director has during director nomination. Additional tests are suggested to examine whether these group of directors and companies do in fact apply certain exercises.

In addition, the study has identified a relatively important attribute, in those directors or companies who are well-connected and well-positioned to exert power are generally noticeable to other in the same network. A director who has multiple directorships has social group in the same boardrooms, may be one of the possible justifications. Consequently, there is a chance that directors with multiple directorships also have multiple directorships in other boardrooms. This study also provides reasonable justification relates to the restriction number directorship enforce for Malaysian publicly listed companies by Bursa Malaysia Berhad. For listing requirement, the maximum number of directorship for either publicly listed or private company have been imposed. The regulations emphasized the importance of directors to perform their duties and obligation for the interest of publicly listed company's shareholders. The directors are believed to effectively fulfil their duties and obligations by providing better governance for the company.

This study is subject to several limitations. First, it is limited to Malaysia publicly listed companies for a one-year period. While the sample encapsulates the majority of Malaysian large publicly listed companies, other large private companies were excluded. Second, the study did not explore the role that directors

are assigned, whether executive or non-executive, or related committee members within the companies, which also may influence the director connections. The SNA used in this study only considers one social connection, namely the director's formal appointment as a board member. Further analyses of other forms of social connections such as co-membership in any social organisations, alumni or other professional bodies' memberships are suggested. These forms of social connections also connect directors, even to unconnected directors from formal networks. Thus, for future research, it is essential to explore whether the exercise of power by the directors and companies in fact actually takes place.

In addition, social networks in the form of informal relationships should be further explored, including the impact of the informal connections as part of a contribution to social network studies. Studies should also be conducted concerning private companies. The additional value of director networks could be captured by including private companies, as a director may hold directorships at both publicly listed and private companies.

REFERENCES

Abd. Hamid, A. (2011). Network governance in government-linked companies (GLCs) and non-government linked companies (NGLCs) in Malaysia. *Journal of Financial Reporting and Accounting, 9*(1), 54–73. https://doi.org/10.1108/19852511111139804

Abdullah, S. N. (2004). Board composition, CEO duality and performance among Malaysian listed companies. *Corporate Governance, 4*(4), 47–61. https://doi.org/10.1108/14720700410558871

Al-dhamari, R. A., & Ismail, K. N. I. K. (2013). Governance structure, ownership structure and earnings predictability: Malaysian evidence. *Asian Academy of Management Journal of Accounting and Finance, 9*(1), 1–23.

Aviña-Vázquez, C. R., & Uddin, S. (2013). *Network of board of directors in Mexican corporations: A social network analysis.* In the Seventh Asia Pacific Interdisciplinary Research in Accounting Conference, 26–28 July 2013, Kobe, Japan.

Barnea, A., & Guedj, I. (2007). Director networks and firm governance. Unpublished Working Paper, University of Texas.

Borgatti, S. P., Everett, M. G., & Freeman, L. C. (2002). UCINet for Windows: software for social network analysis. Harvard MA: Analytic Technologies.

Brick, I. E., & Chidambaran, N. K. (2010). Board meetings, committee structure, and firm value. *Journal of Corporate Finance, 16*(4), 533–553. https://doi.org/10.1016/j.jcorpfin.2010.06.003

Bursa Malaysia Securities Berhad. (2012). *Main market listing requirements.* Kuala Lumpur: Bursa Malaysia Berhad.

Burt, R. S. (1998). The gender of social capital. *Rationality and Society, 10*(1), 5–46. https://doi.org/10.1177/104346398010001001

Bushon, R. B. (2010). Petra Perdana: Governance concerns. *The Star,* 16 January.

Carpenter, M. A., & Westphal, J. D. (2001). The strategic context of external network ties: Examining the impact of director appointments on board involvement in strategic decision making. *Academy of Management Journal, 4*(4), 639–660. https://doi.org/10.2307/3069408

Chenhall, R. H., Hall, M., & Smith, D. (2010). Social capital and management control systems: a study of a non- government organization. *Accounting, Organizations and Society, 35*(8), 737–756. https://doi.org/10.1016/j.aos.2010.09.006

Dey, A., & Liu, X. (2010). *Social connections, Stock-based compensations and director oversight.* Working paper, University of Minnesota.

Durbach, I. N., & Parker, H. (2009). An analysis of corporate board networks in South Africa. *South Africa Journal of Business Management, 40*(March 2008), 15–27.

Fauzi, F., & Locke, S. (2012). Board structure, ownership structure and firm performance: A study of New Zealand listed-firms. *Asian Academy of Management Journal of Accounting and Finance, 8*(2), 43–67.

Finance Committee on Corporate Governance. (2012). *Malaysian code of corporate governance 2012.* Kuala Lumpur: Securities Commission Malaysia.

Flores-Yeffal, N. Y., & Zhang, L. (2012). The role of social networks in determining earnings: A comparison analysis of four racial and ethnic groups. *Sociology Mind, 2*(2), 235–246. https://doi.org/10.4236/sm.2012.22031

Fracassi, C. (2012). *Corporate finance policies and social networks*. Working Paper, University of California, Los Angeles. https://doi.org/10.2139/ssrn.1121503

Fracassi, C., & Tate, G. (2012). External networking and internal firm governance. *Journal of Finance, 67*(1), 153–194. https://doi.org/10.1111/j.1540-6261.2011.01706.x

Fung, S. Y. K., Gul, F. A., & Radhakrishnan, S. (2015). Corporate political connections and the 2008 malaysian election. *Accounting, Organizations and Society, 43*, 67–86. https://doi.org/10.1016/j.aos.2015.04.001

Galaskiewicz, J., & Wasserman, S. (1993). Social network analysis: Concepts, methodology, and directions for the 1990s. *Sociological Methods & Research, 22*(1), 3–22. https://doi.org/10.1177/0049124193022001001

Hoitash, U. (2010). Should independent board members with social ties to management disqualify themselves from serving on the board? *Journal of Business Ethics, 99*(3), 399–423. https://doi.org/10.1007/s10551-010-0660-5

Horton, J., Millo, Y., & Serafeim, G. (2012). Resources or power? Implications of social networks on compensation and firm performance. *Journal of Business Finance & Accounting, 39*(3–4), 399–426. https://doi.org/10.1111/j.1468-5957.2011.02276.x

Jaggi, B., Leung, S., & Gul, F. A. (2009). Family control, board independence and earnings management: Evidence based on Hong Kong firm. *Journal of Accounting and Public Policy, 28*, 281–300. https://doi.org/10.1016/j.jaccpubpol.2009.06.002

Jamaludin, M. F., & Abdul Wahab, E. A. (2016). *Director networks and accruals quality in Malaysia.* Paper presented at the Journal of Contemporary Accounting & Economics Annual Symposium, 6-8 January 2016, Bangkok, Thailand.

Johnson, S. & Mitton, T. (2003). Cronyism and capital controls: Evidence from Malaysia. *Journal of Financial Economics*, *67*(2), 351–382.

Johnson, S., Schnatterly, K., Bolton, J. F., & Tuggle, C. (2011). Antecedents of new director social capital. *Journal of Management Studies, 48*(8), 1782–1803. https://doi.org/10.1111/j.1467-6486.2011.01020.x

Kim, E. H., & Lu, Y. (2011). The independent board requirement and CEO connectedness. *Accounting, Corporate Governance, Law & Institutions eJournal, 3*(75), 1–59. https://doi.org/10.2139/ssrn.1970591

Krishnan, G. V., Raman, K. K., Yang, K., & Yu, W. (2011). CFO/CEO-board social ties, sarbanes-oxley, and earnings management. *Accounting Horizons, 25*(3), 537–557. https://doi.org/10.2308/acch-50028

Larcker, D. F., So, E. C., & Wang, C. C. Y. (2013). Boardroom centrality and firm performance. *Journal of Accounting and Economics, 55*, 225–250. http://doi.org/10.1016/j.jacceco.2013.01.006

Larcker, D. F., & Tayan, B. (2010). Director networks: Good for the director, good for shareholders. *Stanford closer look series: Topic, issues, and controversies in corporate governance and leadership*, 5 August. Retrieved from https://www.gsb.stanford.edu/sites/gsb/files/publication-pdf/cgri-closer-look-08-director-networks.pdf

Mohamad Nor, M. N., Shafie, R., & Wan Hussin, W. N. (2010). Corporate governance and audit report lag in Malaysia. *Asian Academy of Management Journal of Accounting and Finance, 6*(2), 57–84.

Pesämaa, O., Klaesson, J., & Haahti, A. (2011). Board network characteristics and company performance in sweden: The case of Gnosjö companies and their board members in southern Sweden. In A. Fayolle & K. Todorov (Eds.), *European entrepreneurship in the globalizing economy* (pp. 125–138). Cheltenham, UK, Sweden: Edrward Elgar Publishing limited.

Renneboog, L., & Zhao, Y. (2011). Us knows us in the UK: On director networks and CEO compensation. *Journal of Corporate Finance, 17*(4), 1132–1157. https://doi.org/10.1016/j.jcorpfin.2011.04.011

Schultz-Jones, B. (2009). Examining information behavior through social networks: An interdisciplinary review. *Journal of Documentation, 65*(4), 592–631. https://doi.org/10.1108/00220410910970276

Scott, J. (1988). Social network analysis. *Sociology, 22*(1), 109–127. https://doi.org/10.1177/0038038588022001007

Simmel, G. (1971). The stranger. In D. N. Levine (Ed.), *On individuality and social forms: Selected writings* (pp. 143–149). Chicago: The University of Chicago Press.

Smith, J. M., Halgin, D. S., Kidwell-Lopez, V., Labianca, G., Brass, D. J., & Borgatti, S. P. (2014). Power in politically charged networks. *Social Networks, 36*, 162–176. https://doi.org/10.1016/j.socnet.2013.04.007

Smith, K. J. (2009). Do board contacts matter? An analysis of the relationship between boards of directors' ties and the performance of Australia's largest companies (Unpublished Master's Thesis), Queensland University of Technology.

Streeter, C. L., & Gillespie, D. F. (1993). Social network analysis. *Journal of Social Service Research, 16*(1–2), 210–222. https://doi.org/10.1300/J079v16n01_10

Stuart, T. E., & Yim, S. (2010). Board interlocks and the propensity to be targeted in private equity transactions. *Journal of Financial Economics, 97*(1), 174–189. https://doi.org/10.1016/j.jfineco.2010.03.012

Subrahmanyam, A. (2008). Social networks and corporate governance. *European Financial Management, 14*(4), 633–662. https://doi.org/10.1111/j.1468-036X.2007.00429.x

Tichy, N. M., Tushman, M. L., & Fombrun, C. (1979). Social network analysis for organizations. *The Academy of Management Review, 4*(4), 507–519.

Vafeas, N. (1999). Board meeting frequency and firm performance. *Journal of Financial Economics, 53*(1), 113–142. https://doi.org/10.1016/S0304-405X(99)00018-5

Wasserman, S., & Faust, K. (1994). Social network analysis: Methods and applications. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511815478

Yatim, P., Kent, P., & Clarkson, P. (2006). Governance structures, ethnicity, and audit fees of Malaysian listed firms. *Managerial Auditing Journal, 21*(7), 757–782. https://doi.org/10.1108/02686900610680530

Yunos, R. M., Ismail, Z., & Smith, M. (2012). Ethnicity and accounting conservatism: Malaysian evidence. *Asian Review of Accounting, 20*(1), 34–57. https://doi.org/10.1108/13217341211224718