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The effects of information environment on internal and external financing choices

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Abstract: This study examines the effects of the overall information environment on the choices of internal/external funding choices and on the decisions of debt/equity financing (Myers and Majluf, 1984). The empirical findings, whether the combination of all financial deficits or its four components, support the pecking order theory in the perspective of overall information environment. However, the pecking order behaviour does not hold if firms are under financial distress. After classifying sample into good/bad information environment, the results are consistent with the full sample. No evidence supports the pecking order theory when considering the persistence of financing policy.

Keywords: internal financing; external financing; information environment; financial deficits; pecking order theory.

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1 Introduction

Information asymmetry between managers and providers of external financing may affect the financing policy of a firm's capital investment (Bharath et al., 2009; Lemmon and Zender, 2019; Bipin and Saumitra, 2021). Myers and Majluf (1984) propose the pecking order theory of capital structure, predicting that information asymmetry between managers and investors leads to preference ordering of financing sources, with internally generated funds as the priority source, followed by debt and equity. Most research for pecking order theory of capital structure focuses on whether and when the pecking order is an appropriate description for financing behaviours (Naranjo et al., 2020), however, no consistent conclusions are reached. Shyam-Sunder and Myers (1999) suggest that pecking order theory can more accurately describe observed financing behaviour. However, Frank and Goyal (2003) suggest that pecking order theory is a better description of financing behaviours only for large firms, rather than small firms. Moreover, Bharath et al. (2009) argue that smaller firms with information asymmetry can provide the weakness of pecking order theory. Lemmon and Zender (2010) indicate that pecking order theory with consideration of financial crisis costs may provide an appropriate description for financing behaviour. Under the potential increase of agency conflicts, Leary and Roberts (2010) indicate that the support of this financing behaviour will escalate. From the above mentioned literature, it is obvious to learn that most extant studies examine this issue from different perspectives, and their findings are inconsistent.

One important supposition in Myers and Majluf's theory is that the firm's pecking order is to minimise adverse selection cost in financing investment[1]. Specifically, internally generated fund has no information asymmetry costs, but securities, especially the risky ones, may raise additional costs due to new issue price discounts from investors and further distortion of investment decisions from managements. The study of pecking order theory directly related to asymmetric information is still an open issue in both theoretical and empirical research. Hennessy et al. (2007) and Halov and Heider (2011) indicate that information asymmetry affect the financing policy of a firm, and it also

affect the preference of using debt fund over equity fund. Gatchev et al. (2009) indicate that firms with higher information asymmetry tend to choose debt financing[2]. When the degree of information asymmetry is higher, firms are more likely to choose debt financing.[3] Examining pecking order theory from the perspective of information asymmetry, D'Mello and Ferris (2000) and Bharath et al. (2009) find evidence empirically support Myers and Majluf's argument, but Helwege and Liang (1996), Leary and Roberts (2010) conclude the opposite. Some theoretical studies (Fulghieri and Lukin, 2001; Halov and Heider, 2011) and survey evidence from Graham and Harvey (2001) also reject pecking order hypothesis.

Prior research investigates the role of information asymmetry in discussing corporate financing choices focuses either on capital market proxies or on accounting quality indicators. In the capital market specification, Bharath et al. (2009) use several measures of adverse selection developed by the market microstructure literature. Some observed market data, such as quotes, bid-ask spreads, trades, and transaction costs, are typically suggested. Leary and Roberts (2010) use hot/cold periods of equity issuance, analyst coverage, forecast dispersion, firm size, firm age and asset tangibility as proxies for information asymmetry.

Besides, some literature shows that accounting quality may affect the cost of capital and further affect firms' financing choices. Easley and O'Hara (2004) indicate that the accounting treatments of firms' earnings and their disclosure policies, i.e., quality of financial statements, will affect firms' information environment (information risk) (Dang et al., 2017; Li et al., 2019), thereby affecting the cost of capital and idiosyncratic risk. Francis et al. (2005) as well as Aboody et al. (2005) use accounting earnings quality to measure information risk, and find that earnings quality is related to future returns. Chang et al. (2006) propose that when accounting quality is higher, the equity financing amount is greater in addition to the tendency of raising funds by equity financing. Recently, Armstrong et al. (2012) discuss anti-takeover decisions from the following four information environments: information asymmetry between managers and outsiders, information asymmetry between investors which can be displayed by information-based trading, private information flows and collective activities and informativeness of financial statements.[4]

The main purpose of this paper is to explore the effects of overall information environment of a firm on the choice of internal and external financing and the choice of external financing compositions. This study empirically examines Myers and Majluf's theory in the information asymmetry perspective. It expects that firms which avoid suffering from higher costs of capital are likely to follow the pecking order's financing hierarchy when information asymmetry is high (bad information environment). On the other hand, if the information asymmetry is low (good information environment), the pecking order behaviour may not be hold. In other words, the worse the information asymmetry is, the more likely the pecking order behaviour is present.

In a US sample consisting of 4,529 annual observations during 2004–2014, this study employs two discrete choice logit models to estimate the framework of corporate financing choices between internal/external funding as well as the choice between debt/equity financing. To measure the overall information environment, the study considers four proxies, including idiosyncratic risk, informativeness of financial statements, information asymmetry and information quality of financial statements. The study further creates an aggregate information quality index by applying principal component analysis (PCA) on the above four information environment variables, and the

study expects this proxy of information environment (the higher the value, the worse the information quality) to be positively associated with financing choices if pecking order hypothesis holds. The results show that without financial deficit, the worse the information environment is, the higher probability that firms choose internal financing and debt financing if external funds are necessary. This evidence is consistent with the pecking order hypothesis. On the other hand, firms with financial deficit prefer to choose external financing and when external financing is necessary, they prefer to use debt than equity. The study also finds that firms prefer to use external fund and equity financing in a bad information environment, they tend to suffer from capital shortage. Thus, pecking order behaviour does not hold if firms have financial deficits.

In addition, the study splits the whole sample into good/bad information environment to investigate firms' financing behaviour in different circumstances. For the choice of internal/external funding, firms are more probable to seek external funds for the need in capital expenditure and dividend distribution if their information environment is good. If firms are in bad information environment, they have the same behaviour but the demand for external funds is even stronger. The result is consistent with the whole sample, which firms' financing patterns follow pecking order. For the choice of debt/equity financing, firms with financial distress prefer to use debt financing if the information environment is good. However, if the information environment is bad, firms which need funds to support net working capital may have higher probability to use equity financing.

This paper also considers the possibility of financing decision is persistent. Gatchev et al. (2009) indicate that if the persistence of financing choices is ignored in analyses, it induces biased estimation of the sensitivities of financing on investment and income. For example, if firms obtain funds via debt or equity before one year of the planned investment, it will affect the issuance amounts of debt or equity in the current period of investment. Hence, the study uses one-year-lagged cash holding, one-year-lagged long-term debts and one-year-lagged seasoned equity offerings as the explanation variables, that is, the study considers the effect of the prior financing policy on the current one. For the full sample, the results show that firms with higher cash holding in the previous year have higher probability in choosing internal financing. Firms with higher cash holding and higher debt level in the previous year present higher probability in equity financing but they may prefer debt financing if their equity level is high in the previous year. In good information environment, only the level of the one-year-lagged cash holding affects the internal/external financing decisions; and only the level of one-year-lagged debt influences debt/ equity financing. In bad information environment, the study observes that firms with higher cash holding in the previous year may have higher possibility to choose internal financing in the current year.

The remainder of the paper is organised as follows. Section 2 discusses the research design and data. Section 3 presents the results of the empirical tests. Section 4 concludes.

2 Research design and data

2.1 Sample and data

The samples from the US are sourced from the COMPUSTAT database (financial and accounting data) and the Centre for Research in Security Prices (CRSP) database (stock price and returns data). The research period is from 2004 to 2014, totalling 11 years.

However, because the volatility of cash flows is calculated based on standard deviation of operating cash flows of the current year and the past two years (12 quarters), the actual research period is from 2002 to 2014, totally 13 years.

This paper investigates the companies listed on the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotations (NASDAQ) during the research period, excluding companies within the banking, insurance and utilities industries and companies with incomplete data. Due to the calculation of variables in different regression models, the number of observations in the models varies.

2.2 Empirical model

Firms prefer to choose internal funds if pecking order theory holds. At the choice of external capitals, firms prefer to choose debt financing if pecking order theory holds. Hence, the changes in debts should be higher when capital deficits exist. Because the choice of internal/external financings is the function of capital deficiency, this study examines whether firms' financing is a random decision or a support for pecking order theory after considering the overall information environment. Meanwhile, this study also examines the impact of capital deficits and its four components on the financing decisions in the framework of overall information environment. The empirical models are as follows:

$$\begin{aligned} InEx_{it} = {} & \beta_0 + \beta_1 FinDef_{it} + \beta_2 InfoEnvi_{it} + \beta_3 FinDef_{it} InfoEnvi_{it} + \beta_4 ZScore_{it} \\ & + \beta_5 Agency_{it} + \beta_6 PREC_{it} + \beta_7 LEV_{it} + \beta_8 OCF_{it} + \beta_9 ROA + \beta_{10} SIZE \\ & + \beta_{11} Year + \beta_{12} ID + \varepsilon_{it} \end{aligned} \tag{1}$$

$$\begin{aligned} DebtEquity_{it} = {} & \beta_0 + \beta_1 FinDef_{it} + \beta_2 InfoEnvi_{it} + \beta_3 FinDef_{it} InfoEnvi_{it} + \beta_4 InEx_{it} \\ & + \beta_5 ZScore_{it} + \beta_6 Agency_{it} + \beta_7 PREC_{it} + \beta_8 LEV_{it} + \beta_9 OCF_{it} + \beta_{10} ROA \\ & + \beta_{11} SIZE + \beta_{12} Year + \beta_{13} ID + \varepsilon_{it} \end{aligned} \tag{2}$$

where, *InEx* is a dummy variable for the choice of internal/external funding, which equals to 1 if firms' investment expenditures are greater than its internal fund in the current period and 0 otherwise. Following Leary and Roberts (2010), the internal capital is defined as the beginning cash balance plus current period's cash flows minus current period's dividend minus the change in current period's working capital. *DebtEquity* is a dummy variable for the choice of debt/equity financing, which equals to 1 if firms have long-term debts but no seasoned equity offering in the current period and 0 otherwise. *InfoEnvi* is the overall information environment. *ZScore* is financial distress cost; *Agency* is agency costs; *PREC* is the precautionary motive for cash savings; *LEV* is leverage; *OCF* is operating cash flows; *ROA* is the profitability or the operating efficiency of a firm; *SIZE* is company's size.

The study further considers the possibility that financing decision may be persistent. Gatchev et al. (2009) indicate, if the persistence of financing choices is ignored in analyses, it induces a bias estimation of the sensitivities of financing on investment and income. For example, if firms issue debt or equity before one year of planned investment, it will affect the issuance amounts of debt or equity in the current period of investment. Hence, this paper also use one-year-lagged cash holding, one-year-lagged long-term debts and one-year-lagged seasoned equity offerings as the explanation variables, that is,

this study considers the impact of the prior financing policy on the current period's financing policy. The regression models are as follows:

$$\begin{aligned} InEx_{it} = {} & \alpha_0 + \alpha_1 FinDef_{it} + \alpha_2 InfoEnvi_{it} + \alpha_3 FinDef_{it} \cdot InfoEnvi_{it} + \alpha_4 dCH_{it-1} \\ & + \alpha 5 NDebt_{it-1} + \alpha_6 NEquity_{it-1} + \alpha_7 ZScore_{it} + \alpha_8 Agency_{it} + \alpha_9 PREC_{it} \\ & + \beta_{10} LEV_{it} + \beta_{11} OCF_{it} + \beta_{12} ROA_{it} + \beta_{13} SIZE + \beta_{14} Year + \beta_{15} ID + \varepsilon_{it} \end{aligned} \tag{3}$$

$$\begin{aligned} DebtEquity_{it} = {} & \alpha_0 + \alpha_1 FinDef_{it} + \alpha_2 InfoEnvi_{it} + \alpha_3 FinDef_{it} InfoEnvi_{it} + \alpha_4 dCH_{it-1} \\ & + \alpha_5 NDebt_{it-1} + \alpha_6 NEquity_{it-1} + \alpha_7 InEx_{it} + \alpha_8 ZScore_{it} + \alpha_9 Agency_{it} \\ & + \alpha_{10} PREC_{it} + \beta_{11} LEV_{it} + \beta_{12} OCF_{it} + \beta_{13} ROA_{it} + \beta_{14} SIZE \\ & + \beta_{15} Year + \beta_{16} ID + \varepsilon_{it} \end{aligned} \tag{4}$$

where, *dCH* is one-year-lagged cash holding; *NDebt* is one-year-lagged long-term debts and *NEquity* is one-year-lagged seasoned equity offerings. The definitions of other variables are the same as in model (1) and (2).

On the other hand, to investigate the impact of the different components of financial deficits on financing decision of a firm, this paper further decomposes the financial deficits (*FinDef*) in regressions (1)~(4) into four components, that is, *ΔNWC* is the investment on net operating or current assets, *Investment* is the investment on fixed assets, *Income* is the distributable income for common stock and preferred stock shareholders and *Dividend* is the dividend. The study then re-runs the above corresponding regressions, where financial deficits variable (*FinDef*) is replaced by the following four variables: *ΔNWC*, *Investment*, *Income* and *Dividend*. Note that these four variables are scaled by total assets at the beginning of the period. Moreover, to reduce the impact of outliers, all of the variables are winsorized at the 1% and 99% level.

2.3 The definitions of variables

2.3.1 Financial deficits (FinDef)

Following Kayhan and Titman (2007), the study adopts equation (5) to measure financial deficits (*FinDef*).

$$FinDef = \Delta NWC + Investment + CashDividend - NCF \equiv Netequity + Netdebt \tag{5}$$

where, *ΔNWC* is the change in net working capital; Investment is the investment expenditures, *CashDividend* is dividend; *NCF* is internal cash flows; *NEquity* is the net amount of equity issuance, *NDebt* is the net amounts of debts. If *FinDef* is positive, firms' investment is higher than capital induced from operations. If *FinDef* is negative, firms' investment is lower than capital induced from operations.

2.3.2 Information environment variable

The information environment variable, *InfoEnvi* is a composite index of four information environment indicators, including the information asymmetry, the idiosyncratic risk, the value relevance of financial reports and the informativeness of financial statements. The comprehensive measure is calculated by the first principal components analysis (PCA).

2.3.2.1 Information asymmetry

This paper refers to Khan and Watts's method (2009) to measure information asymmetry. The measure includes the following four variables:

1 investing cycle (the total amount of depreciation and amortisation divided by the beginning value of total assets)

2 the systematic risk of the firm (calculated by standard deviation from daily stock prices in the current year)

3 ROA (net income before extraordinary items divided by the beginning value of total assets)

4 firm age.

Next, this paper uses the above four variables to perform the PCA, and obtain a composite index, AsyInfor. The higher the composite index, the higher the information asymmetry of firms. Please note, the study takes the reciprocal of investing cycle, firm age and ROA, but not systematic risk.

2.3.2.2 Idiosyncratic risk

This paper uses the Fama-French (1993) three factors model to measure idiosyncratic risk.

$$R_i - R_{ft} = b_0 + b_{1i}(R_{mt} - R_{ft}) + b_{2i}SMB_t + b_{3i}HML_t + e_i \tag{6}$$

where, R_i = stock returns of firm i, R_m = market returns, R_{ft} risk-free rate of interest, SMB_t = small market capitalisation minus large market capitalisation, and HML_t = high book-to-market ratio minus low book-to-market ratio. The stock returns of firm i in the past 36 months are used to estimate the regression coefficients (i.e., beta risk and the intercept) and to substitute them into the Fama-French 3 factors model to calculate the abnormal return between monthly returns of firm i and the monthly returns of the market. The residual value of equation (6) is used to measure the idiosyncratic risk.

2.3.2.3 Informativeness of financial statements

This paper follows Armstrong et al. (2012) to measure the value relevance of financial statements (FinVR). Based on the adjusted-R^2 of the following time-series regressions of equations (7a) and (7b), this study obtains R^2_{BV} and R^2_{EPSBV}.

$$P_{it} = g_0 + g_1 BV_{it} + e_{it} \tag{7a}$$

$$P_{it} = b_0 + b_1 EPS_{it} + b_2 BV_{it} + e_{it} \tag{7b}$$

where, P_{it} = market price per share of firm i at the end of the third month following the end of the fiscal year t, EPS_{it} = earnings per share before extraordinary items of firm i at time t, BV_{it} = book value per share of firm i at time t. The estimation of equations is based on the seven years rolling-window regression. Next, the value relevance of earnings can be obtained as follows.

$$VRE = \left(R^2_{EPSBV} - R^2_{BV}\right) \Big/ \left(1 - R^2_{BV}\right) \tag{7c}$$

The more informative of financial statements, the higher the degree of value relevance of earnings. The study measures *FinVR* by 1 minus *VRE*.

2.3.2.3 Information quality of financial statements

This paper follows McNichols (2002), which modifies the model of Dechow and Dichev (2002).

$$TCA_{it} = a_0 + a_1 CFO_{it\text{-}1} + a_2 CFO_{it} + a_3 CFO_{it+1} + a_4 \Delta REV_{it} + a_5 PPE_{it} + e_{it} \tag{8}$$

where, TCA is total current accruals, which is the change in current assets minus the change in current liabilities minus the change in cash plus current portion of long-term debts. *CFO* is operating cash flows. *ΔREV* is the change in operating revenue. *PPE* is gross amount of fixed assets. The study obtains the residual values by running model (a) for industry-year, and then taking the absolute values of the residual values as the measure of discretionary accrual variable (*AbRe*). The higher *AbRe*, the lower the quality of financial reports

2.3.3 Net equity (NEquity) and net debt (NDebt)

Net equity (*NEquity*) is net of equity issuance and repurchase divided by beginning total assets, in which equity issuance is the total capital from the issuances of common stocks or preferred stocks and equity repurchase is the total capital paid for repurchasing common or preferred stocks. Net debt (*NDebt*) is the ending total long-term liabilities minus the beginning total long-term liabilities divided by beginning total assets.

2.3.4 Control variables

McLean (2011) finds that the cash saving from share issuance tends to increase year by year. The increase in the precautionary motives is the preferred interpretation of the trend and precautionary cash savings have become the major purpose of stock issuance proceeds. Accordingly, this study uses R&D expenditures, cash flow volatility and dividends and the composite indicator of the principal elements of the three variables as the proxy variables of the precautionary motives for cash savings (*PREC*). Moreover, company size (*SIZE*), financial distress cost (*ZScore*), agency costs (*Agency*), leverage (*LEV*), operating cash flow (*OCF*), profitability (*ROA*) are used as the control variables in the above regression models. Financial distress cost is measured by the Altman Z-Score. Agency cost is defined as follows. Firms' book to market ratios are lower than the median of the sample firms and firms' profitability (EBITDA scaled by the beginning total assets) is higher than the median of the sample firms, These firms are classified as the high agency costs group. Leverage is measured by long-term liability divided by total assets. Operating cash flow is measured by the logarithm of operating cash flows. Firm size is measured by the logarithm of total market capitalisation. The return on assets (*ROA*) of a firm measures its operating efficiency, which is defined as income before extraordinary items divided by total assets at the beginning of the period.

Table 1 Descriptive statistics

Whole sample (*N* = 4,529)								*Good info* (*N* = 1,131)		*Bad info* (*N* = 1,134)	
Variable	*Mean*	*Std. dev*	*Min*	*Q1*	*Median*	*Q3*	*Max*	*Mean*	*Std. dev*	*Mean*	*Std. dev*
InEx	0.524	0.499	0.000	0.000	1.000	1.000	1.000	0.335	0.472	0.638	0.481
DebtEquity	0.699	0.459	0.000	0.000	1.000	1.000	1.000	0.518	0.500	0.783	0.412
NDbet	0.014	0.123	–0.200	–0.019	–0.004	0.009	1.496	0.021	0.151	0.013	0.111
NEquity	–0.045	0.065	–0.837	–0.052	–0.032	–0.015	0.000	–0.037	0.050	–0.066	0.098
FinDef	0.725	0.447	0.000	0.000	1.000	1.000	1.000	0.683	0.466	0.767	0.423
ΔNWC	0.116	1.012	–2.636	–0.734	0.187	0.958	2.699	0.086	1.001	0.100	1.041
Investment	0.849	0.867	–2.523	0.303	1.000	1.484	2.921	0.762	0.861	0.939	0.879
Dividend	0.658	0.417	–2.699	0.493	0.728	0.890	2.575	0.626	0.503	0.701	0.331
Income	0.195	1.044	–3.000	–0.626	0.237	1.026	3.000	0.148	0.966	0.227	1.125
InfoEnvi	–0.000	1.219	–8.327	–0.289	0.305	0.709	3.448	–1.602	1.352	1.058	0.379
dCHt–1	0.135	0.829	–3.994	–0.106	0.139	0.608	1.999	0.240	0.826	0.156	0.771
Zscore	1.300	5.988	–87.849	0.078	2.432	3.825	32.844	–1.851	7.942	2.749	4.442
Agency	0.396	0.489	0.000	0.000	0.000	1.000	1.000	0.149	0.357	0.576	0.494
PREC	0.717	4.705	–2.797	–0.098	0.029	0.221	49.442	1.462	6.386	0.332	3.230
LEV	0.356	0.224	0.001	0.214	0.322	0.448	4.958	0.350	0.209	0.374	0.217
Internal funds	44.624	80.853	–376.309	–1.502	16.457	65.524	1,023.155	15.737	62.601	70.079	102.298
OCF	0.503	1.167	–2.699	–0.587	0.785	1.499	2.572	–0.478	1.063	1.151	0.874
ROA	–0.087	0.296	–3.653	–0.161	0.014	0.072	0.715	–0.389	0.349	0.085	0.153
Size	5.183	1.460	–0.039	4.192	5.366	6.294	9.135	4.738	1.431	5.717	1.310

Notes: 1 – The definitions of all variables refer to Appendix. 2 – The study partitions the sample into two subsamples according to information environment measure (InfoEnvi): one belongs to good information environment (InfoEnvi ≤ –0.289) and the other belongs to bad information environment (InfoEnvi ≥ 0.709).

3 Empirical results

3.1 Descriptive statistics

Table 1 presents descriptive statistics of the financial status of firms, information environment and control variables. The choice of internal fund and the choice of debt financing have means of 0.524 and 0.669, indicating that around 50% of firms use internal capital and about 67% of firms use debt financing when external capital is needed. Average change of debt (*NDebt* = 0.014) is higher than the average change of equity (*NEquity* = –0.045). Approximately 73% of firms are short of capitals. In addition, the overall information environment has a mean of –0.000, a median of 0.305 and a standard deviation of 1.219, suggesting that the information quality for some companies are not satisfactory.

Moreover, the average change of cash holding is 0.135. The average bankruptcy cost of firms (*Z-Score*) is 1.3, suggesting that the sample companies appear to possess a middle high bankruptcy risk. On the other hand, the mean of the agency cost (*Agency*) is 0.396, showing that less than half of the companies suffer from the agency problems. The average leverage counts 35.6% of total assets.

This study partitions the sample into two subsamples, according to their information environment measure (*InfoEnvi*): one belongs to good information environment, where the *InfoEnvi* is equal or less than the first quantile (–0.289) and the other belongs to bad information environment, where *InfoEnvi* is equal or greater than the third quantile (0.709). Comparing the two information quality subsamples, the companies with bad information quality prefer to keep high internal capital and high debt financing when external capital is needed. These firms also show a higher financial deficit but a lower degree of debt changes and equity changes than firms with good information quality. Apparently, it is difficult for them to raise external capital and would thus use internal cash to cover financial deficits. Therefore, the average change of cash holding is lower than that of the firms with good information quality.

In the aspect of financial deficits component, bad information quality firms use more capital in capital expenditures and have more activities in creating income. For firms with bad information environment, the agency problem is normally more serious and the precautionary motive for cash savings is less strong than that of the firms with good information environment. Although the bad information environment companies use relatively higher degree of leverage than that of the firms with good information quality, the bankruptcy risk is relatively low. This is probably due to the fact that they wish to reserve more internal funds. Moreover, the untabulated Pearson correlation coefficients show a slightly higher correlation between *ROA* and *InfoEnvi* (0.652, significant at the 1% level), the variance inflation factor (VIF) test among all variables are below 5. Thus, the potential multi-collinearity problem is excluded.

3.2 The choice of internal capital and information environment

This study employs a discrete choice logit models to estimate the framework of corporate financing choices between internal and external funds. The higher the information environment index, the worse the information quality. Based on Myers and Majluf's theory (1984), the higher degree of the information asymmetry, the more the pecking

order behaviour would be present. A positive relationship between information environment and financing choices is expected if pecking order hypothesis holds.

Table 2 The choice of internal capital and information environment (whole sample)

$$InEx_{it} = \beta_0 + \beta_1 FinDef_{it} + \beta_2 InfoEnvi_{it} + \beta_3 FinDef_{it} InfoEnvi_{it} + \beta_4 ZScore_{it} + \beta_5 Agency_{it} + \beta_6 PREC_{it} + \beta_7 LEV_{it} + \beta_8 OCF_{it} + \beta_9 ROA + \beta_{10} SIZE + \beta_{11} Year + \beta_{12} ID + \varepsilon_{it} \quad (1)$$

Variables	*Model 1*				*Model 1-1*			
	Coefficient		*z–value*	*Odds ratio*	*Coefficient*		*z–value*	*Odds ratio*
FinDef	–0.213	***	–2.538	0.808				
ΔNWC					–0.085	**	–2.061	0.918
Investment					–1.459	***	–19.915	0.232
Dividend					–0.943	***	–7.679	0.389
Income					0.024		0.596	1.025
InfoEnvi	0.205	***	3.486	1.227	0.415	***	6.047	1.514
*FD*InfoE*	–0.186	***	–2.762	0.831				
*DNWC*InfoE*					0.002		0.040	1.002
*Inv*InfoE*					–0.276	***	–5.935	0.759
*Div*InfoE*					–0.056		–0.736	0.945
*Inc*InfoE*					0.034		0.874	1.035
ZScore	0.045	***	4.602	1.046	0.055	***	4.330	1.056
Agency	0.190	*	1.855	1.209	0.310	***	2.729	1.364
PREC	–0.014	*	–1.824	0.986	–0.014		–1.337	0.987
LEV	0.517	***	2.927	1.676	0.690	***	3.042	1.993
OCF	0.441	***	10.14	1.555	0.616	***	11.47	1.851
ROA	–0.318	*	–1.706	0.728	–0.380		–1.610	0.684
SIZE	0.675	***	19.478	1.964	0.867	***	20.863	2.379
Year	Included				Included			
IDs	Included				Included			
_cons	Included				Included			
pseudo R^2	0.257				0.409			
LR chi^2	1,079.490	***			1,124.587	***		
N	4,529				4,529			

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

In Table 2, the results show that without financial deficits, the worse the information environment, the higher probability that firms would choose internal funds. Consistent with pecking order behaviour, the costs of external financing is usually high when information environment is bad. On the other hand, firms with financial deficits prefer to choose external financing. The odds ratio of the intersection term of financial deficits and

information environment is 0.831. It suggests that firms prefer to use external funds when information environment is bad and they do not have enough capital. Thus, pecking order behaviour holds when information environment is taken into consideration, but it does not hold if firms have financial deficits. In addition, this study finds evidence that shows, when firms with lower bankruptcy risk, higher agency cost, higher degree of leverage, better operating performance and larger firm size, tend to choose internal funds. However, firms with higher precautionary motive for cash savings and lower assets returns may prefer external financing.

Furthermore, in Model 1-1, the study decomposes financial deficits into four components: *ΔNWC* is the investment on net operating or current assets; *Investment* is the investment on fixed assets; *Income* is the distributable income for common stock and preferred stock shareholders and *Dividend* is the dividend. This study finds consistent results. Specifically, when firms have capital shortage in net working capital, capital expenditures and dividend distribution, they are more likely to use external funds.

3.3 The choice of external capital and information environment

This study employs discrete choice logit models to investigate the relationship of corporate financing choices between debt and equity financing. In Table 3, the results show that, whether companies have financial deficits, the worse the information environment, the higher probability firms choose debt financing. The finding is consistent with pecking order behaviour, which states that the costs of equity financing are usually higher when information environment is bad. The odds ratio of the intersection term of financial deficits and information environment is 0.661. It suggests that firms prefer to use equity as the source of extra capital when information environment is bad and they do not have enough capital. Thus, pecking order behaviour holds in general information environment but it does not hold if firms have financial deficits and when the information environment gets worse.

Table 3 The choice of external capital and information environment (whole sample)

$$\begin{aligned} DebtEquity_{it} = {} & \beta_0 + \beta_1 FinDef_{it} + \beta_2 InfoEnvi_{it} + \beta_3 FinDef_{it} InfoEnvi_{it} + \beta_4 InEx_{it} \\ & + \beta_5 ZScore_{it} + \beta_6 Agency_{it} + \beta_7 PREC_{it} + \beta_8 LEV_{it} + \beta_9 OCF_{it} + \beta_{10} ROA \\ & + \beta_{11} SIZE + \beta_{12} Year + \beta_{13} ID + \varepsilon_{it} \end{aligned} \quad (2)$$

Variables	*Model 2*				*Model 2-1*			
	Coefficient		*z–value*	*Odds ratio*	*Coefficient*		*z–value*	*Odds ratio*
FinDef	0.430	***	5.638	1.537				
ΔNWC					–0.049		–1.377	0.952
Investment				0.040		0.700	0.923	
Dividend					0.042		0.500	1.043
Income					0.000		0.009	1.000
InfoEnvi	0.674	***	8.618	1.962	0.372	***	6.128	1.450

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

Table 3 The choice of external capital and information environment (whole sample) (continued)

Variables	*Model 2*				*Model 2-1*			
	Coefficient		*z–value*	*Odds ratio*	*Coefficient*		*z–value*	*Odds ratio*
*FD*InfoE*	–0.414	***	–5.362	0.661				
*DNWC*InfoE*					–0.031		–1.045	0.970
*Inv*InfoE*					–0.023		–0.664	0.978
*Div*InfoE*					0.022		0.339	1.023
*Inc*InfoE*					0.004		0.134	1.004
ZScore	0.429	***	5.217	1.536	0.450	***	4.991	1.568
Agency	0.023	***	3.044	1.023	0.020	***	2.618	1.020
PREC	0.023		0.231	1.023	0.043		0.448	1.044
LEV	–0.010		–1.574	0.990	–0.010		–1.566	0.990
OCF	1.577	***	6.748	4.838	1.616	***	6.965	5.033
ROA	0.189	***	4.445	1.208	0.208	***	5.000	1.232
SIZE	–0.389	*	–1.719	0.678	–0.419	*	–1.912	0.658
Year	–0.142	***	–4.491	0.868	–0.159	***	–5.067	0.853
IDs	Included				Included			
_cons	Included				Included			
pseudo R^2	Included				Included			
LR chi^2	0.054				0.046			
N	236.711	***			199.730	***		

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

The odds ratio of *InEx* is 1.536, implying that firms using internal funds may have higher possibility to choose debt financing if extra capital is needed. In addition, the study finds evidence that suggest firms with lower bankruptcy risk, higher level of leverage, better operating performance tend to choose internal funds. However, small companies and firms with lower ROA may prefer equity financing. Furthermore, Model 2-1 shows that the four financial deficit components are not significant, nonetheless, the other findings are consistent with those shown in Model 2.

3.4 The choice of internal capital and good/bad information environment

The study further partitions the sample into two subsamples, based on the information environment measure (*InfoEnvi*), to investigate firms' financing behaviour in different circumstances. One subsample has good information environment (*InfoEnvi* ≤ –0.289) and the other has bad information environment (*InfoEnvi* ≥ 0.709). The study then revises the logit model (1) as follows.

$$InEx_{it} = \beta_0 + \beta_1 FinDef_{it} + \beta_2 ZScore_{it} + \beta_3 Agency_{it} + \beta_4 PREC_{it} + \beta_5 LEV_{it} + \beta_6 OCF_{it} + \beta_7 ROA + \beta_8 SIZE + \beta_9 Year + \beta_{10} ID + \varepsilon_{it} \quad (1a)$$

$$DebtEquity_{it} = \beta_0 + \beta_1 FinDef_{it} + \beta_2 ZScore_{it} + \beta_3 Agency_{it} + \beta_4 PREC_{it} + \beta_5 LEV_{it} + \beta_6 OCF_{it} + \beta_7 ROA + \beta_8 SIZE + \beta_9 Year + \beta_{10} ID + \varepsilon_{it} \quad (2')$$

The study also decomposes financial deficits into four factors (*ΔNWC*, *Investment*, *Income* and *Dividends*) in model 5-1. In Table 4, the results show that firms tend to have higher probabilities to seek external funds for capital expenditures and dividend distribution if their information environment is good. If firms are in bad information environment, they have the same behaviour but rely even more on external funds. The result is consistent with the whole sample that shows firms' financing patterns follow pecking order theory. In addition, this study finds evidence that shows firms with lower bankruptcy risk, higher level of leverage, better operating performance, and bigger firm size tend to choose internal funding. However, if the information environment is bad, firms with better operating performance and bigger firm size are more likely to adopt internal funding, however, firms with higher returns on assets (ROA) may choose external financing.

Table 4 The choice of internal capital and good/bad information environment

$$InEx_{it} = \beta_0 + \beta_1 FinDef_{it} + \beta_2 ZScore_{it} + \beta_3 Agency_{it} + \beta_4 PREC_{it} + \beta_5 LEV_{it} + \beta_6 OCF_{it} + \beta_7 ROA + \beta_8 SIZE + \beta_9 Year + \beta_{10} ID + \varepsilon_{it} \quad (1a)$$

	Good information environment					
	Model 1'			*Model 1'–1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
FinDef	0.177		1.118			
ΔNWC				0.045		0.553
Investment				–0.766	***	–7.832
Dividend				–0.649	***	–3.855
Income				–0.136		–1.585
ZScore	0.065	***	4.307	0.070	***	3.706
Agency	0.245		1.018	0.298		1.172
PREC	–0.013		–1.012	–0.011		–0.838
LEV	1.355	***	3.753	1.553	***	4.057
OCF	0.372	***	4.559	0.420	***	4.718
ROA	0.129		0.530	0.352		1.211
SIZE	0.466	***	7.693	0.510	***	8.210
Year	Included			Included		
IDs	Included			Included		
_cons	Included			Included		
pseudo R^2	0.195			0.272		
LR chi^2	202.504			265.571		
N	1,131			1,131		

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

Table 4 The choice of internal capital and good/bad information environment (continued)

	Bad information environment					
	Model 1'			*Model 1'–1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
FinDef	–0.398	**	–2.160			
ΔNWC				0.013		0.154
Investment				–2.333	***	–11.497
Dividend				–1.181	***	–4.114
Income				0.008		0.103
ZScore	0.043		1.564	0.072	*	1.862
Agency	0.122		0.579	0.191		0.737
PREC	0.008		0.446	0.009		0.284
LEV	0.028		0.069	0.401		0.717
OCF	0.468	***	4.074	0.619	***	4.198
ROA	–1.974	***	–3.243	–1.776	**	–2.223
SIZE	0.792	***	8.759	1.287	***	10.075
Year	Included			Included		
IDs	Included			Included		
_cons	Included			Included		
pseudo R^2	0.235			0.476		
LR chi^2	240.338			247.812		
N	1,134			1,134		

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

3.5 The choice of external capital and good/bad information environment

The sample partition and model specification here is the same with Section 3.4. The study revises logit model (2) as follows.

$$DebtEquity_{it} = \beta_0 + \beta_1 FinDef_{it} + \beta_2 ZScore_{it} + \beta_3 Agency_{it} + \beta_4 PREC_{it} + \beta_5 LEV_{it} + \beta_6 OCF_{it} + \beta_7 ROA + \beta_8 SIZE + \beta_9 Year + \beta_{10} ID + \varepsilon_{it} \quad (2')$$

For the choice of debt or equity financing, firms with financial distress prefer use debt financing if the information environment is good. However, if the information environment is bad, firms which need capital to support net working capital may have higher probably to use equity financing. In addition, consistent with full sample, low bankruptcy risk, high leverage and good operating performance firms have higher probability to use debt financing. This investigation also finds evidence that under good information environment, large size and firms with high precautionary motive for cash savings may prefer equity financing.

Table 5 The choice of external capital and good/bad information environment

$$DebtEquity_{it} = \beta_0 + \beta_1 FinDef_{it} + \beta_2 ZScore_{it} + \beta_3 Agency_{it} + \beta_4 PREC_{it} + \beta_5 LEV_{it} + \beta_6 OCF_{it} + \beta_7 ROA + \beta_8 SIZE + \beta_9 Year + \beta_{10} ID + \varepsilon_{it} \quad (2')$$

	Good information environment					
	Model 2'			*Model 2'–1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
FinDef	0.948	***	7.014			
ΔNWC				–0.016		–0.251
Investment				0.023		0.316
Dividend				–0.011		–0.088
Income				–0.041		–0.620
ZScore	0.026	***	2.786	0.023	***	2.408
Agency	–0.177		–0.772	–0.157		–0.733
PREC	–0.028	***	–2.325	–0.028	**	–2.331
LEV	1.705	***	4.977	1.756	***	5.288
OCF	0.169	***	2.195	0.168	**	2.262
ROA	–0.011		–0.046	–0.009		–0.040
SIZE	–0.210	***	–4.100	–0.233	***	–4.680
Year	Included			Included		
IDs	Included			Included		
_cons	Included			Included		
pseudo R^2	0.084			0.053		
LR chi^2	108.239			71.055		
N	1,131			1,131		
	Good information environment					
	Model 2'			*Model 2'–1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
FinDef	0.225		1.305			
ΔNWC				–0.138	*	–1.856
Investment				–0.019		–0.228
Dividend				–0.105		–0.493
Income				0.001		1.001
ZScore	0.052	**	2.458	0.052	**	2.496
Agency	–0.295		–1.394	–0.308		–1.447
PREC	–0.009		–0.417	–0.010		–0.490
LEV	1.804	***	4.105	1.855	***	4.201
OCF	0.223	**	2.063	0.259	**	2.420

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

Table 5 The choice of external capital and good/bad information environment (continued)

	Good information environment			
	Model 2'		*Model 2'–1*	
	Coefficient	*z-value*	*Coefficient*	*z-value*
ROA	–0.608	–0.800	–0.660	–0.847
SIZE	0.003	0.039	–0.003	–0.038
Year	Included		Included	
IDs	Included		Included	
_cons	Included		Included	
pseudo R^2	0.033		0.035	
LR chi^2	39.730		43.299	
N	1,134		1,134	

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

3.6 Considerations for financing decision persistency

This paper also uses one-year-lagged cash holding, one-year-lagged long-term debts and one-year-lagged seasoned equity offerings as the explanation variables to further consider whether financing decisions are persistent. If the persistence of financing choices is ignored in analysis, it induces biased estimation of sensitivities of financing on investment and income (Gatchev et al., 2009). Hence, this study further considers the effects of the prior financing policy on the current one. The regression models (3) and (4) are estimated in logit estimation. For good/bad information environment subsamples, this study uses the revised models as follows.

$$\begin{aligned} InEx_{it} = {} & \alpha_0 + \alpha_1 FinDef_{it} + \alpha_2 CashHold_{it-1} + \alpha_3 NDebt_{it-1} + \alpha_4 NEquity_{it-1} \\ & + \alpha_5 ZScore_{it} + \alpha_6 Agency_{it} + \alpha_7 PREC_{it} + \beta_8 LEV_{it} + \beta_9 OCF_{it} + \beta_{10} ROA_{it} \\ & + \beta_{11} SIZE + \beta_{12} Year + \beta_{13} ID + \varepsilon_{it} \end{aligned} \quad (3')$$

$$\begin{aligned} DebtEquity_{it} = {} & \alpha_0 + \alpha_1 FinDef_{it} + \alpha_2 CashHold_{it-1} + \alpha_5 NtDebt_{it-1} + \alpha_4 NEquity_{it-1} \\ & + \alpha_5 ZScore_{it} + \alpha_6 Agency_{it} + \alpha_7 PREC_{it} + \beta_8 LEV_{it} + \beta_9 OCF_{it} \\ & + \beta_{10} ROA_{it} + \beta_{11} SIZE + \beta_{12} Year + \beta_{13} ID + \varepsilon_{it} \end{aligned} \quad (4')$$

Table 6 presents the results of financing decision persistency for the whole sample. The investigation finds evidence that shows firms with higher cash holding in the previous year are more likely to choose internal financing, because…?. Firms with higher cash holding and higher debt level in the previous year are more likely to adopt equity financing but they may prefer debt financing if their equity level is high in the previous year. The rest of the estimations are consistent with those findings in Table 2 and Table 3.

Table 6 Financing choice consistency: total sample

$$InEx_{it} = \alpha_0 + \alpha_1 FinDef_{it} + \alpha_2 InfoEnvi_{it} + \alpha_3 FinDef_{it} \cdot InfoEnvi_{it} + \alpha_4 dCH_{it-1} + \alpha_5 NDebt_{it-1} + \alpha_6 NEquity_{it-1} + \alpha_7 ZScore_{it} + \alpha_8 Agency_{it} + \alpha_9 PREC_{it} + \beta_{10} LEV_{it} + \beta_{11} OCF_{it} + \beta_{12} ROA_{it} + \beta_{13} SIZE + \beta_{14} Year + \beta_{15} ID + \varepsilon_{it} \quad (3)$$

$$DebtEquity_{it} = \alpha_0 + \alpha_1 FinDef_{it} + \alpha_2 InfoEnvi_{it} + \alpha_3 FinDef_{it} InfoEnvi_{it} + \alpha_4 dCH_{it-1} + \alpha_5 NDebt_{it-1} + \alpha_6 NEquity_{it-1} + \alpha_7 InEx_{it} + \alpha_8 ZScore_{it} + \alpha_9 Agency_{it} + \alpha_{10} PREC_{it} + \beta_{11} LEV_{it} + \beta_{12} OCF_{it} + \beta_{13} ROA_{it} + \beta_{14} SIZE + \beta_{15} Year + \beta_{16} ID + \varepsilon_{it} \quad (4)$$

	Model 3'			*Model 3'–1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
FinDef	–0.207	**	–2.453			
ΔNWC				–0.091	**	–2.179
Investment				–1.477	***	–19.828
Dividend				–0.962	***	–7.778
Income				0.028		0.672
InfoEnvi	0.207	***	3.457	0.423	***	6.044
*FD*InfoE*	–0.187	***	–2.742			
*ΔNWC*InfoE*				–0.003		–0.066
*Inv*InfoE*				–0.284	***	–5.942
*Div*InfoE*				–0.050		–0.648
*Inc*InfoE*				0.029		0.72
dCH_{t-1}	0.174	***	3.800	0.262	***	5.047
$NDbet_{t-1}$	–0.427		–1.288	–0.707	**	–2.573
$NEquity_{t-1}$	0.710		1.500	0.472		0.908
ZScore	0.046	***	4.686	0.057	***	4.469
Agency	0.196	*	1.913	0.321	***	2.819
PREC	–0.015	*	–1.898	–0.015		–1.461
LEV	0.566	***	3.157	0.801	***	3.391
OCF	0.443	***	10.157	0.619	***	11.501
ROA	–0.286		–1.517	–0.338		–1.424
SIZE	0.679	***	19.464	0.876	***	20.804
Year	Included			Included		
IDs	Included			Included		
_cons	Included			Included		
pseudo R^2	0.261			0.415		
LR chi^2	1,090.351			1,111.435		
N	4,529			4,529		

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

Table 6 Financing choice consistency: total sample (continued)

	Model 4'			*Model 4'-1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
FinDef	0.414	***	5.447			
ΔNWC				–0.057		–1.608
Investment				–0.043		–1.048
Dividend				–0.017		–0.196
Income				0.002		0.068
InfoEnvi	0.680	***	8.634	0.397	***	6.521
*FD*InfoE*	–0.411	***	–5.259			
*ΔNWC*InfoE*				–0.033		–1.092
*Inv*InfoE*				–0.038		–1.086
*Div*InfoE*				0.020		0.310
*Inc*InfoE*				0.005		0.169
dCH_{t-1}	–0.087	**	–2.011	–0.092	**	–2.160
$NDbet_{t-1}$	–0.814	***	–2.994	–0.829	***	–3.332
$NEquity_{t-1}$	0.834	*	1.825	0.919	**	1.975
ZScore	0.024	***	3.281	0.022	***	2.892
Agency	0.043		0.442	0.067		0.696
PREC	–0.012	*	–1.787	–0.012	*	–1.773
LEV	1.664	***	7.003	1.705	***	7.263
OCF	0.227	***	5.400	0.251	***	6.109
ROA	–0.436	*	–1.901	–0.470	**	–2.126
SIZE	–0.081	***	–2.706	–0.097	***	–3.269
Year	Included			Included		
IDs	Included			Included		
_cons	Included			Included		
pseudo R^2	0.092			0.080		
LR chi^2	378.075			368.818		
N	4,529			4,529		

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

Table 7 presents the results of financing decision persistency for the good information environment sub-sample. In the good information environment, only one-year-lagged cash holding affects internal/external financing decisions and one-year-lagged debt level influences debt/equity financing. The rest of the estimations are consistent with those findings in Table 4 and Table 5.

Table 7 Financing choice consistency: good information environment

$$InEx_{it} = \alpha_0 + \alpha_1 FinDef_{it} + \alpha_2 CashHold_{it-1} + \alpha_3 NDebt_{it-1} + \alpha_4 NEquity_{it-1} + \alpha_5 ZScore_{it} + \alpha_6 Agency_{it} + \alpha_7 PREC_{it} + \beta_8 LEV_{it} + \beta_9 OCF_{it} + \beta_{10} ROA_{it} + \beta_{11} SIZE + \beta_{12} Year + \beta_{13} ID + \varepsilon_{it} \quad (3')$$

$$DebtEquity_{it} = \alpha_0 + \alpha_1 FinDef_{it} + \alpha_2 CashHold_{it-1} + \alpha_5 NtDebt_{it-1} + \alpha_4 NEquity_{it-1} + \alpha_5 ZScore_{it} + \alpha_6 Agency_{it} + \alpha_7 PREC_{it} + \beta_8 LEV_{it} + \beta_9 OCF_{it} + \beta_{10} ROA_{it} + \beta_{11} SIZE + \beta_{12} Year + \beta_{13} ID + \varepsilon_{it} \quad (4')$$

	Model 3'			*Model 3'–1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
FinDef	0.188		1.179			
ΔNWC				0.049		0.600
Investment				–0.767	***	–7.777
Dividend				–0.673	***	–3.936
Income				–0.132		–1.534
dCH_{t-1}	0.188	*	1.887	0.205	*	1.946
$NDbet_{t-1}$	–0.589		–1.171	–0.691		–1.219
$NEquity_{t-1}$	0.562		0.561	0.635		0.631
ZScore	0.065	***	4.309	0.072	***	3.737
Agency	0.253		1.045	0.312		1.235
PREC	–0.014		–1.107	–0.013		–0.985
LEV	1.417	***	3.879	1.644	***	4.254
OCF	0.373	***	4.525	0.419	***	4.703
ROA	0.173		0.698	0.409		1.388
SIZE	0.467	***	7.682	0.507	***	8.212
Year	Included			Included		
IDs	Included			Included		
_cons	Included			Included		
pseudo R^2	0.20			0.277		
LR chi^2	204.987			262.600		
N	1,131			1,131		

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

Table 7 Financing choice consistency: good information environment (continued)

	Model 4'			*Model 4'–1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
FinDef	0.938	***	6.834			
ΔNWC				–0.029		–0.445
Investment				0.030		0.405
Dividend				–0.024		–0.190
Income				–0.037		–0.544
dCH_{t-1}	–0.033		–0.423	–0.057		–0.761
$NDbet_{t-1}$	–1.669	***	–2.793	–1.651	***	–3.004
$NEquity_{t-1}$	0.023		0.021	0.457		0.428
ZScore	0.026	***	2.761	0.022	**	2.403
Agency	–0.159		–0.694	–0.139		–0.640
PREC	–0.030	**	–2.441	–0.030	**	–2.436
LEV	1.847	***	5.236	1.863	***	5.494
OCF	0.161	**	2.075	0.161	**	2.147
ROA	–0.043		–0.185	–0.054		–0.245
SIZE	–0.211	***	–4.106	–0.235	***	–4.699
Year	Included			Included		
IDs	Included			Included		
_cons	Included			Included		
pseudo R^2	0.094			0.064		
LR chi^2	110.438			79.671		
N	1,131			1,131		

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

Table 8 presents the results of financing decision persistency for the bad information environment sub-samples. In the bad information environment, the study finds that firms with higher cash holding in the previous year may be more likely to choose internal financing in the current year. The rest of the estimations are consistent with those findings in Table 4 and Table 5.

Table 8 Financing choice consistency: bad information environment

$$\begin{aligned} InEx_{it} = {} & \alpha_0 + \alpha_1 FinDef_{it} + \alpha_2 CashHold_{it-1} + \alpha_3 NDebt_{it-1} + \alpha_4 NEquity_{it-1} \\ & + \alpha_5 ZScore_{it} + \alpha_6 Agency_{it} + \alpha_7 PREC_{it} + \beta_8 LEV_{it} + \beta_9 OCF_{it} + \beta_{10} ROA_{it} \\ & + \beta_{11} SIZE + \beta_{12} Year + \beta_{13} ID + \varepsilon_{it} \end{aligned} \quad (3')$$

$$DebtEquity_{it} = \alpha_0 + \alpha_1 FinDef_{it} + \alpha_2 CashHold_{it-1} + \alpha_5 NtDebt_{it-1} + \alpha_4 NEquity_{it-1} + \alpha_5 ZScore_{it} + \alpha_6 Agency_{it} + \alpha_7 PREC_{it} + \beta_8 LEV_{it} + \beta_9 OCF_{it} + \beta_{10} ROA_{it} + \beta_{11} SIZE + \beta_{12} Year + \beta_{13} ID + \varepsilon_{it} \quad (4')$$

	Model 3'			*Model 3'–1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
FinDef	–0.372	**	–2.003			
ΔNWC				–0.005		–0.063
Investment				–2.38	***	–11.459
Dividend				–1.189	***	–4.034
Income				0.013		–0.164
dCH_{t-1}	0.253	***	–2.876	0.394	***	–3.602
$NDbet_{t-1}$	–0.745		–1.222	–1.089		–1.237
$NEquity_{t-1}$	0.165		–0.213	0.712		–0.725
ZScore	0.047	*	–1.712	0.080	**	–2.003
Agency	0.122		–0.572	0.173		–0.64
PREC	0.009		–0.444	0.009		–0.274
LEV	0.081		–0.192	0.53		–0.928
OCF	0.477	***	–4.091	0.630	***	–4.269
ROA	–2.071	***	–3.117	–1.728	**	–1.982
SIZE	0.801	***	–8.721	1.318	***	–9.961
Year	Included			Included		
IDs	Included			Included		
_cons	Included			Included		
pseudo R^2	0.241			0.485		
LR chi^2	243.028			252.788		
N	1,134			1,134		
	Model 4'			*Model 4'–1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
FinDef	–0.372	**	–2.003			
ΔNWC				–0.005		–0.063
Investment				–2.38	***	–11.459
Dividend				–1.189	***	–4.034
Income				0.013		–0.164
dCH_{t-1}	0.253	***	–2.876	0.394	***	–3.602
$NDbet_{t-1}$	–0.745		–1.222	–1.089		–1.237
$NEquity_{t-1}$	0.165		–0.213	0.712		–0.725
ZScore	0.047	*	–1.712	0.080	**	–2.003
Agency	0.122		–0.572	0.173		–0.64

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

Table 8 Financing choice consistency: bad information environment (continued)

	Model 4'			*Model 4'–1*		
	Coefficient		*z-value*	*Coefficient*		*z-value*
PREC	0.009		–0.444	0.009		–0.274
LEV	0.081		–0.192	0.53		–0.928
OCF	0.477	***	–4.091	0.630	***	–4.269
ROA	–2.071	***	–3.117	–1.728	**	–1.982
SIZE	0.801	***	–8.721	1.318	***	–9.961
Year	Included			Included		
IDs	Included			Included		
_cons	Included			Included		
pseudo R^2	0.241			0.485		
LR chi^2	243.028			252.788		
N	1,134			1,134		

Notes: 1 – The definitions of all variables refer to Appendix – ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

4 Conclusions

The study of pecking order theory that is directly related to asymmetric information is still an open issue in both theoretical and empirical research. To fulfil the literature, this paper considers both the aspects of an overall information environment and capital deficits. If the internal/external funding choice is a function of financial deficits, firms would still prefer internal funding to external funding according to the pecking order theory. Meanwhile, if the choices of internal financing, debt financing and equity financing are a function of financial deficits, firms tend to choose debt financing with external funding if the pecking order theory is satisfied. To verify the above relationship, this study further splits the sample into good/bad information environment. The study also decomposes the aggregated financial distress into four components to investigate which capital source is preferred for the specific capital usages. The study finally considers the financing policy persistency.

The major empirical results are summarised as follows. First, in the test of the full sample, the worse the information environment, the higher probability that firms choose internal financing and debt financing if external funding is necessary. This evidence is consistent with the pecking order hypothesis. However, firms with financial deficits prefer to choose external financing and when external funding is necessary, they prefer to use debt than equity financing. The study also finds evidence to show that firms prefer to use external funding and equity financing in a bad information environment and when suffering capital shortage. Thus, pecking order behaviour does not hold if firms are under financial deficits.

Second, the sample partition results are consistent with the full sample. Firms that have higher probability to seek external funds for capital expenditures and dividend distribution if their information environment is good. If firms are in bad information environment, they have the same behaviour but rely more on external funding. In addition, firms with financial distress prefer to use debt financing if the information

environment is good. However, if the information environment is bad, firms which need capital to support net working capital may be more likely to use equity financing.

Finally, the financing choices persistence results show that, firms with higher cash holding in the previous year are more likely to choose internal financing. Firms with higher cash holding and higher debt level in the previous year are more likely to adopt equity financing but they may prefer debt financing if their equity level is high in the previous year. In the good information environment, only one-year-lagged cash holding affects internal/external financing decisions and only one-year-lagged debt level influences debt/equity financing. In the bad information environment, the study finds that firms with higher cash holding in the previous year may have be more likely to choose internal financing in the current year.

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Notes

1 Myers (1984), Myers and Majluf (1984) advocate the pecking order theory of financing: the cost of internal funds is less than external funds. As a result, researchers generally assume that a firm saves internal funding from internal cash flows (Acharya et al., 2007; Han and Qiu, 2007).

2 They also find that firms with more agency problems and higher intangible assets investments as well as higher growth opportunities are more likely to choose equity financing.

3 In addition, when the agency problem is more serious and the growth opportunity is higher, firms are more likely to choose equity financing.

4 The results find that after pass the anti-takeover act, the firms have asymmetric information decrease, informativeness of financing report increase, and the incentive of collective private information of outsiders and analysts decrease.

Appendix

Table A1 Variable definitions

Variable	*Definition*
Internal funds	Defined as that in Leary and Roberts (2010) $Internal\ funds = Cashbalance + Operating\ cash\ flow - Dividends - Working\ capital$
InEx	Equals to 1 if the firm's investment expenditure is greater than its internal fund in current period, and 0 otherwise
DebtEquity	Equals to 1 if the firm has long-term debts but no seasoned equity offering in current period and 0 otherwise
NDbet	The ending total long-term liabilities minus the beginning total long-term liabilities divided by beginning total assets
NEquity	Net of equity issuance and repurchase divided by beginning total assets
FinDef	$FinDef = \Delta NWC + Investment + CashDividend - NCF \equiv Netequity + Netdebt$
ΔNWC	The investment on net operating or current assets
Investment	The investment on fixed assets
Dividend	The dividend payment
Income	The distributable income for common stock and preferred stock shareholders
InfoEnvi	A composite index of four information environment indicators, including the information asymmetry, the value relevance of financial reports, the informativeness of financial statements and the collection of private information, which is calculated by the first principal components analysis (PCA)
dCHt–1	The change of cash to total assets ratio from year t–1 to year t
Zscore	The financial distress cost is measured by the Altman Z-Score
Agency	The agency cost is measure by
PREC	Defined as McLean (2011) The precautionary motives is a composite index of three variables, the R&D expenditures, cash flow volatility and dividends
LEV	$Leverage = Long\text{-}term\ liability / Total\ asset$
OCF	Logarithm of operating cash flow
ROA	The return on assets (*ROA*) of a firm measures its operating efficiency, which is defined as income before extraordinary items divided by total assets at the beginning of the period
Size	Logarithm of total market capitalisation