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Financing Decision, Dynamic Investment and Enterprise Property Value: Evidence from Chinese Listed Companies in Manufacturing

Zhe-Fan Piao and Le Zhang
School of Finance, Zhejiang University of Finance and Economics, 310018, Hangzhou, China

Abstract: Based on the theories of investment and finance decisions, this study analyzes the influences of financing decision, dynamic investment on the value of enterprise property empirically. Learn from Leland (1994), Sundaresan and Wang (2007), we use a sample of 380 Chinese listed companies in manufacturing during the period of 2003-2011 and find that: (1) Compared with the Non-SOEs, SOEs with lager size, higher profitability and better operating environment are easy to bank borrowing and equity finance; (2) Volatility of company's price and changes of asset loss rate significantly affected the value of enterprises' property, especially the loss rate; (3) non-SOEs can make better decisions of investment and finance than SOEs, with a better level of reach their goal of property value (67, 87%).

Key words: Financing decision, dynamic investment, optimal property value, listed company

INTRODUCTION

Since the theory of MM (Miller and Modigliani and Miller, 1958), a large number of documents concerning the examination of capital structure theory appeared. With the development and innovation of the capital structure theory, the focus is turning from the choice of financing pattern to the correlation of finance structure and enterprise value. Based on the development of capital structure theory, there formed the trade-off theory, agency costs theory, information asymmetry hypothesis and tax hypothesis of debt maturity structure. These basic theories have led to a series of derivate research on the relationship between the financing constraints and investment-cash flow sensitivity (Cleary, 1999), capital structure and dynamic investment performance, capital structure and firm value from the dynamic perspective (Leland, 1994; Sundaresan and Wang, 2007). Recently, many scholars have put their eyes on the relation between the financing behavior and firm value of listed companies at home and abroad.

Compared with foreign countries, the financing environment in China, under the economic transformation, is immature. These restrictions, like the imbalanced development of capital markets and imperfect protection of investor, make the relationship between finance structure and firm value of Chinese companies more complicated. Especially, does this connection happen in China? Whether the decisions of finance and investment are helpful to improve property value? All these issues need to be theoretical analysis and empirical testing.

In this context, this research designs a model of optimal enterprise property value based on the decision of finance and investment. It offers an empirical study on the difference of property value between real and optimal, using the sample of Chinese listed companies in manufacturing during 2003-2011. Researches in this area can help the firms to choose the proper financing method and invest more efficiently.

LITERATURE REVIEW

Starting from the real option models and the model of investment and financing decisions (Dotan and Ravid, 1985), financing decision and dynamic investment becomes a very hot topic. Currently, researches about this field mainly focus on the following three aspects:

- **Tests of debt maturity theory:** The test of debt maturity structure theory mainly concentrated on the trade-off theory and the pecking order theory. The trade-off theory holds that, instead of equity finance, debt finance can increase the market value of the enterprise due to the exits of the tax shield. But the rising debt levels will increase the financial cost (Philosophov and Philosophov, 2005; Bany-Ariffin *et al.*, 2010) and intensify the agency conflicts of the companies. The pecking order theory believes that, financial managers have the information that investors do not have. Therefore, enterprises tend to prefer internal finance which do not suffer from information asymmetry, instead of

Corresponding Author: Zhe-Fan Piao, School of Finance, Zhejiang University of Finance and Economics, 310018, Hangzhou, China

external finance. If external finance is still needed, companies will issue bonds first. They insist that specific target capital structure is inexistence. In the past 30 years, researches about the validity of these two theories have not been unanimously approved so far (Leary, 2009; Kayo and Kimura, 2011)

- **Studies on model of the optimal enterprise assets value based on the financing and dynamic investment:.** Since the research on the models of interaction between the dynamic investment, operating and financing decision which is put forward by Leland (1994), Mauer and Triantis (1994), many scholars studied the impact of dynamic investment and financing decision on firm value (Leary and Roberts, 2005; Strebulaev, 2007). Compared to other researches, Sundaresan and Wang (2007) learned from the study of Titman and Tsyplakov (2007) and Hennessy and Whited (2005), integrated the process of investment and financing decision-making, built a model of optimal corporate property. This model provides a quantitative method for our study but it failed to deal with the rate of loss and the range of volatility
- **Studies on dynamic investment of Chinese listed companies in manufacturing:** Researches concerning on this subject currently includes two major classes: one is about the property of investment and efficiency which has a big disagreement among academics. On one hand, many scholars insisted that overinvestment is prevalent among Chinese companies and they looking for the cause from the point of the free cash flow hypothesis, manager opportunism and so on. On the other hand, many scholars proved the non-efficiency investment is result from the lack of investment, not overinvestment by empirical studies. They also investigated from the aspect of information asymmetry and finance restrictions. The other is the factors of investment efficiency. Many professors found that, the investment behavior responded actively to the changes of the capital cost in manufacturing SOEs. What's more, the corporate governance, soft constraint of budget, economic cycle, technological changes, financing constraints, cash flows and ownership structure

RESEARCH METHODOLOGY REGRESSION MODELS

In order to investigate the impact of dynamic investment and financing decision on firm value and learning from Leland (1994) and Sundaresan and Wang (2007), this study build a forming diagram of the firm value based on the decision of financing and dynamic investment as following.

Figure 1 describes the process of finance and investment decision-making and firm value under different conditions, as well as the main idea of this research.

The design process of model is divided into the following steps:

- Assume that the market price of demand for their products is p and p_1^i is threshold in the first investment period, when $p = p_1^i$ the investors will wait and see; when $p = p_1^i$ will select financing between options and bonds that the price is C_1
- When $p = p_1^\alpha$, that is p lower than the threshold in the first investment period, the firms will drop the options in the second period; When $p_1^d<p<p_2^i$, we got cash flow Q_1^p between the two periods. If $p = p_2^i$ will select financing between options and bonds that the price is C_2
- When investors exercise its option in the first period (T_1^i), cost of financing for firms (stock ownership financing and bond financing) is I_1. In this study, we assume that the bond is perpetual
- When the investors drop its option after the two periods of growth ($p>p_2^d$), firms should got the cash flow $(Q_1+Q_2)p$. At this point, when the coefficient of Geometric Brownian Motion are α_1, α_2, α_3, the loss rate of assets are $ə_1$, $ə_2$, $ə_3$, thus we got nine optimal asset value

In this study, we follow Mauer and Triantis (1994), the firm observes the demand shock p for its product, where p is given by the following Geometric Brownian Motion (GBM) process:

$$dp(t) = \alpha p dt + \sigma p dz \qquad (1)$$

where, α is coefficient of Geometric Brownian Motion. We may view p as the price process for the good produced by the firm. Assume that the risk-free interest rate is constant and is equal to r. For convergence, we assume r>a. σ is volatility. Under all-equity financing, the asset in place from exercising the t growth option is given by growth option is given by:

$$V_t(p) = \frac{1-\tau}{r-\alpha}(Q_t p - k_n) \qquad (2)$$

where, Q_t (Q_t>0) is quantity produced, t (t = 1, 2) is period, the tax τ>0 and the profit in t period is $Q_t p - k_n$. Let $V_1(p)$ and $V_2(p)$ denote the after-tax (all-equity-financed) values

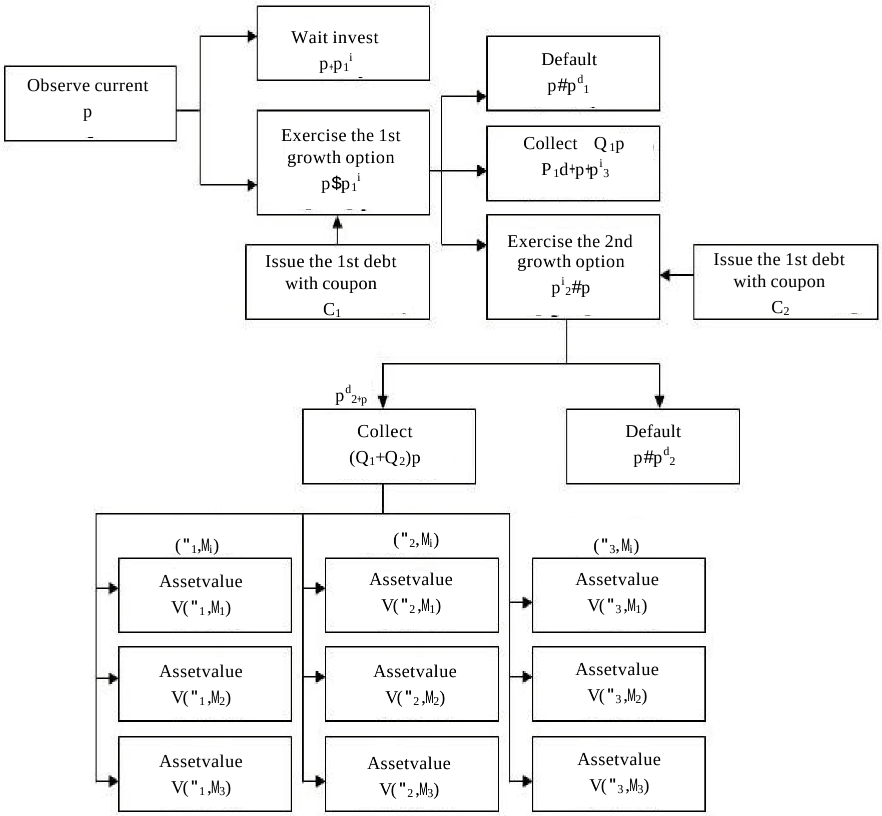

Fig. 1: Firm value forming diagram based on the financing-dynamic investment decision-making

of assets in place generated from exercising the first and the second growth options, respectively. After the first asset is in place, the firm collects the cash flows Q_1p before either exercising its (second) growth option, or exercising its (first) default option. Let T_1^d and T_2^d denote the endogenously chosen time for firm's first default and the second investment, after the exercise of the first growth option ($t = T_1^i$). As in the standard tradeoff theory, assume that debt may potentially cause distress at default and hence is also costly to the equity holders ex ante. Assume that the firm recovers a fraction of residual values from the first asset in place and also from the second (unexercised) growth option, upon default at T_1^d. We assume that the firm's total value $V_1(\bullet)$ at the first default time T_1^d is given by a fraction (1-ə) of the sum of the "un-levered" value of (first) asset in place $V_1(p(T_1^d))$ and $\omega V_2(p(T_1^d))$, a proxy for the unexercised (second) growth option, in that:

$$V_1^T(p(T_1^d)) = (1-\partial)((V_1(p(T_1^d)) + \omega V_2(p(T_1^d))) \quad (3)$$

where, $V_1(p)$ and $V_2(p)$ are given by Eq. 2 and $0 = \omega < 1$. We interpret ə (0 = ə =) as a measure of inefficiency due to default. We leave the modeling of debt maturity for future research. Because debt is perpetual and not callable, the first debt continues to exist even after exercising the second growth option. Let D_2^s (p) and D_2^n (p) denote the market values of the first (seasoned) debt and of the second debt issued at the second investment time T_2^d, respectively. These debt values (after the second growth option is exercised) are given by:

$$D_2^s(p) = E_t^p\left[\int_t^{T_2^d} e^{-r(s-t)} c_1 ds + e^{-r(T_2^d-t)} D_2^s(p(T_2^d))\right], T_2^i \le t \le T_2^d \quad (4)$$

$$D_2^n(p) = E_t^p\left[\int_t^{T_2^d} e^{-r(s-t)} c_1 ds + e^{-r(T_2^d-t)} D_2^n(p(T_2^d))\right], T_2^i \le t \le T_2^d \quad (5)$$

where E_t^p ($\bullet$) denote the conditional expectation at time t when p(t) = p. The residual values of the first and second debt, D_2^n (p (T_2^d)) and D_2^s (p (T_2^d)) are given by the debt seniority structure to be discussed later. The total market value of debt after exercising both growth options is then given by $D_2(p) = D_2^n(p)+D_2^s(p)$. Let$D_1(p)$ denote the market value of the first debt after the first growth option is exercised but before the second growth option or the first default option is exercised. We have:

$$D_1(p) = E_t^p[\int_t^{T_1^d \wedge T_2^i} e^{-r(s-t)} c_1 ds + e^{-r(T_1^d - t)} D_1(p(T_1^d))1_{T_1^d < T_2^i} + e^{-r(T_2^i - t)} D_2^s(p(T_2^i))1_{T_1^d > T_2^i}] \quad (6)$$

First consider the firm's decision problem after it has exercised its second growth option ($t = T_2^i$). Equity holders have incentives to default after debt is in place. Equity holders choose the default time T_2^d to maximize:

$$E_t^p[\int_t^{T_2^d} e^{-r(s-t)}(1-\tau)(Qp(s) - C)ds], \quad t \geq T_2^i \quad (7)$$

where, $Q = Q_1+Q_2$ and $C = C_1+C_2$. Under the assumption that equity is junior to debt, equity holders receive nothing at default. Let E_2 (p) denote equity value from the above optimization problem and x_2^d denote the endogenous (second) default threshold.

Let $V_2^n(x)$ denote the sum of equity value and (newly issued) debt value after T_2^i, in that $V_2^n(x) = E_2(x)+D_2^n(x)$. The net gain for equity holders is thus given by $E_2(p(T_2^i))-(I_2-D_2^n(p(T_2^i))) = V_2^n(p(T_2^i))-I_2$. Equity holders choose the first default time T_1^d, the second investment time T_2^i and the coupon C_2 on the second perpetual debt to maximize:

$$E_t^p[\int_t^{T_1^d \wedge T_2^i} e^{-r(s-t)}(1-\tau)(Q_1 p(s) - C_1)ds + e^{-r(T_2^i - t)}(V_2^n(p(T_2^i)) - I_2)1_{T_1^d > T_2^i}] \quad (8)$$

Let E_1 (p) denote the value function from the above optimization problem and x_1^d and x_2^i denote the endogenous default threshold and the investment threshold, respectively. As we naturally anticipate, the default decision (the default time T_2^d and the default threshold x_2^d) solved from the last stage optimization problem (7) enters into the objective function (8) because $V_2^n(x)$ depends on the second default threshold x_2^d.

After both growth options are converted into assets in place ($t = T_2^i$), the firm generates total cash flows at the rate of Q_x, where, $Q = Q_1+Q_2$. The total coupon rate is $C = C_1+C_2$. The firm has only the default decision (characterized by the default threshold x_2^d) to make after both growth options are exercised. Failure to pay either debt holders immediately triggers default. Equity holders optimally choose time to default as in Leland (1994). The following value-matching and smooth-pasting conditions describe the equity holders optimal default decision by picking the endogenous default boundary x_2^d:

$$E_2(p_2^d) = 0, \; E'_2(p_2^d) = 0 \quad (9)$$

When $p = p_2^d$, equity is worthless ($E_2(p) = 0$). Leland (1994) shows that the equity value E_2 (p) may be written as follows:

$$E_2(p) = V(x) - \frac{(1-\tau)c}{r} - [V(p_2^d) - \frac{(1-\tau)c}{r}](\frac{p}{p_2^d})^\gamma, \quad p \geq p_2^d \quad (10)$$

where the optimal default threshold x_d^2 and γ are given by:

$$p_2^d = \frac{r-\alpha}{Q} \times \frac{\gamma}{\gamma - 1} \times \frac{c}{r} \quad (11)$$

$$\gamma = -\frac{1}{\sigma^2}[(\alpha - \frac{\sigma^2}{2}) + \sqrt{(\alpha - \frac{\sigma^2}{2})^2 + 2r\sigma^2}] \quad (12)$$

Equity value $E_2(p)$ is given by the "un-levered" firm value V(p), subtracting the present value of the tax shields $(1-\tau)c/r$ and adding the value of the default option which is given by the product of the present discounted value $(p/p_2^d)^\gamma$ for a unit payoff at the default boundary x_2^d and the present value of savings from default,$-(V(p_2^d)-(1-\tau)c/r)$. As in Leland (1994), the standard option value argument implies that the default threshold p_2^d decreases with volatility σ and the equity value E_2 (p) is convex in p.

We now may define various value functions, given the default threshold x_2^d and the coupon rates C_1 and C_2. Before the firm defaults, equity holders make the promised payments. When the firm defaults, debt seniority structure gives the recovery values for the first and the second debt: $D_2^s(x_2^d)$ and $D_2^n(x_2^d)$. Assume that the debt covenants will be strictly enforced without any violation. Given these values at the endogenous default boundary x_2^d, we may write the market values of the seasoned debt issued at T_1^i and of the second debt issued at T_2^i, before default at T_2^d, as follows:

$$D_2^s(x) = \frac{c_1}{r} - [\frac{c_1}{r} - D_2^s(x_2^d)](\frac{x}{x_2^d})^\gamma \quad (13)$$

$$D_2^n(x) = \frac{c_2}{r} - [\frac{c_2}{r} - D_2^n(x_2^d)](\frac{x}{x_2^d})^\gamma, \; x \geq x_2^d \quad (14)$$

The total debt value is $D_2(x) = D_2^s(x)+D_2^n(x)$. The total debt value at default $D_2(x_2^d)$ is equal to the total firm's liquidation value at default, since equity is worthless at default. Using the standard argument in option pricing, we note that $D_2^s(x)$, $D_2^n(x)$ and $D_2(x)$ are all concave in x because of default. Firm value $V_2(x) = E_2(x) +D_2(x)$ is then given by:

$$V_2(p) = V(p) + \frac{\tau c}{r} - [\alpha V(p_2^d) + \frac{\tau c}{r}](\frac{p}{p_2^d})^\gamma, p \geq p_2^d \qquad (15)$$

Firm value $V_2(p)$ is given by the "unlevered" (after-tax) firm value V(p), plus $\tau \bullet c/r$, the perpetuity value of tax shield $\tau \bullet c$ from both coupon payments C_1 and C_2(assuming no default), minus the expected loss given default (the last term). The expected loss given default is given by the product of the present discounted value $(p/p_2^d)^\gamma$for a unit payoff at the default boundary p_2^d and the loss given default $\alpha V(p_2^d)+\tau \bullet c/r$ which includes both liquidation cost $\alpha V(p_2^d)$ and the perpetuity value of forgone tax shields $\tau \bullet c/r$. As in Leland (1994), firm value $V_2(p)$ is concave in p. Intuitively, after T_2^i, the firm is long in the "unlevered" asset values and the tax shield perpetuity $\tau \bullet c/r$ and short in a liquidation option. Recall that $V_2^n(p)$ is the sum of equity value $E_2(p)$ and debt value $D_2^n(x)$ issued when exercising the second growth option: $V_2^n(p) = E_2(p) + D_2^n(p)$. Using (14) and (15), we have:

$$V_2^n(p) = V(p) + \frac{\tau c - c_1}{r} + (D_2^n(p_2^d) - V(p_2^d)) + \frac{c_1 - \tau c}{r})(\frac{p}{p_2^d}), \quad p \geq p_2^d \qquad (16)$$

In order to test the impact of financing and dynamic investment, we used the Eq. 17-19 to analyzed when $\Delta V>0$ or $\Delta V<0$:

$$\Delta V_1 = V_{i,2007} - V_1(p_1) \qquad (17)$$

$$\Delta V_2 = V_{i,2011} - V(\alpha_i, \partial_i) \qquad (18)$$

$$\Delta V_3 = V_{i,2011} - V_2(p_2) \qquad (19)$$

SAMPLE AND VARIABLES

The source of this data set is China Stock Market and Accounting Research Database (CSMAR) in China. However, several adjustments are necessary. First, we choose the sample periods from 2003 to 2011; second, select the manufacturing listed companies before January 1, 2003; third, eliminate the companies of the share price and accounting data change percentage anomaly. Results, we got a sample of 380 firms/years over the period 2003-2011.

It described that the changed trend of operational cash flow and long-term equity investment (2003-2011) in Fig. 2. We know that operational cash flow and long-term equity investment are as clear ascendant trend but 2007 and 2010.

It has shown positive correlation between operational cash flow and long-term equity investment and proves that the earnings power of State-owned companies depend the external investment. In contrast, Non-state companies are not.

It described that the changed trend of total assets, current liabilities, long-term equity investment and owner's equity (2003-2011) in Fig. 3. We know that changed trend of total assets, owner's equity, current liabilities and long-term equity investment are as clear ascendant trend but 2008 year. It has shown positive correlation between total assets and current liabilities.

Estimates from the regression models, we done the variable definition just like that C_1 is long-term liabilities in period 1; C_2 is long-term liabilities in period 2; σis impulse value of price; Q_1 is operating income in period 1; Q_2 is operating income in period 2; Q is total operating income during period 1 and 2 in Table 1.

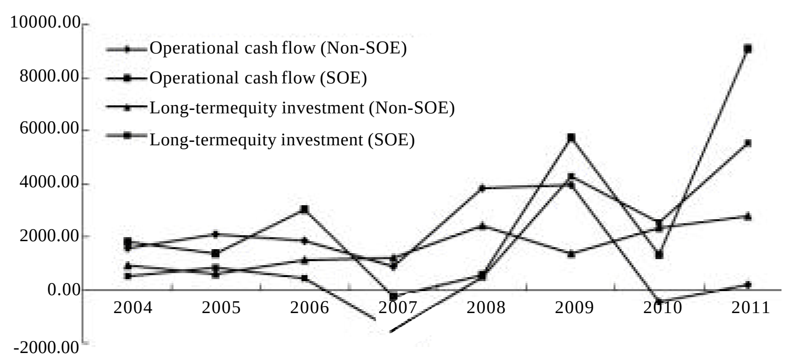

Fig. 2: Trend of operational cash flow and long-term equity investment (2003-2011)

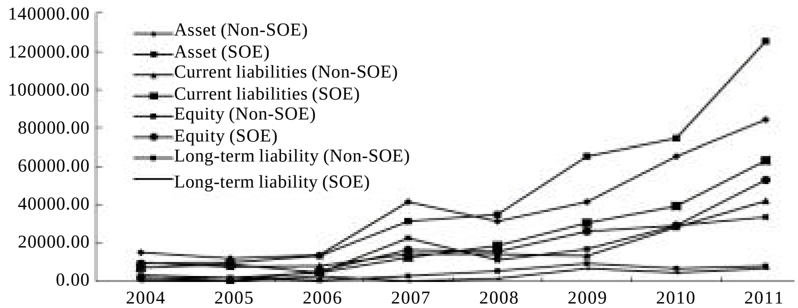

Fig. 3: Trend of total assets, current liabilities, long-term equity investment and owner's equity (2003-2011)

Table 1: Variable definition

	Variable	Account form
C_1	Long-term debt(1)	Selection of variables/10000
C_2	Long-term debt(2)	Selection of variables/10000
σ	The volatility of investment	The price index of different manufacturing industry (2003-2011)
Q_1	Operating income(1)	Selection of variables/10000
Q_2	Operating income(2)	Selection of variables/10000
Q	Sum of operating income	$Q = Q_1+Q_2$
r	Riskless rate	4.75%
α	Loss rate of assets	10, 20, 30%
p_2^d	The optimal threshold	Equation 11
γ	Based on quadratic equation root	Equation 12
1; 2	Group	1: Target value<actual value 2: Target value>actual value

RESULT AND DISCUSSION

Descriptive statistics: It is a descriptive statistics for all of the variables (2004-2011) in Table 2. We know that the operating income and the operating cash flow are larger than these in Non-state corporations but the operating income is severe downturn in 2010 year. Based on this, we fund that the business environment and ability were large differences in State-owned and Non-state corporations.

Basis statistical analysis: As we know, coefficient of Geometric Brownian Motion less than risk-free interest rate in regression models ($0<\mu<r$). Under r = 1.75% condition, α_1 = 4.25%, α_2 = 3.75%, α_3 = 3.25%. Substituting α_1, α_2, α_3 into equation based on Leland (1994), we obtain $E_2(\alpha_1)$, $E_2(\alpha_2)$, $E_2(\alpha_3)$. When calculating what a company is worth, we need to consider the drop in its asset value, so the changes with rate of loss ($ə_1$ = 10%, $ə_2$ = 20%, $ə_3$ = 30%), we obtain the different loss value. Thus, we obtain nine corporate values: $V_2(p)(\alpha_1, ə_1)$, $V_2(p)(\alpha_2, ə_1)$, $V_2(p)(\alpha_3, ə_1)$, $V_2(p)(\alpha_1, ə_2)$, $V_2(p)(\alpha_2, ə_2)$, $V_2(p)(\alpha_3, ə_2)$, $V_2(p)(\alpha_1, ə_3)$, $V_2(p)(\alpha_2, ə_3)$, $V_2(p)(\alpha_3, ə_3)$.

In Table 3, the critical values of p1(a1), p1(a2), p1(a3), p2(a1), p2(a2) and p2(a3) in state-owned are lower than the value in Non-state and the other values are higher than the Non-state.

It has shown positive correlation between operational cash flow and long-term equity investment and proves that the earnings power of state-owned companies depend the external investment (Leary, 2009; Voutsinas and Werner, 2011; Feng, 2012).

In order to test the impact of financing and dynamic investment and financial crisis to the firm value, this study build the two periods (2003-2007 year and 2008-2011 year). And estimate the real firm asset and the difference frequencies by the Eq. 17-19 in Table 4.

In Table 5, it shows that the real firm asset and the difference frequencies when V>0 or V<0. Among them, 87% State-owned firms did not reach they optimal target asset value and Non-state firms are 67%, it better than the value in State-Owned firms.

There are very important impact of the price fluctuations (α) and the change of the asset loss rate (ə) to the firm value (V), in particular, when ə is 30%, there are two State-owned firms (2.17%) and 106 Non-state firms which V>0.

In Table 6, the difference of firm values are 29(31.52%), 11(11.96%) and 7(7.61%) in State-owned firms under ΔV_3 and got 4(4.35%), 3(3.26%) and 2(2.17%) under ΔV_1.

Compared with State-owned firms, the difference of firm values are 204(70.83%), 142(49.31%) and 108(37.50%) in State-owned firms under ΔV_3 and got 151(52.43%), 92(32.29%) and 60(20.83%) under ΔV_1.

The results revealed that the deterioration in the business environment and financial conditions

Table 2: Descriptive statistics (2004-2011)

			2004CH	2005CH	2006CH	2007CH	2008CH	2009CH	2010CH	2011CH
Operating income	Non-state (288)	Mean	20487.00	16381.00	18972.00	37571.00	27769.00	9804.50	62802.00	68806.00
		SD	40576.20	47468.10	42115.00	73496.50	76939.60	85479.40	155310.00	177915.00
		Min	-83300.00	-119000.00	-491000.00	-126000.00	-143000.00	-465000.00	-157000.00	-830000.00
		Max	288000.00	435000.00	403000.00	671000.00	799000.00	721000.00	869000.00	860000.00
	State-owned (92)	Mean	18535.00	25679.00	27387.00	37977.00	34037.00	47536.00	111400.00	190540.00
		SD	34266.70	108503.00	83820.20	50929.60	84809.90	239640.00	268926.00	628559.00
		Min	-65300.00	-906000.00	-652000.00	-268000.00	-524000.00	-205000.00	-846000.00	-167000.00
		Max	173000.00	109000.00	780000.00	276000.00	719000.00	992000.00	994000.00	803000.00
Net operating cash flow	Non-state (288)	Mean	1585.70	2119.50	1880.20	908.86	3830.50	3967.00	-419.10	201.58
		SD	10683.70	10232.80	12854.00	13152.80	21304.60	31820.90	24289.40	27966.40
		Min	-40500.00	-30700.00	-37900.00	-45200.00	-62500.00	-73100.00	-104000.00	-65300.00
		Max	53900.00	62400.00	104000.00	59900.00	168000.00	408000.00	165000.00	183000.00
	State-owned (92)	Mean	1840.20	1377.40	3042.30	-239.04	579.83	5751.00	1324.60	9097.00
		SD	13970.60	11140.90	9945.12	10664.60	16683.30	33213.50	37464.30	42986.90
		Min	-72700.00	-275000.00	-339000.00	-39600.00	-503000.00	-697000.00	-117000.00	-586000.00
		Max	89700.00	56500.00	29600.00	45600.00	57800.00	242000.00	117000.00	281000.00
Financial cost	Non-state (288)	Mean	311.08	318.30	389.40	565.51	860.45	-570.05	496.66	1285.50
		SD	815.17	711.21	1008.59	1181.58	2615.59	2119.55	2869.67	5224.67
		Min	-1282.10	-1072.70	-2527.10	-4438.30	-10700.00	-14900.00	-8273.80	-32100.00
		Max	6028.83	6709.81	5421.35	6257.47	25500.00	14400.00	26900.00	40200.00
	State-owned (92)	Mean	322.58	304.96	295.16	500.45	648.49	-916.00	750.85	1406.20
		SD	743.61	632.76	986.47	1246.15	1640.58	2613.62	2256.89	4749.65
		Min	-1067.70	-766.47	-2848.30	-3326.00	-4687.80	-20300.00	-5399.50	-12400.00
		Max	3345.30	2842.20	4412.24	5912.52	6923.24	5359.75	12500.00	33400.00
Long-term equity investment	Non-state (288)	Mean	928.74	606.27	1141.60	1206.70	2445.00	1377.20	2349.70	2784.10
		SD	4852.32	6577.90	8159.09	23374.00	22604.50	10212.10	10187.60	16720.20
		Min	-20000.00	-42900.00	-40500.00	-33200.00	-55200.00	-33200.00	-29500.00	-19000.00
		Max	32700.00	47500.00	82900.00	276000.00	373000.00	111000.00	89400.00	189000.00
	State-owned (92)	Mean	542.20	833.21	450.11	-1497.90	488.28	4277.40	2553.40	5540.50
		SD	4378.77	4585.78	5816.18	7211.27	5384.89	38647.00	22644.00	28513.00
		Min	-18600.00	-6019.50	-108000.00	-46700.00	-387000.00	-137000.00	-245000.00	-528000.00
		Max	18400.00	29900.00	39800.00	11500.00	20300.00	391000.00	225000.00	252000.00
Construction in process	Non-state (288)	Mean	1014.50	244.17	-551.68	1022.70	5081.30	2103.60	411.25	5572.10
		SD	14291.20	12863.00	15072.10	17739.20	25028.10	31920.80	26895.60	34556.40
		Min	-81100.00	-135000.00	-173000.00	-98400.00	-204000.00	-153000.00	-219000.00	-246000.00
		Max	139000.00	73500.00	91200.00	207000.00	176000.00	263000.00	172000.00	286000.00
	State-owned (92)	Mean	659.00	962.04	2019.40	-2428.80	6117.20	4812.00	-76.25	11222.00
		SD	6128.18	9366.22	14011.10	12492.30	25205.10	22909.00	38394.00	26690.20
		Min	-15500.00	-211000.00	-460000.00	-763000.00	-222000.00	-250000.00	-301000.00	-266000.00
		Max	25500.00	56100.00	91500.00	21100.00	219000.00	163000.00	940000.00	134000.00

Table 3: Summary statistics of critical value and optimal target value

		$p_1(\alpha_1)$	$p_1(\alpha_2)$	$p_1(\alpha_3)$	$p_2(\alpha_1)$	$p_2(\alpha_2)$	$p_2(\alpha_3)$
Non-state (288)	Mean	0.03220	0.06280	0.09190	0.03250	0.06350	0.09300
	SD	0.01892	0.03682	0.05365	0.01910	0.03717	0.05417
	Min	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	Max	0.09000	0.18000	0.27000	0.09000	0.19000	0.28000
State-owned (92)	Mean	0.02990	0.05840	0.08560	0.03000	0.05870	0.08610
	SD	0.02137	0.04173	0.06103	0.02139	0.04178	0.06111
	Min	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	Max	0.09000	0.17000	0.26000	0.09000	0.17000	0.26000
		$D_1(\alpha_1)$	$D_1(\alpha_2)$	$D_1(\alpha_3)$	$D_2(\alpha_1)$	$D_2(\alpha_2)$	$D_2(\alpha_3)$
Non-state (288)	Mean	1.95E+08	1.96E+08	1.98E+08	2.34E+08	2.34E+08	2.35E+08
	SD	4.80E+08	4.83E+08	4.86E+08	5.05E+08	5.07E+08	5.09E+08
	Min	31579.13	31645.96	31715.58	129882.47	133263.86	136767.48
	Max	5.19E+09	5.23E+09	5.28E+09	5.26E+09	5.30E+09	5.34E+09
State-owned (92)	Mean	3.67E+08	3.69E+08	3.71E+08	4.12E+08	4.13E+08	4.14E+08
	SD	9.22E+08	9.25E+08	9.28E+08	9.49E+08	9.51E+08	9.54E+08
	Min	176419.93	176527.5	176642.89	1014402.95	1032902.56	1051962.3
	Max	5.90E+09	5.90E+09	5.91E+09	6.01E+09	6.01E+09	6.02E+09
		$V(\alpha_1, \theta_1)$	$V(\alpha_2, \theta_1)$	$V(\alpha_3, \theta_1)$	$V(\alpha_1, \theta_2)$	$V(\alpha_2, \theta_2)$	$V(\alpha_3, \theta_2)$
Non-state (288)	Mean	1.35E+10	6.77E+09	4.52E+09	1.29E+10	6.46E+09	4.31E+09
	SD	1.64E+10	8.19E+09	5.46E+09	1.55E+10	7.75E+09	5.16E+09
	Min	2.53E+09	1.26E+09	8.43E+08	2.42E+09	1.21E+09	8.10E+08
	Max	8.96E+10	4.48E+10	2.99E+10	8.44E+10	4.22E+10	2.81E+10
State-owned (92)	Mean	1.55E+09	7.76E+08	5.19E+08	1.50E+09	7.50E+08	5.01E+08
	SD	6.29E+08	3.15E+08	2.10E+08	6.08E+08	3.04E+08	2.03E+08
	Min	1.47E+08	73789740	49263780.9	1.43E+08	71628659.8	47795171
	Max	2.51E+09	1.25E+09	8.40E+08	2.47E+09	1.23E+09	8.25E+08

Table 3: Continue

		$E_2(\alpha_1)$	$E_2(\alpha_2)$	$E_2(\alpha_3)$	$V(\alpha_1, \partial_3)$	$V(\alpha_2, \partial_3)$	$V(\alpha_3, \partial_3)$
Non-state (288)	Mean	8.35E+09	4.11E+09	2.69E+09	1.23E+10	6.14E+09	4.10E+09
	SD	1.00E+10	4.97E+09	3.29E+09	1.46E+10	7.31E+09	4.87E+09
	Min	1.61E+09	6.98E+08	3.80E+08	2.23E+09	1.12E+09	7.46E+08
	Max	5.41E+10	2.68E+10	1.78E+10	7.93E+10	3.96E+10	2.64E+10
State-owned (92)	Mean	9.98E+08	4.84E+08	3.13E+08	1.45E+09	7.24E+08	4.84E+08
	SD	3.89E+08	1.91E+08	1.26E+08	5.88E+08	2.94E+08	1.96E+08
	Min	1.43E+08	71291586	47410616.6	1.39E+08	69467579.2	46326561
	Max	1.60E+09	7.96E+08	5.26E+08	2.43E+09	1.21E+09	8.10E+08
		$V_1(\alpha_1)$	$V_1(\alpha_2)$	$V_1(\alpha_3)$	$V_2(\alpha_1)$	$V_2(\alpha_2)$	$V_2(\alpha_3)$
Non-state (288)	Mean	4.25E+09	2.13E+09	1.42E+09	9.55E+09	4.78E+09	3.18E+09
	SD	4.75E+09	2.37E+09	1.58E+09	1.35E+10	6.75E+09	4.50E+09
	Min	8.07E+08	4.04E+08	2.69E+08	2.39E+08	1.20E+08	79733782
	Max	2.90E+10	1.45E+10	9.67E+09	8.27E+10	4.14E+10	2.76E+10
State-owned (92)	Mean	4.94E+08	2.47E+08	1.65E+08	2.49E+09	1.25E+09	8.31E+08
	SD	1.97E+08	9.83E+07	6.55E+07	8.07E+09	4.04E+09	2.69E+09
	Min	16807465	8403732.6	5602488.41	90120900.5	45060450.3	30040300
	Max	7.91E+08	3.95E+08	2.64E+08	7.62E+10	3.81E+10	2.54E+10

$p_1(a_1)$, $p_1(a_2)$, $p_1(a_3)$, $p_2(a_1)$, $p_2(a_2)$ and $p_2(a_3)$ are critical value

Table 4: ANOVA analysis

	F	Sig.		F	Sig.
OI(1)*NOE	10.835	0.001	$D_1(\alpha_1)$*NOE	5.466	0.020
OI(2)*NOE	13.036	0.000	$D_1(\alpha_2)$*NOE	5.453	0.020
LD(1)*NOE	4.830	0.029	$D_1(\alpha_3)$*NOE	5.440	0.020
LD(2)*NOE	1.609	0.205	$D_2(\alpha_1)$*NOE	5.386	0.021
$P_1(\alpha_1)$*NOE	0.955	0.329	$D_2(\alpha_2)$*NOE	5.384	0.021
$P_1(\alpha_2)$*NOE	0.926	0.336	$D_2(\alpha_3)$*NOE	5.380	0.021
$P_1(\alpha_3)$*NOE	0.900	0.343	$V(\alpha_1, \partial_1)$*NOE	49.128	0.000
$P_2(\alpha_1)$*NOE	1.125	0.290	$V(\alpha_2, \partial_1)$*NOE	49.237	0.000
$P_2(\alpha_2)$*NOE	1.092	0.297	$V(\alpha_3, \partial_1)$*NOE	49.340	0.000
$P_2(\alpha_3)$*NOE	1.064	0.303	$V(\alpha_1, \partial_2)$*NOE	49.701	0.000
$P_2(\alpha_1)$*NOE	57.593	0.000	$V(\alpha_3, \partial_2)$*NOE	49.810	0.000
$V_1(\alpha_2)$*NOE	57.593	0.000	$V(\alpha_3, \partial_2)$*NOE	49.912	0.000
$V_1(\alpha_3)$*NOE	57.593	0.000	$V(\alpha_1, \partial_3)$*NOE	50.285	0.000
$V_1(\alpha_1)$*NOE	22.558	0.000	$V(\alpha_2, \partial_3)$*NOE	50.395	0.000
$V_2(\alpha_2)$*NOE	22.558	0.000	$V(\alpha_3, \partial_3)$*NOE	50.498	0.000
$V_2(\alpha_3)$*NOE	22.558	0.000	$V_2(\alpha_1)$*NOE	52.019	0.000
$V_2(\alpha_1)$*NOE	49.274	0.000	$V_2(\alpha_2)$*NOE	46.097	0.000
$E_2(\alpha_2)$*NOE	48.701	0.000	$V_2(\alpha_3)$*NOE	44.493	0.000
$E_2(\alpha_3)$*NOE	48.107	0.000			

OI is operating income; NOE is nature of enterprise; LD is long-term debt

Table 5: ΔV_2 Frequency

	State-owned				Non-state			
	Dif.>0		Dif.<0		Dif.>0		Dif.<0	
	Num.	Per.(%)	Num.	Per.(%)	Num.	Per.(%)	Num.	Per.(%)
$V(\alpha_1, \partial_1)$	12	13.04	80	86.96	195	67.71	93	32.29
$V(\alpha_2, \partial_1)$	4	4.35	88	95.65	147	51.04	141	48.96
$V(\alpha_3, \partial_1)$	2	2.17	90	97.83	113	39.24	175	60.76
$V(\alpha_1, \partial_2)$	12	13.04	80	86.96	193	67.01	95	32.99
$V(\alpha_2, \partial_2)$	4	4.35	88	95.65	144	50.00	144	50.00
$V(\alpha_2, \partial_2)$	2	2.17	90	97.83	108	37.50	180	62.50
$V(\alpha_2, \partial_3)$	10	10.87	82	89.13	192	66.67	96	33.33
$V(\alpha_1, \partial_3)$	4	4.35	88	95.65	141	48.96	147	51.04
$V(\alpha_1, \partial_3)$	2	2.17	90	97.83	106	36.81	182	63.19

Table 6: V_1 and V_3 Frequency

	State-owned				Non-state			
	Dif.>0		Dif.<0		Dif.>0		Dif.<0	
	Num.	Per.(%)	Num.	Per.(%)	Num.	Per.(%)	Num.	Per.(%)
$\Delta V_1(\alpha_1)$	4	4.35	88	95.65	151	52.43	137	47.57
$\Delta V_1(\alpha_2)$	3	3.26	89	96.74	92	32.29	195	67.71
$\Delta V_1(\alpha_3)$	2	2.17	90	97.83	60	20.83	228	79.17
$\Delta V_3(\alpha_1)$	29	31.52	63	68.48	204	70.83	44	29.17
$\Delta V_3(\alpha_2)$	11	11.96	81	88.04	142	49.31	146	50.69
$\Delta V_3(\alpha_3)$	7	7.61	85	92.39	108	37.50	180	62.50

constraining the development of enterprises. So, enterprise operators require further regulating its financing decisions and reducing the loss rate of asset.

CONCLUSION

Learn from Leland (1994), Sundaresan and Wang (2007), this study use a sample of 380 Chinese listed companies in manufacturing during the period of 2003-2011, to analyze the influences of financing decision, dynamic investment on the value of enterprise property empirically based on the theories of investment and finance decisions. The results indicate that: (1) The operational cash flow and long-term equity investment are as clear ascendant trend, except 2007 and 2010; (2) The profitability of State-owned enterprises rely on the external investment overly but the operating cash flows and changes in the value of long-term equity investments of Non-state-owned enterprise are not significantly related; (3) The deterioration in the business environment and financial conditions after the financial crisis constrained the development of enterprises, so more and more companies are dependent on the short-term funding to meet the demand of daily operations. (4) The decisions of investment and financing in Non-state companies are better than it in State-owned companies, because there are more companies which do not meet the level of optimal target asset value.

This study provides clear evidence of the interaction effects among financing decision, dynamic investment and enterprise property value of industrial enterprises. And it has positive reference meaning and value in the research of investment and financing. But, the research in this field still has great scope, such as the valuation criterion of liability, equity value and the forecasting of future cash flows and so on.

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