Why do firms choose negative net debt policy? ☆

Katsutoshi Shimizu[a,*], Kim Cuong Ly[b,]

[a] *Department of Economics, Nagoya University*
[b] *School of Management, Swansea University*

Abstract

This study investigates a new phenomenon that the number of firms that have negative net debt is increasing. Although zero-leverage becomes prevalent in the world, negative net debt phenomena is more prevalent in Japan. We argue that negative net leverage can be regarded as a special form of zero gross leverage. The main findings are (i) poor investment opportunity, low default costs, low cost of holding cash, and abundant cash are the driving forces of negative net leverages, determinants a cash rich firm is more likely to have negative net debt, (ii) the determinants of negative net leverage is qualitatively similar to those of zero leverage, (iii) in particular, higher default probability is a determinant of debt reduction, lower cost of holding cash is a determinant of cash accumulation, less profitable opportunity is a determinant of decreasing dividends, and (iv) firms continue to reduce debts, increase dividend payments and investments over time after achieving negative net leverage.

Keywords: pecking order, leverage, cash, investment

JEL classification: G32

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*Corresponding author: Katsutoshi Shimizu, Department of Economics, Nagoya University.
Address: Furo-cho, Chikusa-ku, Nagoya, Aichi, 464-8601, Japan. Tel.: +81-52-789-2378, Fax: +81-52-789-2378

Email addresses: shimizu@soec.nagoya-u.ac.jp (Katsutoshi Shimizu), k.c.ly@swansea.ac.uk (Kim Cuong Ly)

1. Introduction

The presence of low leverage in a firms capital structure is regarded as financial conservatism of desire to maintain financial flexibility or preserve debt capacity for future needs. The continued studies of zero-leverage phenomenon are adding to the debate internationally in scope (Bessler et al. 2013, Strebulaev and Yang 2013) by its definition of no debt as a special case of low-leveraged policy. How this debate continues if firms hold a net negative debt policy in which firms aim to hold more cash than the debt outstanding? This paper is the first to answer the question why firms pursue net negative net debt policy in their capital structure.

The previous studies have left two major gaps in the low-leverage literature. Strebulaev and Yang (2013) argue that low or zero leverage is a worldwide phenomenon. Zero leverage is a common feature in market-oriented economies (Bessler et al. 2013). It is widely acknowledged that if the firms do not have sufficient debt capacity, thus, pursue long-term zero-leverage policy to obtain greater financial flexibility. If negative net leverage firms have higher proportion of cash, a question can be raised whether firms could achieve a desire of greater financial flexibility than zero-leverage policy? Obviously, no studies have been devoting more effort to investigate a severe scenario of low leverage. Second, zero-leverage puzzle was extensively examined in the US with the feature of capital market-oriented economies (for example, Rapp et al. 2014, De Jong et al. 2012, Denus and McKeon 2012, Ang and Smedema 2011). The leverage policy is affected by the economic environment of the country where firm operates (Antoniou et al. 2008),

therefore, the lesson learnt from the US could not be generalized to countries with different market conditions like bank-based economies. More specifically, among developed country of bank-oriented economies (like France, Germany or Japan), Japanese firms are found to be the slowest in adjusting their capital structure toward the target leverage level (Antoniou et al. 2008). Given the market condition of Japan in mid-1990s, many banks suffer a large amount of bad loans (Hanazaki and Horiuchi 2003). Firms need to borrow loan in surplus cash outlay states and keep abundant cash balance (Takami 2016). Our study aims to bridge this gap by analysing the determinants of net negative net debt policy in Japan which has different financial and institutional traditions.

Our empirical strategies are listed, followed by our findings. The first analysis makes clear the determinants of negative net debt policies by estimating single probit equations. The evidence indicates that poor investment opportunities, low default costs, low costs of holding cash, and abundant amount of cash are the main driving forces of negative net debt policies.

The second analysis investigates four options to achieve negative net debt policy: debt reduction, cash accumulation, decreasing dividend, and decreasing investment. The evidence indicates that (i) higher default probability is a determinant of debt reduction, (ii) lower cost of holding cash is a determinant of cash accumulation, (iii) less profitable opportunity is a determinant of decreasing dividends, and (iv) less cash is a determinant of cash accumulation, decreasing dividend, or decreasing investment.

The third analysis investigates debt policy, cash policy, dividend policy, and investment policy taken by firms that adopt negative net policies. In

particular, we focus on the effect of duration that a firm continues to adopt negative net policy on these four policies. The evidence indicates that the firms that have negative net debt policies continue to reduce debts over time, but they do not continue to accumulate cash. Furthermore, they increase dividend payments and investments as the years go by and firm's financial condition allows.

This paper aims to contribute as follows. First, there is a substantial literature on financial flexibility (Rapp et al. 2014, Bessler and et al. 2013, Strebulaev and Yang 2013, Denis and McKeon 2012, Ang and Smedema 2011). Our evidence is the first to contribute to this line of literature that negative net debt phenomenon could increase more financial flexibility. Our findings provide more understanding that firms with high financial flexibility in capital-market oriented economies and bank-oriented economies will react differently. While US firms gradually repay debts out of free cash flows (Denis and McKeon 2012), Japanese firms decide to hold more cash. Japanese firms increase dividend payments and investments as the years go by and firm's financial condition allows. This evidence shows that when information asymmetry is relieved in bank-oriented countries, Japanese firms are more likely to converge to their long-term plan.

Second, in presence of information asymmetries in bank-oriented economies like Japan, firms tend to hold abundance cash instead of paying debt. Third, the pecking-order theory (Myers 1984, Myers and Majluf 1984) shows that due to asymmetric information, firms employe a herachical order of financing preferences that internal financing is prioritized. Our evidence indicates that the firms that have negative net debt policies continue to reduce debts over

time, but they do not continue to accumulate cash. We contribute to the knowledge that firms restrict their debt capacity in case of sufficiently large financing deficits by stopping their borrowing for cash abundance. Therefore, firms could reduce information asymmetry faced in their bank-oriented country.

The organization of the paper is as follows. Section 2 explaines our econometric model and hypotheses. Section 3 presents the empirical results. Section 4 presents the accuracy rate of our two step methodology to estimate the likelihood of external financing. Section 5 concludes the paper.

2. A brief outline on Japanese economy and hypothesis development

2.1. Bank-finance-oriented civil law country

Japan is characterized as bank-finance-oriented civil law country and firms are dependent on bank lending. However, many banks turned out to be undercapitalized or unhealthy (Hanazaki and Horiuchi 2003) since problem loans significantly mounted by the mid-1990s, indicating a negative investment environment in Japan. There is an increasing trend of the proportion of firms that have negative net debt from 1994, as shown in Figure 1.

Net debt is defined as the amount of debt minus cash holdings. Net debt becomes negative when a firm has greater cash holdings than the debt outstanding. In the sense that such firm can repay the debt immediately whenever it likes, it has actually zero leverage. Figure 1 indicates that the proportion of such firms increased from 33% in 1994 to 50% in 2015. Strebulaev and Yang (2013) report that 33% of firms had non positive net debt

on average over the 1962–2009 period, with highest record 49.0%. Similarly to Japan, there is also an increasing trend on the proportion of U.S. firms with non-positive net debt.[1] This figure has distinguished the significance in institutional traditions of Japan from other bank-oriented economies. What we have observed in Japan is that firms tend to hold more cash than debt, resulting in negative net debt. One may need to understand why such patterns occur. Most of existing studies purely on zero-leverage fail to explain this dimension.

Figure 1

From informational asymmetry perspective, the pecking order theory suggests that firms do not have leverage targets (Antoniou et al. 2008). They use debt only when retained earnings are insufficient. In the sense that such Japanese firm can repay the debt immediately whenever it likes, it has actually zero leverage. Duchin (2010) suggest that negative shocks to the supply of external capital along with the presence of financing frictions would hamper investment if firms lack sufficient capital to fund their investment opportunities. In this regard, Japanese firms are more likely to borrow loan in surplus cash outlay states and keep abundant cash balance (Takami 2016). Antonios et al. (2008) argue that firms in capital market-oriented economies have an arms length relation with their lenders, hence, the role of collateral in raising debt is limited. However, it is not the case in Japan. Therefore,

[1]See Table 1 of Strebulaev and Yang (2013). In the U.S., the fraction of zero leverage firms increased almost to 20% recently.

Baker and Wurgler (2002) suggest that market conditions influence pecking order by timing the market to minimize the cost of capital.

2.2. Hypothesis

Harris and Raviv (1991) report that leverage is positively related to investment opportunities. Bessler et al. (2013) find that firms with zero-leverage policy tend to depend highly on internal funds and, thus, less flexible in their investment decisions. Leary and Robert (2010) argue that debt capacity constrains the firms ability to issue more debt. Antonios et al. (2008) suggest that the growth opportunities vary across nations. According to the pecking order theory, a firm uses first its internal funds for investment. This implies that the internal funds accumulate if the firm has no investment opportunity. Accumulation of cash makes net leverage negative. Hence, we predict that a firm is more likely to adopt negative net debt policy as it has lower market-to-book ratio. Therefore, we hypothesize the first hypothesis that

H1: A firm that has little good opportunity of investment is more likely to have negative net leverage.

Bessler et al. (2013) find that constraint firms do not have sufficient debt capacity, thus have to maintain a zero-leverage policy for longer period of time. Harris and Raviv (1991) report that leverage is inversely related to bankruptcy risk. A firm that has lower bankruptcy cost is easily to become negative-net-debt organization. Due to high information asymmetry, firm finds harder to gain access to bank lending and borrow at higher cost (Antonios et al. 2008). High bankruptcy cost prevents a firm from becoming

negative-net-debt corporate because it is more costly for such firm to hold more cash without repaying debt. Repaying debt is less costly for such firm than becoming negative net leverage. To measure the bankruptcy cost, we use distance-to-default (Vassalou and Xing 2004). The distance-to-default measures the deviation from the default point. Hence, the default probability is inversely related to the distance-to-default. The second hypothesis predicts positive relationship between the likelihood of being negative net leverage and the distance-to-default as following:

H2: A firm that has lower default probability is more likely to have negative net leverage.

Firms that hold cash and apply lease financing are more likely to have zero leverage (Strebulaev and Yang 2013). The trade-off theory posits that change in leverage ratio indicates changing dynamics of the cost-benefit tradeoff of debt (Mello et al. 2018). Mello et al (2018) find that shareholders perceived firms to be over-levered when they consider an increase in debt as a negative influence on their wealth. As argued in the literature (Opler et al. 1999), the cost of holding cash is its lower rate of return than those of other financial assets. Hence, as the risk-free interest rate declines, the cost of holding cash becomes relatively lower and a firm may hold more cash, thereby inducing the firm to become negative net leverage. Our third hypothesis is:

H3: A firm is more likely to become negative net leverage during the period of lower interest rate than otherwise.

Dang (2013) argue that cash-rich firms are more likely to be unlevered. Ang and Smedema (2011) find that US firms obtain large cash reserves to prepare for future recession. Since net debt is calculated by deducting cash

from debt, the more cash leads to a decrease in net debt unless a firm does not use that cash for other purposes like repayment of debts. Alternatively, if a firm employes cash for repayment of debt or dividend payment, the firm would not be more likely to become negative net leverage. Therefore, we postulate the fourth hypothesis is

H4: A firm that has more amount of cash at the previous period is more likely to have negative net leverage.

3. Data and empirical strategy

3.1. Data and summary statistics

Our analysis employs Nikkei NEEDS-Financial QUEST database. The original data has the sample period 1991–2015. The original data contains 20,916 firm-year observations with 836 firms on average in a year. The sample includes listed firms, but does not include financial firms. After excluding missing values and outliers, the remained sample has 14,202 observations.

Table 1 summarizes the frequency distributions of our sample firms by leveraging status, debt reduction status, and investment status. Among 14,202 firms, 40% chose negative net leverage and 60% chose positive net leverage. There are 5% of the firms that chose zero gross leverage and the remaining 95% chose positive gross leverages. By definition, zero-gross levarage firms have negative net leverage. Among positive gross leverage firms, 37% of the firms chose negative net leverage.

Table 1 also reports the number of firms that reduced debt by more than 5%. There are 49% of the firms that have reduced debt. The proportions

of the firms that reduced debt are not much different between net leverage status.

At the bottom, Table 1 reports the number of firms that have positive or negative investment. There are 44% of the firms that have experienced negative investment. The proportions of the firms that had negative investments are not much different between net leverage status.

Table 1

In sum, Table 1 indicates that negative net leverage is prevalent, but suggests that negative net leverage status is not much related to debt reduction or investment status.

Table 2 compares the summary statistics by the status of net leverage. As the two rows at the bottom indicate, the most sample means are significantly different by the sign of net leverage. The significant differences are found for our main variables: cash, market-to-book ratio, distance to default, and risk-free rate. First, the firms that have negative net leverage hold greater cash than the firms that have positive net leverage. Second, the negatice net leverage firm has higher market-to-book ratio, which is the measure of profitable investment opportunity, than the positive net leverage firm. Third, the negative net leverage firm has a higher distance-to-default, which is the measure of default probability, than the positive net leverage firm. Fourth, risk-free rate is lower for the negative net leverage firm than for the positive net leverage firm.

Table 2

To investigate the determinants of negative net leverage and to test these four hypotheses, we estimate single probit equations where the dependent variable takes one when a firm becomes NNL. We also consider the determinants of debt reduction by estimating single probit equations where the dependent variable takes one when a firm reduces debt. Furthermore, we estimate the bivariate probit equations where net leverage status and debt reduction status are the dependent variables.

In these estimations, control variables are asset size (Size), the volatility of cash flow(Risk), ratio of tangible asset to total asset (Tangible assets), rate of profitability (Profitability), ratio of dividend to asset(Dividend ratio), and age(firm age since listing).

4. Results

4.1. The determinants of negative net leverage and debt reduction: Single probit estimations

Table 3 reports the results of single probit estimations. The dependent variable is negative net leverage which takes one when a firm has negative net leverage and zero otherwise, for model (i). All explanatory variables are taken one lag to mitigate the endogeneity issue.

The firms that have lower market-to-book ratios are more likely to become NNL, supporting the hypothesis H1. Harris and Raviv (1991) report that leverage is positively related to investment opportunities. Poor investment opportunity is the reason for becoming NNL. Bessler et al. (2013) find that

firms with zero-leverage policy tend to depend highly on internal funds and, thus, less flexible in their investment decisions. This result suggests that firms become NNL just because cash accumulates. Importantly, the negative sign is opposite to the usual evidence for the negative correlation of leverage and growth opportunity (Graham 2000). However, the result is consistent with McConnell and Servaes (1995) that argue that there is positive relation between growth opportunity and leverage for low growth firms.

The coefficient of distance-to-default is positive. Since the default probability is negatively related to distance-to-default theoretically, the result means that firms having lower bankruptcy costs choose NNL, supporting the hypothesis H2. Due to high information asymmetry, firm finds harder to gain access to bank lending and borrow at higher cost (Antonios et al. 2008). In other words, firms that have higher bankruptcy costs cannot afford to choose NNL.

The cross-term of risk-free rate and cash is significantly negative. The trade-off theory posits that change in leverage ratio indicates changing dynamics of the cost-benefit tradeoff of debt (Mello et al. 2018). Hence, firms with lower costs of holding cash are more likely to become NNL, which supports the hypothesis H3. Our results indicate that the cost of holding cash becomes lower causes the firm to adopt negative net debt policy. This finding is contrast with Denis and McKeon (2012) that US firms gradually repay debts out of free cash flows to increase financial flexibility. Lastly, firms that have more cash at the previous period are more likely to choose NNL, which supports the hypothesis H4.

Looking at control variables, smaller firms are more likely to become

NNL. Firms that have greater proportion of tangible assets are less likely to become NNL. In striking contrast to Rapp et al. (2014) that US firms with high financial flexibility pay lower dividends. More profitable firms, firms that paid greater dividend, and younger firms are more likely to become NNL. Jensen (1986) suggest that agency costs increase with free cash flow. Also, the free cash flow theory indicates a positive relation between leverage and profitability.

Table 3

We investigate the decision of adopting zero gross leverage policy in model (ii). The dependent variable is ZL which takes one when a firm have zero leverage and zero otherwise. The signs of coefficients are the same as those of model (i) for distance to default and cash while they are different for market-to-book ratio and cost of holding cash. Firms that are more likely to become NNL have the common reason for becoming zero leverage firms, which suggests that these firms may become zero leverage firms in the future.

The variable market-to-book ratio lost the significance, which means that the decision of adopting zero leverage policy is independent of the growth opportunity. Although not reported, we find the negative relationship between gross leverage and growth opportunity in the same sample. Therefore, we should conclude that the leverage is negatively related to the growth opportunity while the decision of adopting zero leverage is independent of growth opportunity.

The cost of holding cash lost its significant. This result seems reasonable

because the dependent variable ZL does not include cash while NNL include cash.

For robustness check, we restrict the sample to firms that have positive gross leverages in model (iii). Zero leverage implies negative net leverage, but the inverse is not true. Even when excluding zero leverage firms, we find the results similar to model (i). This estimation confirms that the hypotheses 1, 2, 3, and 4 hold robustly.

4.2. Do firms choose different method to achieve negative net leverage?

To become negative net leverage, firms have at least four options: debt reduction(DR), cash accumulation(CA), decreasing dividends(DD), and decreasing investment(DI). Next question is whether the determinants of each choice are different or not. In table 4, we estimate single probit equations for this purpose. The dependent variable is DR in model (i), CA in (ii), DD in (iii), and (DI) in (iv), respectively. DR takes one when a firm reduces debt and zero otherwise. CA takes one when a firm accumulates cash and zero otherwise. DD takes one when a firm decreases dividend payment and zero otherwise. DI takes one when a firm decreases investment and zero otherwise. When each of four variables takes one, the net leverage decreases by definition.

The estimated coefficients of DR are qualitatively similar to those of CA. The estimated coefficients of DD and DI are qualitatively different from those of DR and CA in that the market-to-book have significantly negative coefficients. The coefficient signs are mostly similar to those of Table 3 except for the cost of holding cash and the variable Age. Therefore, the remarkable

finding in table 4 is that the firms that have higher growth opportunity are less likely to decrease divdends and to decrease investments.

Table 4

4.3. Robustness check: Biprobit estimations

Table 5 does some robustness checks. First, in model (i), we consider the choices of NNL and ZL by estimating bivariate probit equations, which confirms the result of Table 3 again. Growth and cost of cash affect the NNL while they do not ZL even after controlling the correlation between disturbances in each equation of the seemingly unrelated bivariate probit model.

Second, in other models of Table 5, we consider four pairs of seemingly unrelated bivariate probit estimations, with one of each dependent variable is DR, CA, DD, and DI. If there exist correlated unobserved factors that affect the choices of NNL and each option, we may find the results different from the previous Table 4.

However, the results of Table 5 are much similar to those of Table 4. Avoiding the replications, we point out the different result only. Cost of holding cash has significantly negative coefficient in model (lost the significane except for DI equation in model (v). Higher cost of holding cash decreases the likelihood of decreasing investments. In other words, low cost of holding cash reasonably increases the likelihood of decreasing investments.

Table 5

4.4. Relative choice over four options: Multiple logit model

Which firm prefers which option? This section extends the analysis of table 4 further by examining relative choice over four options in mutinomial logit models.

In model (i) in Table 6, we consider the characteristics of firms that prefer reducing debt to the choice other than four options. From the budget equation of the firm, firms may increase cash flow or decrease net working capital when it decrease net leverage. In other words, either or both of the increased cash flow or/and decreased net working capital can be regarded as the strategy other than four options(DR, CA, DD, DI).[2]

The base choice (Choice 0) is set to the strategy of choosing other than four options. Choice 1 is DR only and Choice 2 is the strategy including at least one of cash accumulation, decreasing dividends, or decreasing investments in model (i). The choices in other models are defined similarly.

We point out remarkable findings only: (i) higher default probability is a determinant of debt reduction and cash accumulation, (ii) lower cost of holding cash is a determinant of cash accumulation, (iii) lower growth is a determinant of decreasing dividends, and (iv) less cash is a determinant of cash accumulation, decreasing dividend, or decreasing investment.

Table 6

[2]For example, see equation (2) of Leary and Roberts(2010, p334).

4.5. Strategies of NNL firms: How do they behave?

The last analysis deals with the corporate strategies of NNL firms after they became NNL. We consider four dependent variables in Table 7: growth of debt, cash ratio, dividend ratio, and investment ratio. We consider the duration of NNL firms in particular as the explanatory variables. This variable counts the number of years after a firm became NNL. The estimation method is instrumental variable method. We use lag of explanatory variables and the difference of explanatory variables.

As Table 7 shows, the growth of debt is decreasing in the NNL duration. As the years pass, the NNL firms reduce the growth of debt, which means a possibility that they finally reach zero-leverage firms. It indicates that increasing debt capacity have large effect on the decision that firms hold cash.

The cash ratio is also decreasing in the NNL duration. The NNL firms do not continue to accumulate cash after they became NNL. It is obvious that NNL firms could decrease the information asymmetry down to a certain level. Therefore, firms tend to increase investment by their surplus of cash to earn more profits.

The dividend ratio is increasing in the NNL duration. As the years pass, the NNL firm strengthens more and more its financial muscle, which enables it to increase dividend payment. However, US firms with high financial flexibility will pay lower dividends and stockpile cash (Ang and Smedema 2011).

The investment ratio is also increasing in the NNL duration. As the years pass, the NNL firm increases investment.

Table 7

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5. Conclusions

This paper studies the determinant of negative net leverage firms. We find that poor investment opportunity, low default costs, low cost of holding cash, and abundant cash increase the likelihood of firms employing negative net leverage policy in their capital structure. the firms that have negative net debt policies continue to reduce debts over time, but they do not continue to accumulate cash. Furthermore, they increase dividend payments and investments as the years go by and firm's financial condition allows.

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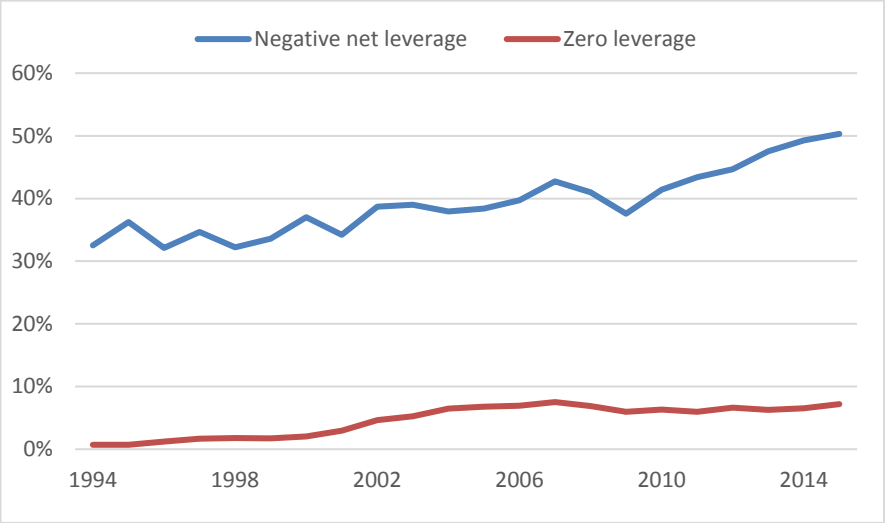
Figure 1: Negative net leverage and zero gross leverage



(Note) The figure shows the proportion of firms that have negative net debt, gross debt ratio, net debt ratio, and investment ratio(left axis).

Table 1: Frequency distributions of financing decisions

	Net leverage		Gross leverage		Total
	Negative	Positive	Zero	Positive	
Gross leverage					
Zero	736	0			736
	(100%)	(0%)			
Positive	4,989	8,477			13,466
	(37%)	(63%)			
Total	5,725	8,477			14,202
Debt Reduction					
No	3,035	4,180	710	6,505	7,215
	(42%)	(58%)	(10%)	(90%)	(51%)
Yes	2,690	4,297	26	6,961	6,987
	(39%)	(61%)	(0%)	(100%)	(49%)
Total	5,725	8,477	736	13,466	14,202
Investment					
Negative	2,424	3,811	348	5,887	6,235
	(39%)	(61%)	(6%)	(94%)	(44%)
Positive	3,301	4,666	388	7,579	7,967
	(41%)	(59%)	(5%)	(95%)	(56%)
Total	5,725	8,477	736	13,466	14,202
	(40%)	(60%)	(5%)	(95%)	

(Note) The table reports the frequency distributions of the firms by status of gross leverage, net leverage, debt reduction, and sign of investment.

Table 2: Summary statistics by financing decision and investment growth

Sample	Investment	1 Cash	2 Market-to-book	3 Distance to default	4 Risk-free rate	5 Size	6 Cash flow	7 Risk	8 Tangible asset	9 Profitability	10 Dividend ratio	11 Firm age	12 Num Obs.
All	0.008	0.121	1.085	18.528	1.501	11.561	0.074	0.053	0.305	0.071	0.007	2.678	14,202
Positive net leverage	0.008	0.088	1.077	16.241	1.555	11.679	0.066	0.051	0.348	0.064	0.006	2.681	8,477
Negative net leverage	0.009	0.170	1.097	21.914	1.420	11.386	0.084	0.056	0.242	0.081	0.010	2.675	5,725
t-stat	0.541	65.467	2.426	19.453	-8.887	-13.405	23.710	10.933	-42.616	24.522	42.909	-0.689	
p-value	0.589	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.491	

(Note) The table reports the summary statistics for our main variables and control variables. The t-statistics are on the null hypothesis that the sample means are not different between positive and negative net leverage firms.

Table 3: The determinants of negative net leverage and zero leverage

Model	(i)	(ii)	(iii)
Dep. Var.	NNL	ZL	NNL
Sample	All	All	Non zero- leverage
Market to book ratio	-0.093*	0.018	-0.124**
	(0.049)	(0.067)	(0.054)
Distance to Default	0.018***	0.017***	0.016***
	(0.001)	(0.001)	(0.001)
Risk free rate \times Cash	-0.473**	0.310	-0.575**
	(0.223)	(0.304)	(0.232)
Cash	8.852***	1.677***	9.601***
	(0.416)	(0.485)	(0.448)
Size	-0.108***	-0.139***	-0.092***
	(0.012)	(0.019)	(0.012)
Risk	1.399*	0.807	1.250
	(0.850)	(1.179)	(0.889)
Tangible assets	-3.691***	-1.911***	-3.577***
	(0.151)	(0.214)	(0.160)
Profitability	10.334***	5.453***	9.849***
	(0.482)	(0.695)	(0.508)
Dividend ratio	75.762***	29.027***	74.327***
	(4.254)	(4.626)	(4.413)
Age	-0.060**	-0.295***	-0.038
	(0.029)	(0.040)	(0.030)
Constant	-0.421**	0.401	-1.053***
	(0.206)	(0.289)	(0.214)
Observations	14,202	14,202	13,466

(Note) The table reports the results of single probit estimations. The dependent variable NNL takes one when a firm has negative net debt and zero otherwise. The dependent variable ZL takes one when a firm has zero gross leverage and zero otherwise. In model (iii), the sample is restricted to the firms that have ZL=0. The robust standard errors are reported in parentheses. *, **, and *** shows 10, 5, 1% significance levels, respectively.

Table 4: The determinants of debt reduction, cash accumulation, decreasing dividends, and decreasing i

Model	(i)	(ii)	(iii)	(iv)
Dep. Var.	DR	CA	DD	DI
Market to book ratio	0.050	0.021	-0.518***	-0.358***
	(0.047)	(0.045)	(0.060)	(0.057)
Distance to Default	0.004***	0.009***	0.011***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)
Risk free rate \times Cash	0.002	-0.012	0.286	-0.223
	(0.182)	(0.165)	(0.188)	(0.167)
Cash	3.009***	0.914***	1.869***	2.596***
	(0.322)	(0.298)	(0.332)	(0.317)
Size	-0.062***	-0.111***	-0.087***	-0.118***
	(0.012)	(0.011)	(0.012)	(0.013)
Risk	0.534	0.537	-0.276	-0.743
	(0.848)	(0.788)	(0.867)	(0.807)
Tangible assets	-1.811***	-2.361***	-2.073***	-1.857***
	(0.138)	(0.136)	(0.147)	(0.144)
Profitability	6.292***	6.804***	5.352***	2.498***
	(0.445)	(0.438)	(0.455)	(0.452)
Dividend ratio	12.086***	31.508***	79.881***	34.914***
	(3.453)	(3.368)	(3.833)	(3.675)
Age	0.008	-0.023	-0.019	-0.003
	(0.029)	(0.028)	(0.029)	(0.030)
Constant	-1.140***	0.136	-0.517**	-0.797***
	(0.203)	(0.194)	(0.211)	(0.224)
Observations	14,202	14,202	14,202	14,202

(Note) The table reports the results of single probit estimation. The dependent variables are debt reduction(DR), cash accumulation(CA), decreasing dividends(DD), and decreasing investment(DI). The robust standard errors are reported in parentheses. *, **, and *** shows 10, 5, 1% significance levels, respectively.

Table 5: Determinants of negative net leverage: Biprobit estimation

Model	(i)		(ii)		(iii)		(iv)		(v)	
Dep. Var.	NNL	ZL	NNL	DR	NNL	CA	NNL	DD	NNL	DI
Market to book ratio	-0.107**	0.026	-0.100**	0.023	-0.059	0.014	-0.097**	-0.442***	-0.096**	-0.312***
	(0.045)	(0.055)	(0.041)	(0.040)	(0.041)	(0.039)	(0.043)	(0.043)	(0.043)	(0.043)
Distance to Default	0.018***	0.018***	0.015***	0.004***	0.016***	0.009***	0.016***	0.011***	0.016***	0.009***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Risk free rate \times Cash	-0.470**	0.272	-0.233	-0.010	-0.044	-0.082	-0.262	0.233	-0.335*	-0.287*
	(0.213)	(0.288)	(0.188)	(0.153)	(0.192)	(0.156)	(0.188)	(0.156)	(0.192)	(0.161)
Cash	9.197***	1.768***	6.733***	3.127***	6.817***	1.280***	7.417***	2.037***	7.553***	2.870***
	(0.408)	(0.425)	(0.351)	(0.280)	(0.357)	(0.277)	(0.359)	(0.287)	(0.369)	(0.295)
Size	-0.106***	-0.135***	-0.117***	-0.049***	-0.115***	-0.099***	-0.120***	-0.082***	-0.117***	-0.099***
	(0.012)	(0.021)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.013)	(0.012)	(0.013)
Risk	1.189	0.955	1.014	0.685	1.314	0.664	0.746	-0.285	1.134	-0.789
	(0.838)	(1.208)	(0.810)	(0.839)	(0.799)	(0.794)	(0.797)	(0.852)	(0.805)	(0.818)
Tangible assets	-3.534***	-2.244***	-3.395***	-1.911***	-3.450***	-2.451***	-3.460***	-2.177***	-3.472***	-2.042***
	(0.136)	(0.206)	(0.130)	(0.135)	(0.131)	(0.132)	(0.131)	(0.139)	(0.132)	(0.139)
Profitability	9.788***	6.143***	9.476***	6.583***	9.734***	7.265***	9.779***	5.448***	9.613***	3.447***
	(0.445)	(0.609)	(0.416)	(0.417)	(0.418)	(0.407)	(0.421)	(0.425)	(0.429)	(0.428)
Dividend ratio	73.182***	29.573***	65.057***	12.223***	63.358***	31.563***	62.869***	80.700***	68.484***	34.342***
	(3.843)	(4.541)	(3.568)	(3.338)	(3.568)	(3.256)	(3.557)	(3.489)	(3.694)	(3.439)
Age	-0.081***	-0.280***	-0.049*	0.003	-0.055**	-0.019	-0.048*	-0.019	-0.060**	-0.000
	(0.029)	(0.044)	(0.028)	(0.029)	(0.028)	(0.029)	(0.028)	(0.030)	(0.028)	(0.030)
Constant	-0.554***	0.231	0.108	-1.229***	-0.065	-0.099	-0.077	-0.672***	-0.082	-1.087***
	(0.212)	(0.317)	(0.199)	(0.215)	(0.201)	(0.206)	(0.201)	(0.220)	(0.205)	(0.237)
\Rho		1.542***		2.213***		2.339***		2.457***		2.156***
		(0.181)		(0.107)		(0.094)		(0.155)		(0.076)
Observations		14,202		14,202		14,202		14,202		

(Note) The table reports the results of biprobit estimations. The dependent variables are NND and ZL in model (i), NNL and DR in model (ii), NNL and CA in model (iii), NNL and DD in model (iv), and NNL and DI in model (v). NNL takes one when a firm has negative net debt and zero otherwise. The robust standard errors are reported in parentheses. *, **, and *** shows 10, 5, 1% significance levels, respectively.

Table 6: Relative choice of four options: Multinomial logit estimationsestimation

Model	(i)		(ii)		(iii)		(iv)	
Choice	1	2	1	2	1	2	1	2
Base choice	DR only	No DR including CA, Other than four options	CA only	No CA including DR, Other than four options	DD only	No DD including DR, Other than four options	DI only	No DI including DR, Other than four options
Market to book ratio	0.112	-0.486***	0.229	-0.472***	-0.716***	-0.366***	-0.237	-0.412***
	(0.148)	(0.115)	(0.157)	(0.115)	(0.171)	(0.114)	(0.183)	(0.114)
Distance to Default	-0.016***	-0.013***	-0.011**	-0.014***	-0.003	-0.014***	-0.001	-0.014***
	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)
Risk free rate \times Cash	0.307	0.462*	-1.276**	0.537**	0.330	0.454*	0.577	0.424
	(0.343)	(0.271)	(0.519)	(0.271)	(0.366)	(0.270)	(0.422)	(0.269)
Cash	-0.207	-4.034***	-3.069***	-3.506***	-2.130***	-3.701***	-2.758***	-3.571***
	(0.789)	(0.603)	(0.939)	(0.597)	(0.810)	(0.598)	(1.000)	(0.596)
Size	-0.075	-0.136***	-0.112*	-0.129***	-0.176***	-0.124***	-0.171**	-0.125***
	(0.061)	(0.046)	(0.064)	(0.046)	(0.062)	(0.046)	(0.074)	(0.046)
Risk	-2.654	2.746	3.749	2.282	-6.223*	3.165	10.151***	1.904
	(3.598)	(2.530)	(3.273)	(2.525)	(3.560)	(2.534)	(3.393)	(2.529)
Tangible assets	1.955***	1.619***	-0.927	1.898***	0.506	1.757***	0.893	1.672***
	(0.659)	(0.498)	(0.687)	(0.500)	(0.658)	(0.498)	(0.763)	(0.497)
Profitability	-0.678	-4.789***	4.874**	-5.230***	-1.754	-4.602***	-10.680***	-3.991***
	(1.981)	(1.484)	(2.041)	(1.490)	(1.940)	(1.482)	(2.370)	(1.481)
Dividend ratio	13.536	70.831***	6.526	70.101***	93.784***	60.214***	18.796	66.752***
	(14.998)	(11.178)	(15.437)	(11.176)	(14.092)	(11.116)	(18.361)	(11.108)
Age	-0.094	-0.091	-0.040	-0.102	-0.205*	-0.079	-0.098	-0.095
	(0.125)	(0.094)	(0.130)	(0.094)	(0.119)	(0.094)	(0.145)	(0.094)
Constant	0.838	4.774***	1.612**	4.614***	3.244***	4.449***	2.076**	4.566***
	(0.762)	(0.568)	(0.790)	(0.566)	(0.758)	(0.567)	(0.907)	(0.566)
Observations	5,725	5,725	5,725	5,725	5,725	5,725	5,725	5,725

(Note) The table reports the results of four multinomial logit estimations. The dependent variables are three choices in each model. For example, in model (i), the base choice 0 is choosing the strategy other than four options(DR, CA, DD, DI). The choice 1 is to choose debt reduction only. The choice 2 is to choosing no debt recution but at least one of CA, DD or DI. The choice variables in other models are defined similarly. The robust standard errors are reported in parentheses. *, **, and *** shows 10, 5, 1% significance levels, respectively.

Table 7: The behaviors of NNL firms

Model	(i)	(ii)	(iii)	(iii)
Dep. Var.	Growth of Debt	Cash ratio	Dividend ratio	Investment ratio
Duration of NNL	-0.001*	-0.004***	0.012**	0.002***
	(0.000)	(0.001)	(0.005)	(0.001)
Market to book ratio	-0.001	-0.040***	0.248***	0.023***
	(0.003)	(0.004)	(0.051)	(0.004)
Distance to Default	-0.000***	-0.001***	0.002***	0.000**
	(0.000)	(0.000)	(0.001)	(0.000)
Risk free rate \times Cash	-0.016***	0.039***	-0.167***	-0.009
	(0.006)	(0.011)	(0.064)	(0.006)
Cash	0.924***	0.039	0.602***	0.044***
	(0.012)	(0.028)	(0.189)	(0.016)
Size	-0.001	0.005**	0.013	0.000
	(0.001)	(0.002)	(0.011)	(0.001)
Risk	0.120***	-0.163***	0.770**	-0.244***
	(0.032)	(0.045)	(0.353)	(0.050)
Tangible assets	0.012*	0.046**	-0.163*	-0.037***
	(0.007)	(0.019)	(0.099)	(0.009)
Profitability	0.016	-0.230***	0.716***	0.238***
	(0.024)	(0.044)	(0.252)	(0.032)
Dividend ratio	0.433**	-0.773**	85.033***	-0.964***
	(0.193)	(0.315)	(4.528)	(0.255)
Age	0.004**	0.018***	-0.027	-0.008***
	(0.002)	(0.004)	(0.021)	(0.003)
Constant	0.021**	0.070***	-0.432***	-0.010
	(0.008)	(0.023)	(0.146)	(0.013)
AB test for AR1	0.000	0.000	0.002	0.000
AB test for AR2	0.073	0.105	0.117	0.004
Sargan test of overidentification	0.000	0.000	0.000	0.000
Hansen test of overidentification	1.000	1.000	1.000	1.000
Observations	5,725	5,725	5,725	5,725

(Note) The table reports the results of single probit estimation. The dependent variable takes one when a firm has negative net debt and zero otherwise. The robust standard errors are reported in parentheses. *, **, and *** shows 10, 5, 1% significance levels, respectively.