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CEO Inside Debt and Costs of Bank Debt Financing

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Abstract

This study examines the role of CEOs' pensions and deferred compensations by exploring their impacts on pricing and non-pricing contract terms of bank loans. CEO's inside debt, defined as the sum of defined benefit pensions and deferred compensations, pays fixed amounts at periodic intervals. We find that higher inside debt holdings significantly reduce both loan rate spreads and demands for collateral. We also find that such effects are particularly pronounced under weak external governance proxied by strong anti-takeover defenses. Overall, our results support the idea that debt-like incentives for CEOs increase align the interests between managers and creditors.

Keywords: inside debt, managerial agency, costs of debt, debt contracts, loan terms

INTRODUCTION

"Why are managers' monetary incentives … traditionally correlated with the value of equity rather than the value of debt?" (Dewatripont and Tirole 1994)

"There is another type of distortion that should be recognized: payoffs to financial executives have been shielded from the consequences that losses could impose on parties other than shareholders" (Bebchuk 2010)

A vast prior literature in corporate finance assumes that managerial incentives are composed of cash and stock-based

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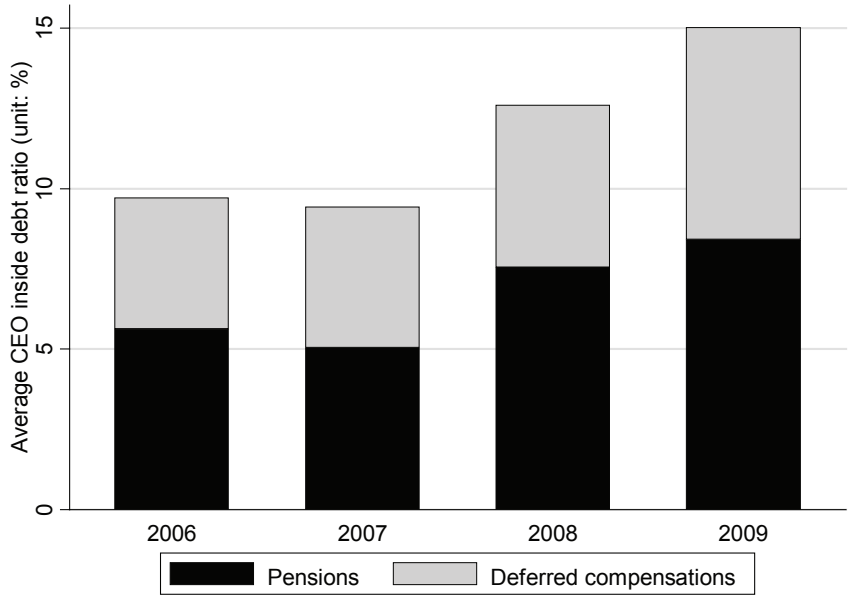

Figure 1. Trends in CEO Inside Debt Holdings

compensation and align the interests of shareholders and management. A recent research by Sundaram and Yermack (2007), however, shows that CEOs in the U.S. *do* have debt-based incentives. CEO's inside debt, defined as the sum of defined benefit pensions and differed compensations, is 9 percent of the sum of his/her inside debt and equity linked wealth in 2006 and has sharply increased to 15 percent in 2009 (See figure 1 for details). CEO's inside debt pays fixed amounts for lifelong or given periods, and the amount of payments does not vary explicitly with stock price. CEO's inside debt, however, is largely underfunded and unsecured, suggesting that the present value of such incentives is tightly linked with default risk. Despite the significant presence of inside debt, our understanding of debt-like CEO incentives is at best limited.

This paper attempts to shed light on the role of CEO's inside debt by investigating its impact on pricing and non-pricing contract terms using detailed information on loans to publicly traded large corporations in the U.S. during 2006-2009. Agency and signaling views predict that closely aligned interests between borrowers and creditors reduce costs of debt, but they make distinct predictions for the use of debt covenants and collateral requirements. For instance,

Smith and Warner (1979) posit that better alignment of the interests leads to lower rate and *less* tight covenants (and *less* demand for collateral). Conversely, Besanko and Thakor (1987) predict that "good" borrowers likely to choose lower rate but *tighter* covenants (including *more* demand for collateral) in order to sort themselves out. These predictions highlight the importance of testing the joint hypotheses on loan pricing and non-price contract terms together. In this paper we test the effects of CEO's inside debt holdings on pricing and non-pricing contract terms of bank loans jointly.

We establish novel evidence that the use of inside debt better aligns interests of creditors and managers. We find that, on average, higher inside-debt holdings decrease loan spreads and lower the requirements of collateral, while we cannot find statistically significant evidence that inside debt holdings affect debt covenant intensity. We also explore the interaction between inside debt and external governance and show that these patterns are more pronounced for firms with less shareholder-friendly governance. We check the robustness of our findings by considering endogenous nature of CEO's inside debt holdings. Our findings remain intact.

Our analysis contributes to growing empirical research on managerial incentives and debt contracting. Wei and Yermack (2011) document that CEO's inside debt holdings reduce the costs of publicly traded bonds while increasing costs of equity. Despite the evidence for the impacts on publicly traded securities, empirical evidence on private debt pricing and non-pricing terms is scant. We fill the gap by conducting a comprehensive analysis using detailed information on bank loan contracts.

This study bridges recent studies in corporate governance literature by examining the interactive effects of external and internal governance; in particular, the interaction between the absence of shareholder-friendly corporate governance, proxied by strong anti-takeover defenses, and CEO's inside debt holdings. Chava et al. (2009) investigates the impact of anti-takeover defenses on costs of debt, implicitly assuming that managerial incentives under less shareholder-friendly governance are inevitably aligned with creditors' interests. Meanwhile, Chava et al. (2010) examines the average effect of CEO entrenchment on debt covenants, indicating that managerial incentives can alter the link between interests of managers and creditors. Although these studies examine the effects of external and internal governance separately, they do

not investigate their interactions. In a realistic setting, there will be three-way interactions between shareholders, creditors, and managers, suggesting that internal governance, such as managerial incentives, may substitute or complement external governance. In order to fill the gap, we explore whether inside debt incentives complement strong shareholder-friendly governance or whether such incentives better align interests of CEOs with those of creditors under the lack of shareholder-friendly governance.

A handful of unpublished research also examines the impact of CEO inside debt on costs of bank loans (For example, Anantharaman et al. 2010, Chen et al. 2010). Our study differs from extant studies in a number of ways. Firstly, as we discuss earlier, we address the importance of testing the joint hypotheses about pricing and non-pricing terms in understanding the role of inside debt.

Secondly, we document new evidence that collateral requirements also hinge on CEO's inside debt holdings; the use of inside debt is negatively associated with demand for collateral. Notably, our finding does not negate Winton and Rajan (1995)'s assertion that good borrowers choose debt contracts with low interest rates and high collateral requirements in order to sort themselves out. Instead, our findings may indicate that the effects of incentive convergence dominate the effect of signaling.

Lastly, we explore the interaction between internal governance (managerial incentives) and external governance (discipline by takeovers). To my knowledge, this is the first research which addresses the importance of the interaction between debt-like CEO incentives and vulnerability to hostile takeovers. We show that inside debt holdings align creditor and manager interests especially when managers have weak incentives to act in the interests of shareholders (under strong anti-takeover defenses). This finding suggests that, without adequate managerial incentives, managers under weak governance may pursue their own interests at the costs of both shareholders and creditors.

RELATED LITERATURE AND TESTING HYPOTHESES

A number of recent research studies show that managerial agency problems are more intricate than assumed in extant research

(Cho 2009; Choi et al. 2007, 2008; Shin 2011). Recent research also shows that management can indeed act in the interests of bond holders depending on managerial power or incentives. For instance, Chava et al. (2010) show that entrenched CEOs tend to reduce the use of tight bond covenants. Moreover, Sundaram and Yermack (2007) show that the amount of CEO pension is negatively associated with risk exposure of the firm. These findings suggest that creditor-friendly managerial incentives may mitigate agency problems between creditors and management, although such incentives can intensify the conflicts between shareholders and management.

There are several different ways in which inside debt can affect debt contracting. First of all, CEOs' inside debt can increase the convergence of interests between shareholders and CEOs, thus lowering the costs of bank loans and thereby leading to less strict debt. In many cases, defined benefit pension are not fully secured. This occurs because the pension payments to CEOs are far greater than the maximum amount federally secured under ordinary tax-qualified pension plans (Sundaram and Yermack 2007). In the event of a firm's bankruptcy, the recovery value of pension depends on liquidation value of the firm. As a consequence, CEOs with significant amounts of pensions and deferred compensations are likely to reduce risk exposure, even though such action is against shareholders' interests. If inside debt moderates managers' risk-taking incentives, creditors may offer loans with better conditions to such firms, including narrowed spreads and low demands for collateral and covenants.

> **H1:** Higher CEO inside debt-holdings reduce costs of bank loans and demands for tight covenants and collateral.

Alternatively, CEOs with inside debt compensations may choose loans with tight debt covenants and collateral requirements in order to lower costs of debt. Besanko and Thakor (1987) posit that borrowers with low risk will choose loan contracts with low interest rate and collateral requirement in order to separate themselves from higher risk borrowers. Garleanu and Zwiebel (2009) also claim that "good" borrowers are more likely to accept loans with tighter loan covenants when it is possible to renegotiate the tight loan covenants ex post. In a similar vein, we conjecture that inside debt may align

interests between creditors and management, and that managers with inside debt incentives select loan contracts with high demands for collateral and tight covenants in order to signal their incentive alignments with creditors. We call this as *signaling hypothesis*.

> **H2:** Managers with higher inside debt holdings choose loans with lower spreads but tighter covenants and higher collateral requirements.

Smith and Warner (1979) suggest two competing hypotheses: "The irrelevance hypothesis" and "the costly contracting hypothesis." According to the irrelevance hypothesis, the firm's investment decisions depend solely on the net present value of projects, implying that existence of any type of debt covenant or collateral requirement is also irrelevant (Modigliani and Miller 1958).

> **H3:** Inside debt holdings do not affect private debt contracting.

The costly contracting hypothesis predicts that debt covenants can be used to mitigate conflicts of interests between shareholders and debt holders, particularly when the costs of covenants are lower than the costs of alternative mechanisms to resolve such conflicts. Although Smith and Warner (1979) simplifiy intricate managerial agency issues in their hypotheses, it is natural to expect that the use of CEO's inside debt can attenuate manager-creditor conflicts and substitute the role of debt covenants. As a consequence, inside debt may also reduce collateral and covenanant requirements. The costly contracting hypothesis also makes the same prediction as hypothesis 1.

A strand of recent studies shows that strong shareholder rights are beneficial to shareholders but acts against creditors. Gompers et al. (2003) introduce a measure of shareholder controls. They consider the reciprocal of the number of anti-takeover provisions as the proxy for shareholder-friendly corporate governance. They show that the stock price of the firms with stronger governance likely to be higher. Chava et al. (2009) show that the costs of public debt are higher for such firms, supporting the notion that shareholder-friendly governance exacerbates shareholder-creditor conflicts. This literature, however, raises another important question of the conditions under which weak shareholder controls can ensure

managers to act in the best interests of creditors. Unlike the implicit assumption that anti-takeover defenses mechanically help creditors, opportunistic managers may pursue their own interests at the costs of creditors. Therefore, for a given level of anti-takeover defenses, the presence of creditor-friendly incentives, particularly inside debt, may affect debt contracts differently.

To extend our understanding of the interaction between shareholder rights and creditor friendly incentives, we explore two competing possibilities. First of all, if incentives from holding inside debt complement the role of strong shareholder rights, we expect that the firms with stronger covenant are more likely to use inside debt as managerial incentive, and such use of inside debt can lower the costs of debt. Conversely, if the potential costs of takeovers to creditors are substantial, there will be no or minimal effects of inside debt under strong shareholder controls. We expect that inside debt can play a significant role only when there is absence of shareholder-friendly governance.

DATA AND EMPIRICAL SPECIFICATIONS

Sample Selection

We obtain detailed information about the terms of syndicated and single-lender loans to non-financial and non-utility borrowers from Loan Pricing Corporation (LPC)'s DealScan database. DealScan database includes loans to large firms and most observations are obtained from SEC filings, while the rest of the observations are collected through direct contacts with lenders and borrowers (Nini et al. 2009). We match the sample with information on CEO equity, pensions, and deferred compensation from ExecuComp and firm characteristics from COMPUSTAT industrial annual files during the years of 2006-2009. In 2006, SEC proposed a rule that would make detailed proxy disclosure of executive compensation mandatory. We exploit this newly available information on the present values of executive stock holdings, pensions, and other deferred compensations. When we merge COMPUSTAT and ExecuComp with the loan observations, we use the link between COMPUSTAT and Dealscan database, provided by Chava and Roberts (2008).[1)]

1) We thank Michael Robert for generously providing the link file to us.

Importantly, we use the most recent accounting information that is available before loans are made to borrowers in order to avoid the problem of reverse causality.

Dealscan database includes tranche-level observations. When a loan deal consists of multiple tranches (named as "facility" in the data), each tranche has a different rate of interest but the same loan covenants as the other tranches in the same deal. Following Sufi (2007), we use deal-level data.[2] We use tranche amount-weighted means of spreads above LIBOR.

When we examine the interactive effects of anti-takeover defenses and inside debt on loan contract terms, we match the data with G-index which is defined as the number of anti-hostile takeover provisions (see Gompers et al. 2003 for details).[3]

Empirical Specifications

This paper investigates the impact of CEO inside debt on loan pricing and non-pricing contract terms. To do so, we estimate the following regressions.

$$\begin{aligned} Loan\ spread_{it} = {} & \alpha_0 + \alpha_1\ CEO\ inside\ debt\ ratio_{it} \\ & + Controls_{it} + Industry\ effects_i \\ & + Year\ effects_t + \epsilon_{it}, \end{aligned} \tag{1}$$

$$\begin{aligned} & \Pr\left(Collateral\ required = 1\right) = \\ & \Phi_{it}\left(\begin{array}{l} \beta_0 + \beta_1\ CEO\ inside\ debt\ ratio_{it} \\ + Controls_{it} + Industry\ effects_i + Year\ effects_t + \epsilon_{it} \end{array}\right), \end{aligned} \tag{2}$$

2) Anantharaman, Fang, and Gong (2010) and Chen, Dou, and Wang (2011) report that their numbers of observations are larger than ours. This happens due to two following reasons. First, they use tranche-level data. Since tranches are part of a deal, their interest rates can be highly clustered. Covenants are in fact the same for all the tranches in a deal. To avoid the potential bias due to clustering, we follow Sufi(2007) and use deal-level data. Secondly, their papers do not seem to merge past account information with loans. This can cause serious reverse causality problems. Although we do not report the results here, we re-examined our results using loan-level data merged in fiscal years although some accounting information become available after loans are initiated. We also find that the results for debt covenants become significant, findings similar to Anantharaman, Divya, Vivian W. Fang, and Guojin Gong (2010). We claim that such results are potentially subject to serious reverse causality problems.

3) We are grateful to Andrew Metrick for generously sharing the data with us.

and

$$\begin{aligned} \textit{Covenant intensity} = {} & \gamma_0 + \gamma_1 \textit{ CEO inside debt ratio}_{it} \\ & + \textit{Controls}_{it} + \textit{Industry effects}_{i} \\ & + \textit{Year effects}_{t} + \epsilon_{it} \end{aligned} \tag{3}$$

where *Loan spread* is spread over LIBOR which includes all relevant fees and spread over LIBOR ("All-in-drawn Spread"). *Collateral required* is a dummy variable that equals one if a loan is secured by collateral and zero otherwise. *Covenant intensity* is defined as the number of various types of bank loan covenants following Graham et al. (2008) and Bradley and Roberts (2004). Similar to these studies, we also consider two distinct types of covenants, specifically financial covenants and general covenants.

The measure of CEO inside debt is the sum of the balance of deferred compensations and the value of defined benefit pensions. We scale it with the sum of inside debt and shareholdings since the incentive effects of inside debt are likely to hinge on the relative portion of inside debt. For instance, when CEO's shareholdings are substantially large, the impact of inside debt may become minimal. This also makes the inside debt ratio approach to zero. Meanwhile, Sundaram and Yermack (2007) use a definition of inside debt ratio different from ours. They define inside debt ratio as inside debt over shareholdings, but we do not use their definition because a signficant number of CEOs in our data hold no or small amount of equity or stock options. If a CEO does not hold any equity, of course, Sundaram and Yermack (2007)'s ratio cannot be defined, while our definition does not suffer from such problem.

The control variables attempt to reflect various characteristics known to affect private or public debt contract terms. *Controls* include firm characteristics, loan type dummies, loan purpose dummies. Firm -level controls include firm size (log of book value of total assets), return on assets (EBITDA divided by total assets), leverage (total liabilities divided by total assets), growth opportunities as measured by market-to-book ratio (market value of equity plus the book value of liabilities over total assets), credit quality approximated by Altman's Z-core, a dummy variable of having credit rating and another dummy variable for investment grade credit rating (see Han (2008b)).

Controls also include asset tangibility proxied by property, plant, and equipment (PPE) divided by total assets. According to Benmelech et al. (2005), Almeida and Campello (2007) and Han (2008a), redeployability of tangible assets significantly influences firms' financial constraints, yielding better terms of credit. CEOs in firms with highly liquid assets may more easily engage in asset substitutions and have stronger incentive to divert assets because the expected profits from diverting liquid assets can be higher than ones from diverting illiquid assets (Burkart and Ellingsen 2004).

We also control for the dummy variables of having credit rating and investment grade bond rating. Faulkender and Petersen (2006) show that the availability of debt financing can be constrained by the accessibility to bond markets. In a similar vein, investment grade bond rating can also reduce the financial constraints faced by borrowers. The data is collected at the end of the fiscal year prior to loan initiation.

In order to avoid the possibility that unobserved heterogeneity drives our findings, we control for various fixed effects. In fact, the sample period contains the recent financial crisis. We expect that the negative economic shock may help us to find the distinct responses of investors to difference level of congruence of interests between CEOs and creditors. This occurs because the potential costs of divergence of CEO-creditor incentives can be more detrimental to creditors during financial crisis. Despite the advantage of detecting the contractual differences, it may also be subject to unexpected influences of financial crisis. To avoid such effects, we control for year fixed effects.

We include two dummy variables for loan types: *TermLoan* and *Revolver*: approximately 25% of loans are term loans, while about 65% loans are revolving credit lines. We also include three dummy variables for loan purposes: *Working Capital, Corporate Purpose*, and *Takeover*. About 46% of loans are initiated for general corporate purpose, 26% for working capital, and 13% for takeovers. Following Petersen (2009), we use heteroscedasticity-consistent standard errors adjusted for clustering at firm levels and/or time levels whenever available.[4)]

Table 1 reports a summary of the descriptive statistics of loan-

4) We thank Mitchell Petersen for generously sharing his stata procedures which adjust standard errors clustering at firm and time levels simultaneously

Table 1. Summary Statistics: CEO inside debt and bank loans
The table describes the firm, loan, and CEO characteristics of loan-level sample.

	N	Mean	Std. Dev.	25th percentile	Median	75th percentile
(Firm characteristics)						
Total assets (unit: million dollars)	1,230	9,681	32,169	879	2,247	6,791
Leverage ratio	1,230	0.59	0.26	0.44	0.55	0.68
Return on assets	1,230	0.15	0.09	0.10	0.14	0.19
Market to book ratio	1,230	1.80	0.86	1.21	1.57	2.12
Z-score	1,230	1.87	1.24	1.13	1.87	2.53
Asset tangibility	1,230	0.30	0.24	0.11	0.23	0.46
Firm has a debt rating (1=yes)	1,230	0.40	0.49	0	0	1
Investment grade bond rating (1=yes)	1,230	0.27	0.44	0	0	1
(Loan characteristics)						
Loan spread	1,230	1.98	1.68	0.63	1.63	2.75
Collateral required (1=yes)	1,082	0.61	0.49	0	1	1
Covenant intensity	1,230	4.17	3.07	2	4	6
Financial covenant intensity	1,230	1.46	1.18	0	2	2
General covenant intensity	1,230	2.72	2.31	0	2	4
(CEO characteristics)						
CEO inside debt ratio	1,230	0.14	0.21	0.00	0.05	0.18
CEO's age (unit: years)	1,230	53.97	6.34	50.00	54.00	58.00

level data merged with CEO inside debt and firm characteristics. The borrowing firms have an average book value of assets of $9.68 billion, which is greater than the typical firm size in COMPUSTAT data. This occurs mainly because LPC collects information about loans for large firms.

RESULTS

Determinants of CEO inside debt

Before turning to the impact of inside debt on loan pricing, we

explore determinants of CEO inside debt. Sundaram and Yermack (2007) examine the determinants of inside debt use for the years 1996 to 2002, but the more recent results are nonexistent. Here we extend their analysis by examining their findings using the more recent data.

It is worth noting that understanding the endogenous nature of CEO inside debt in the analysis later in this paper. We consider two potential instrument variables which affect the use of firm *i*'s CEO inside debt but do not *directly* affect loan pricing and non-pricing contract terms: specifically, CEO age and 3-digit SIC industry average of CEO inside debt. For this purpose, we merge COMPUSTAT with ExecComp.The data includes 5,012 firm-level observations. While the average firm size is smaller than loan-level data, firm-level data is very similar to the loan-level data in other characteristics.

Figure 2 demonstrates the mean inside debt ratios for different CEO ages. As the figure shows, in the sample between ages 45 to 49, inside debt is 8% of debt and equity linked wealth proxied by the sum of total balance of options and shareholdings plus inside debt. It increases monotonically until age 55 to 59 and then starts to decrease gradually. In the sample of ages 55 to 59, it is 16.6% of the

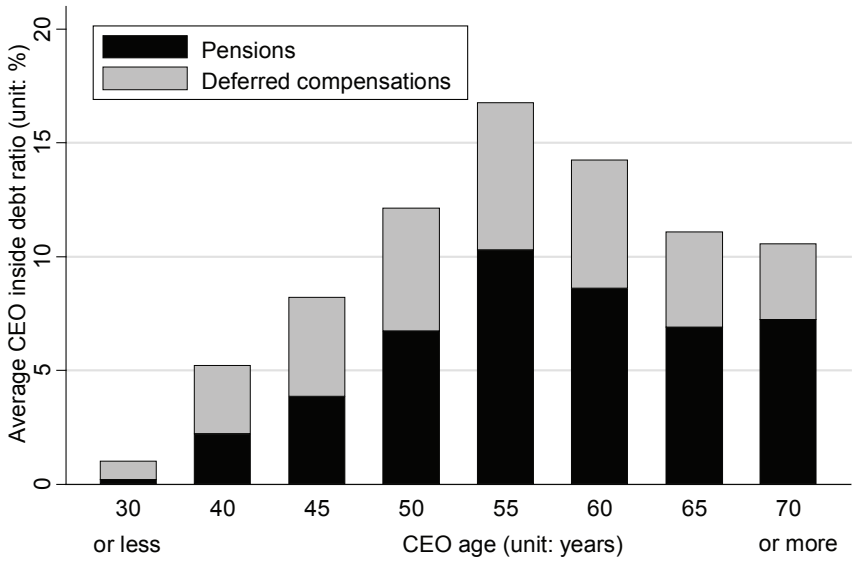

Figure 2. CEO Inside Debt Holdings by Age

total wealth. The pattern of inside debt is consistent with the trend reported by Sundaram and Yermack (2007).[5] For the same age groups, the percent defined benefit pensions increase from 3.85% to 10.29%, and the percent of deferred compensations increases from 3.01% to 6.47%

For robustness checks, we control for various firm characteristics. The regression specification is the following:

$$\begin{aligned} \textit{Inside Debt Ratio}_{it} = {} & \beta_0 + \beta_1 \textit{CEO age}_{it} + \beta_2 \left(\textit{CEO age}_{it}\right)^2 \\ & + \beta_3 \left(\textit{3-digit SIC industry inside debt ratio}_{it}\right) \\ & + \textit{Controls}_{it} + \textit{Industry effects}_i \\ & + \textit{Year effects}_t + \epsilon_{it}, \end{aligned} \tag{4}$$

In the above equation, we include *3-digit SIC industry inside debt ratio* which is defined as the average inside debt ratio for 3-digit SIC industry. The use of debt-like incentives may hinge on technology.[6] In this case, we expect that inside debt ratio is positively associated with industry average inside debt level. To avoid the possibility that firm *i*'s inside debt ratio is included in both sides of the equation and drives the association between firm *i*'s inside debt ratio, we exclude the firm *i*' inside debt ratio when we calculate the industry

Table 2. Summary Statistics: CEO inside debt

	N	Mean	Std. Dev.	25th percentile	Median	75th percentile
Total assets (unit: million dollars)	5,012	7,412	30,095	545	1,490	4,661
Leverage ratio	5,012	0.57	2.31	0.35	0.51	0.65
Return on assets	5,012	0.12	0.45	0.09	0.13	0.18
Market to book ratio	5,012	1.92	2.71	1.17	1.53	2.14
Z-score	5,012	-1.36	134.94	1.05	1.86	2.66
Asset tangibility	5,012	0.26	0.22	0.09	0.18	0.37
CEO inside debt ratio	5,012	0.12	0.20	0.00	0.02	0.16
CEO's age (unit: years)	5,012	54.24	7.13	50	54	59

5) In constrast to our definition of inside debt ratio, Sundaram and Yermack(2007)'s inside debt ratio is defined as the inside to equity-holdings. We find that a significant number of CEOs hold no equity holdings. Therefore, Sundaram and Yermack(2007 exclude firms with CEO who have no equity holdings.

6) For instance, during the recent financial crisis, there has been a debate on the use of debt-linked compensations in banking industry.

Table 3. Determinants of CEO Inside Debt Ratio

The table presents the determinants of CEO's inside debt ratios. Inside debt ratio is defined as "inside debt holding /(inside debt holdings+ shareholdings)." t-statistics (in the parentheses) are corrected for heteroscedasticity and clustering at firm and year following Petersen (2009). Industry inside debt ratio is 3-digit SIC industry average inside debt ratio. *, **, *** indicates the statistical significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
ln(Assets)	0.018***	0.017***	0.017***	0.016***
	(3.26)	(3.11)	(2.84)	(2.70)
Leverage ratio	0.126***	0.126***	0.107***	0.107***
	(7.63)	(7.44)	(7.14)	(6.98)
Return on assets	-0.003	-0.002	-0.003	-0.002
	(-0.83)	(-0.48)	(-0.90)	(-0.55)
Market to book ratio	-0.016***	-0.016***	-0.014***	-0.013***
	(-4.93)	(-4.43)	(-4.91)	(-4.23)
Z-score	0.002***	0.002***	0.002***	0.002***
	(7.41)	(7.28)	(6.70)	(6.58)
Asset tangibility	0.042	0.039	0.015	0.013
	(1.46)	(1.37)	(0.59)	(0.50)
CEO's age (unit: years)		2.391***		2.647***
		(2.74)		(3.13)
$(\text{CEO's age})^2$		-0.283***		-0.318***
		(-2.58)		(-2.99)
Industry inside debt ratio			0.607***	0.592***
			(5.95)	(5.90)
Constant	-0.139***	-5.156***	-0.242***	-5.728***
	(-3.64)	(-2.95)	(-5.26)	(-3.37)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Adjusted R^2	0.182	0.192	0.216	0.224
Observations	5,012	5,012	5,012	5,012

average of inside debt ratio.

Table 2 reports the descriptive statistics for firm-level analysis. Except for the firm size and Altman's Z scores, firm characteristics are analogous to ones for loan-level sample.

Table 3 presents the results from estimating fixed-effect OLS regressions. The regression specifications control for firm size (log of total assets), leverage (total liabilities to total assets), profitability

(return on assets), investment opportunities (book to market (asset) ratio), Altman's *z* score, and asset tangibility (PPE over total assets). Interestingly, larger, more levered and creditworthy corporations tend to have higher CEO inside debt ratio, while firms with greater investment opportunities likely to have lower inside debt.

The regression results reconfirm that CEO age (proxied by log of CEO age) and the use of inside debt have a nonlinear relationship. The column (1) of table 3 displays the benchmark result which does not include either CEO age or industry average of inside debt. Columns (2) and (3) of table 3 report the nonlinear effect of CEO age and the positive effect of industry average of inside debt respectively, and the forth column reports the results for the empirical specification which includes both effects. Regardless of specifications of the model, we find that CEO age and industry average inside debt ratio are positively and significantly associated with firm i's inside debt ratio. In the later analyses, we use industry inside debt ratio and CEO age as instrument variables.

Inside Debt and Costs of Bank Loans

In this section, we directly investigate the relationship between CEO inside debt and loan rate spreads. As abundant theories in banking and corporate finance show, information asymmetry is at the root of corporate financing. This suggests that unobserved heterogeneity may bias estimates of the effects of CEO inside debt on loan contract terms. To avoid this possibility, we include various fixed effects and also use heteroscedasticity consistent standard errors clustered at firm and year levels following Petersen (2009).

Table 4 provides the results from estimating Tobit regressions whose dependent variable is the loan rate spread over LIBOR (censored at zero). The first column of table 4 reports the results from regressing firm *i*'s CEO inside debt ratio on loan spread. It shows that loan spread is negatively associated with CEO inside debt ratio and the relationship is statistically and economically significant at 0.01 level, supporting the notion that the use of inside debt attenuates the agency problem between management and creditors.

CEO inside debt, however, may suffer from endogeneity problems. To check the robustness of the results, we re-estimate equation 1 by using two instrument variables which vary with the use of

Table 4. CEO's Inside Debt Holdings and Loan Rate Spreads: Tobit Regression Results

The table presents the results from estimating Tobit regressions. The dependent variable is bank loan spread over LIBOR censored at 0. t-statistics (in the parentheses) are corrected for heteroscedasticity and clustering at firm and year following Petersen (2009). Industry inside debt ratio is 3-digit SIC industry average inside debt ratio. *, **, *** indicates the statistical significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)
CEO inside debt ratio	-0.139***		
	(-2.91)		
CEO's age		-0.350***	
		(-3.32)	
Industry average inside debt ratio			-1.118***
			(-9.52)
Leverage ratio	1.161***	1.111***	1.200***
	(3.07)	(2.81)	(8.19)
ln (Assets)	-0.165***	-0.167***	-0.164***
	(-11.59)	(-11.81)	(-11.75)
Market to book ratio	-0.185***	-0.186***	-0.189***
	(-14.15)	(-14.96)	(-15.68)
Z-score	-0.178***	-0.180***	-0.172***
	(-12.19)	(-12.45)	(-11.84)
Asset tangibility	0.065	0.059	0.094*
	(1.27)	(1.11)	(1.80)
Return on assets	-0.027	0.021	-0.063
	(-0.06)	(0.05)	(-0.15)
Investment grade bond rating (1=yes)	-0.843***	-0.848***	-0.841***
	(-28.70)	(-27.20)	(-27.75)
Firm has a debt rating (1=yes)	-0.264***	-0.276***	-0.278***
	(-6.70)	(-6.72)	(-6.87)
Constant	3.246***	4.727***	3.219***
	(27.41)	(11.35)	(24.97)
Loan type dummies	Yes	Yes	Yes
Loan purpose dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
McFadden's pseudo R^2	0.207	0.207	0.208
Observations	1,230	1,230	1,230

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

CEO inside debt but does not affect loan rate directly. As we see in table 3, the industry average of inside debt ratio is shown to be associated with firm *i*'s use of inside debt. However, it is unlikely to be influenced by loan rate spreads for firm *i*. The columns (2) and (3) of table 4 display the estimates from Tobit regressions with CEO's age and the industry average CEO inside debt as instrumental variables of inside debt. We find that those instruments variables are negatively associated with loan rate spread, and the effects are significant at 0.01 level.

For the further robustness check, table 5 reports the results from estimating Tobit regressions with endogenous inside debt. Instead of considering inside debt as exogenous, we model it as a reduced form function of explanatory variables in the main equation and two instrument variables, CEO's age and the industry-level inside debt.

We use LIML estimators and test erogeneity of inside debt. Monte Carlo simulations by Stock et al. (2002) and Poi (2006) show that limited maximum likelihood estimators (LIML) are less likely to yield bias than GMM and 2SLS estimators. Column (1) of table 5 shows the estimation results using the total sample of 1,230 deals. The Wald statistics rejects the null hypothesis that inside debt is exogenous. We find that the qualitative results remain robust.

We also examine whether the finding is more pronounced for information-intensive loans. Berger and Udell (1995) argue that lines of credit depend more on borrower-specific, proprietary information. Column (2) of table 5 displays the result for the subsample of revolving lines of credit. About 65% of the loans in the sample are revolving lines of credit. Using the subsample, we reconfirm the negative impact of inside debt on loan rate spread. For the other remaining loans, we also find the estimates similar to the ones from estimating other specifications although they are statistically insignificant.

Anti-takeover Defenses and Loan Pricing

In this section, we examine the interactive effects of anti-takeover defenses and CEO's inside debt on loan pricing. As we discuss in the section 2, the role of inside debt may hinge on the level of shareholder-friendly governance. In particular, we explore whether inside debt can align the interests between managers and creditors in the absence or presence of strong (shareholder-friendly)

Table 5. Robustness: IV Tobit Regressions

The table presents the results from estimating Tobit regressions with endogenous inside debt ratio. The dependent variable is bank loan spread over LIBOR censored at 0. t-statistics (in the parentheses) are corrected for heteroscedasticity and clustering at firm and year following Petersen 2009. Industry inside debt ratio is 3-digit SIC industry average inside debt ratio. *, **, *** indicates the statistical significance at 10%, 5%, and 1%, respectively.

	All	Lines of credit	Other loans
CEO inside debt ratio	-1.506**	-1.353**	-1.425
	(-2.34)	(-2.22)	(-1.17)
Leverage ratio	1.572***	1.535***	1.621***
	(4.78)	(4.82)	(2.90)
ln (Assets)	-0.157***	-0.120***	-0.240***
	(-4.00)	(-3.77)	(-2.97)
Market to book ratio	-0.189***	-0.088	-0.447***
	(-2.76)	(-1.14)	(-3.71)
Z-score	-0.160**	-0.067	-0.355***
	(-2.43)	(-1.01)	(-2.87)
Asset tangibility	0.181	0.078	0.331
	(0.68)	(0.31)	(0.58)
Return on assets	-0.391	-0.630	0.185
	(-0.42)	(-0.64)	(0.11)
Investment grade bond rating (1=yes)	-0.828***	-0.703***	-1.121***
	(-7.70)	(-8.19)	(-4.57)
Firm has a debt rating (1=yes)	-0.243**	-0.273***	-0.219
	(-2.01)	(-2.83)	(-0.88)
Constant	2.993***	2.391***	4.617***
	(4.55)	(5.56)	(4.77)
Loan type dummies	Yes	No	No
Loan purpose dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Observations	1,230	795	435
Wald exogeneity test (p-value)	0.016	0.012	0.300

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

governance.

Table 6 represents the results of estimating fixed-effect Tobit regressions using two subsamples; low (G-index less than and equal to 9) and high (G-index higher than 9) levels of anti-takeover defenses. We test the equality of the coefficients on instrumented inside debt variables from the two subsamples. To be consistent with the approaches used in the previous analyses, we attempt to estimate Tobit regressions with endogenous inside debt using LIML, but the empirical results fail to converge. As an alternative approach, we estimated Tobit regressions with the fitted inside debt ratio and the industry inside debt separately.

The first and the second columns of table 6 present the results from estimating Tobit regressions with fitted inside debt ratios reported in Table 3. We find significant evidence that higher inside debt lowers loan spreads for firms with high G-index while there is no such effect for firms with low G-index. In the third and the fourth columns, we check the robustness of the findings using the 3-digit SIC industry inside debt ratio. The results remain qualitatively unchanged.

We also formally test the equality of the coefficients on instrumented inside debt ratios between strong and weak shareholder control subsamples. In both specifications, we cannot reject the null hypothesis that there is no difference between the coefficients (p-values are 0.106 and 0.165, respectively).

Inside debt and Non-pricing Contract Terms of Bank Loans

In table 7, we examine the effects of CEO's inside debt holdings on the use of collateral by estimating the equation (2). The first column of table 7 presents the probit regression estimates. The second column presents the results from estimating probit regression with endogenous CEO inside debt holdings. Here, we also use the industry average CEO inside debt ratio and CEO age as instrumental variables. Without considering endogeneity of inside debt, we cannot find significant evidence for the effect of inside debt holdings. Interestingly, however, when we consider the endogeneity, inside debt holding significantly lowers the probability of requiring collateral. We test the endogeneity of inside debt and reject the null hypothesis of no endogeneity at 0.05 level.

As we discussed in section 2, the joint tests of the effects of

Table 6. Anti-Takeover Defenses and Inside Debt

The table presents the results from estimating Tobit regressions with endogenous inside debt ratio. The dependent variable is bank loan spread over LIBOR censored at 0. G-index is the number of anti-takeover defenses constructed by Gompers et al. 2003. *t*-statistics (in the parentheses) are corrected for heteroscedasticity and clustering at an individual firm level. Industry inside debt ratio is 3-digit SIC industry average inside debt ratio. *, **, *** indicates the statistical significance at 10%, 5%, and 1%, respectively.

	Low G-index (G-index≤9)	High G-index (G-index>9)	Low G-index (G-index≤9)	High G-index (G-index>9)
Fitted CEO inside debt ratio	0.121 (0.18)	-1.373* (-1.95)		
Industry average inside debt ratio			-0.192 (-0.32)	-1.312** (-2.14)
G-index	-0.018 (-0.48)	-0.029 (-0.84)	-0.018 (-0.49)	-0.030 (-0.90)
Leverage ratio	1.121*** (3.06)	1.210*** (3.99)	1.172*** (4.00)	0.920*** (3.64)
ln (Assets)	-0.172*** (-3.73)	-0.185*** (-2.60)	-0.171*** (-3.68)	-0.197*** (-2.76)
Market to book ratio	-0.329*** (-3.60)	-0.147* (-1.69)	-0.331*** (-3.61)	-0.155* (-1.77)
Z-score	-0.199** (-2.48)	-0.215 (-1.57)	-0.196** (-2.43)	-0.222* (-1.67)
Asset tangibility	-0.056 (-0.15)	-0.059 (-0.17)	-0.030 (-0.09)	-0.174 (-0.55)
Return on assets	1.129 (1.05)	-0.770 (-0.63)	1.086 (0.99)	-0.362 (-0.31)
Investment grade bond rating (1=yes)	-0.730*** (-5.93)	-0.954*** (-6.46)	-0.730*** (-5.89)	-0.976*** (-6.62)
Firm has a debt rating (1=yes)	-0.193 (-1.22)	-0.547*** (-2.73)	-0.195 (-1.23)	-0.592*** (-2.91)
Constant	3.035*** (3.99)	6.367*** (5.78)	2.997*** (3.85)	6.612*** (6.16)
Loan type dummies	Yes	Yes	Yes	Yes
Loan purpose dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Pseudo R^2	0.269	0.231	0.269	0.231

Table 6. (continued)

	Low G-index (G-index≤9)	High G-index (G-index>9)	Low G-index (G-index≤9)	High G-index (G-index>9)
Observations	492	431	492	431
$H_0 : \beta_{InsideDebt}^{\text{Low G-index}} = \beta_{InsideDebt}^{\text{High G-index}}$ (p-value)		0.106		0.165

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

inside debt on loan contract terms are crucial in understanding the role of inside debt. We find that higher inside debt narrows loan spreads and also reduce the demands for collateral. In sum, the findings here appear to support the interest convergence hypothesis (hypothesis 1) and costly contracting hypothesis.[7] In the third and the fourth columns of table 7, we also examine the interactive effects of inside debt holdings and shareholder-friendly governance. The third column presents the result from estimating IV probit regression using loans to firms with shareholder-friendly governance (weak anti-takeover defenses; G-index less then and equal to 9), and the fourth column presents the regression result using loans to firms with less shareholder-friendly governance (strong anti-takeover defenses; G-index greater than 9). We find that the coefficient on inside debt for firms with weak governance is about ten times greater than the one for firms with strong governance. Even after considering endogeneity of inside debt, the impact of CEO's inside debt holdings on collateral requirement is far more significant for firms with less shareholder-friendly governance.

Table 8 presents the results from estimating negative binomial regressions whose dependent variables are the number of different types of loan covenants. Although the coefficients on inside debt are negative in the most specifications, we cannot find any evidence statistically significant at 0.10 level.

In summary, this paper shows that the use of CEO's inside debt

7) We, however, cannot test whether our findings are more consistent with one of these hypothesesCostly contracting hypothesis assumes that loan covenants are more cost efficient than other mechanisms, but it is prohibitively difficult the claim. We leave the issue for the future research.

Table 7. CEO Inside Debt and Collateral

The table presents the results from estimating probit regressions with/without endogenous inside debt ratio (Probit/IV probit). The dependent variable is a dummy variable which equals one if collateral is used to secure bank loan, and zero otherwise. G-index is the number of anti-takeover defenses constructed by Gompers et al. 2003. *t*-statistics (in the parentheses) are corrected for heteroscedasticity and clustering at an individual firm level. Industry inside debt ratio is 3-digit SIC industry average inside debt ratio. *, **, *** indicates the statistical significance at 10%, 5%, and 1%, respectively.

Dep. var.: Secured by collateral (1=yes)	Probit	IV probit		
		All	Low G-index (G-index≤9)	High G-index (G-index>9)
CEO inside debt ratio	-0.238 (-0.76)			
CEO inside debt ratio (instrumented)		-2.805*** (-2.71)	0.204 (0.08)	-2.956** (-2.30)
Leverage ratio	1.206*** (3.23)	1.751*** (4.34)	2.408** (2.36)	1.070** (2.13)
lnassets	-0.295*** (-4.55)	-0.228*** (-2.89)	-0.417*** (-4.04)	-0.133 (-1.22)
Market to book ratio	-0.242** (-2.39)	-0.223** (-2.26)	-0.395*** (-2.65)	-0.233* (-1.69)
Z-score	-0.105 (-1.26)	-0.055 (-0.64)	0.092 (0.61)	-0.162 (-1.33)
Asset tangibility	0.969* (1.82)	1.199** (2.40)	0.296 (0.35)	1.706** (2.22)
Return on assets	-0.971 (-0.78)	-1.650 (-1.33)	-0.514 (-0.21)	-1.298 (-0.68)
Investment grade bond rating (1=yes)	-2.263*** (-10.74)	-1.950*** (-6.32)	-2.414*** (-6.66)	-2.074*** (-4.02)
Firm has a debt rating (1=yes)	-0.983*** (-5.54)	-0.817*** (-3.93)	-1.080*** (-3.85)	-0.698** (-2.26)
Constant	3.163*** (4.11)	3.045*** (2.75)	3.000*** (2.59)	2.351* (1.72)
Loan type dummies	Yes	Yes	Yes	Yes
Loan purpose dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	1,082	1,082	498	499
Wald exogeneity test (p-value)	.	0.034	0.629	0.040

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8. CEO's Inside Debt Holdings and Covenant Intensity

The table presents the results from estimating Poisson regressions without endogenous inside debt ratio. The dependent variable is the number of covenants. G-index is the number of anti-takeover defenses constructed by Gompers et al. 2003. *t*-statistics (in the parentheses) are corrected for heteroscedasticity and clustering at an individual firm level. Industry inside debt ratio is 3-digit SIC industry average inside debt ratio. *, **, *** indicates the statistical significance at 10%, 5%, and 1%, respectively.

	Covenants	Low G-index (G-index≤9)	High G-index (G-index>9)	Financial covenants	General Covenants
CEO inside debt ratio (instrumented)	-0.831 (-0.38)	2.427 (0.69)	-1.324 (-0.46)	-0.072 (-0.08)	-0.759 (-0.45)
Leverage ratio	0.288 (0.42)	0.636 (0.58)	-0.255 (-0.27)	-0.162 (-0.62)	0.450 (0.83)
ln(Assets)	-0.264*** (-3.15)	-0.358*** (-3.14)	-0.103 (-0.80)	-0.162*** (-5.10)	-0.102 (-1.57)
Market to book	-0.359*** (-2.74)	-0.328 (-1.58)	-0.417** (-2.27)	-0.173*** (-3.64)	-0.185* (-1.76)
Z-score	-0.028 (-0.26)	0.038 (0.22)	0.007 (0.05)	-0.025 (-0.60)	-0.003 (-0.03)
Asset tangibility	-1.177* (-1.80)	-1.515* (-1.67)	-0.695 (-0.72)	-0.632** (-2.50)	-0.545 (-1.06)
Return on assets	-0.262 (-0.15)	1.306 (0.50)	-0.111 (-0.05)	1.519** (2.24)	-1.780 (-1.40)
Investment grade bond rating (1=yes)	-1.664*** (-6.66)	-1.249*** (-3.75)	-2.272*** (-5.82)	-0.327*** (-3.32)	-1.337*** (-6.84)
Firm has a debt rating (1=yes)	-0.829*** (-3.07)	-0.535 (-1.48)	-1.157*** (-3.17)	-0.064 (-0.63)	-0.765*** (-3.64)
Constant	6.301*** (5.06)	5.222*** (3.50)	6.725*** (3.60)	2.623*** (5.28)	3.678*** (3.77)
Loan type dummies	Yes	Yes	Yes	Yes	Yes
Loan purpose dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.276	0.270	0.289	0.271	0.245
Observations	1,230	606	625	1,230	1,230
Exogeneity test (p-value)	0.621	0.443	0.534	0.712	0.651

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

reduces costs of bank loans and demands for collateral, while there is no significant evidence for the effect of inside debt on loan covenants. For firms with weak shareholder rights, managerial incentives induced by holding inside debt appears to be statistically and economically significant, while we do not find such evidence for the firms with strong shareholder rights. Overall, our findings jointly support the notion that debt-based incentives for CEOs increase convergence of interests between creditors and managers on average. However, it appears that debt-based incentives do not complement strong shareholder rights. Instead, when there is absence of strong shareholder rights, debt-based incentives play important roles in aligning the interests of creditors with managers.

CONCLUSION

A huge literature on managerial incentives is dedicated to the questions about stock-based incentives. Implicit in the literature is the assumption that manager-creditor interests can be easily aligned. Recent studies, however, illustrate that managerial incentives can be more intricate than the assumption; each firm may have a different level of manager-creditor congruence depending on the amount of lifelong pensions and deferred compensations to managers. In particular, managers with debt-like incentives, such pensions and deferred compensations, may benefit from reducing risk exposures and pursuing conservative financial policies, potentially at the costs of shareholders (Sundaram and Yermack 2007, Wei and Yermack 2011).

This paper presents novel evidence on the relationship between CEO's inside debt holdings, measured as the sum of defined benefit pensions and deferred compensations, and private debt contract structure. Higher inside debt compensation decreases loan spread over LIBOR and reduce demands for collateral, while there is no significant evidence of the impact on debt covenant intensity. Overall, the findings support the creditor-manager congruence view that managers with pensions and deferred compensations are likely to have less incentive to take risk, thus aligning their incentives with creditors.

We also attempt to bridge the gap in extant studies in corporate finance by exploring the interactive effects of internal and external

governance, particularly interactions between inside debt and anti-takeover defenses. A vast research in corporate finance investigates managerial incentives and shareholder-creditor agency conflicts separately, but their interactions are not thoroughly explored. Managerial incentive literature simplifies away agency issues between managers and creditors, mainly focusing on manager-shareholder convergence of interests. We provide evidence that the effects of inside debt on private debt contracts are more pronounced when there is lack of strong external governance accompanied by hostile takeovers, suggesting that lack of shareholder-friendly governance does not necessarily lead to creditor-friendly governance.

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