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外部公司治理、資本結構與公司價值之關聯性

External Corporate Governance, Capital Structure, and Firm Value

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摘要

公司治理的重要議題之一即為代理成本的問題。治理較差的公司，其管理者擁有相對較大的權利且不受制於董事會的控管，導致管理者容易做出對公司及股東不利的決策，此行為所引發的公司價值下降現象，即為代理成本理論。根據代理成本理論的假設，在沒有接管威脅的環境下，管理者不會提高負債使行為受限，隱含公司治理差所帶來的代理問題將導致負債減少。而在自由現金流量理論中，則主張透過負債提高所擔保的利息支付，可以有效降低管理者所能自由操控的現金流量，以達到緩和代理成本的目的，隱含公司治理與負債的使用有功能替代的現象。

本文即是在考慮變數間存在內生性問題的情況下，針對公司治理與資本結構的關係進行探討，並觀察這兩者與公司價值間之關聯性。結果顯示，公司治理與負債比之間有顯著的負向關係，代表在以美國公司為樣本的研究中，負債的使用有助於緩和代理問題，故與公司治理為替代關係。

關鍵字：公司治理、代理成本、資本結構、公司價值。

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ABSTRACT

In the free-cash-flow theory, shareholders use debt to discipline managers and maximize firm value. In contrast, managerial models assume that, without a takeover threat, managers will not lever up to constrain themselves. Debt seems to be an efficient mechanism of corporate governance. This paper shows how capital structure is influenced by corporate governance which is measured as the strength of shareholder rights. We also investigate the effect of corporate governance and leverage work on firm value. Our analysis is mindful of the potential endogeneity between firm value, shareholder rights, and debt ratio. The empirical evidence shows an inverse relationship between leverage and shareholder rights, suggesting that firms adopt higher debt ratios where shareholder rights are more restricted. This result is consistent with agency theory, which predicts that leverage helps alleviate agency problems.

Keywords: corporate governance, shareholder rights, agency costs, capital structure, firm value

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倩如　丁亥年夏天

僅誌於　新竹交大

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1. Introduction

Corporate governance is the set of mechanisms that induce the self-interested controllers of a company to make decisions that maximize the value of the company to its shareholders. In other words, good corporate governance should have a significantly positive effect on stock returns and firm value. In a recent influential paper, Gompers, Ishii, and Metrick (GIM) (2003) examine the relation between governance¸ stock returns, and firm value. GIM develop a measure of shareholder rights based on a governance index (G-index) that contains a count of various anti-takeover provisions. As G-index increases, firms tend to experience bad governance. Consistent with the view that good governance positively affects firm value, they find that low-G firms (well-governed) have higher Tobin's Q ratios and better operating performance than high-G firms (badly-governed). Furthermore, a hedge portfolio that is long low-G firms and is short high-G firms generates an abnormal return of approximately 8.5 percent per year over the period from 1990 to 1999. This finding has interested many researchers in investigating the causality between corporate governance and other facts which influence stock returns and firm value.

One of GIM's explanations for the significant difference in abnormal returns is referred to the agency problem between shareholders and managers, which increases the cost on capital expenditure or acquisition behavior. They find firms with weaker governance have relative high capital expenditures and more acquisition activities. As a result, they conjecture that firms with better governance quality should suffer less agency conflicts.

Similarly, leverage has been argued to alleviate agency costs in several ways. First, one way to reduce agency conflicts is to increase the percentage ownership of management by financing the capital need with debt (Jensen and Meckling, 1976). Second, the use of debt increases the probability of bankruptcy and job loss. This risk of losing job may prompt managers to decrease their consumption of perks and increase their efficiency (Grossman and Hart, 1982). Third, the obligation of interest payments resulting from the use of debt reduces the amount of free cash flow available to managers to engage in excessive perquisite consumption (Jensen, 1986).

Motivated by this agency theory, this paper explores the association between capital structure and corporate governance. Because corporate governance influences agency costs and agency costs, in tern, impact capital structure. We examine how capital structure is influenced by corporate governance. Since capital structure is the way how firms finance their capital budget, leverage measured by the ratio of total debt to total assets is used to substitute for the capital structure.

Two hypotheses are made to describe the proper relationship between corporate governance and leverage. First, leverage is determined as an outcome of corporate governance. Firms with low governance quality suffer more agency problems. Managers of these firms are better able to exploit shareholders and place their private benefits ahead of those of the shareholders. As argued by agency theory and shown by empirical evidence, debt plays a role in controlling agency costs, making it more difficult for opportunistic managers to misbehave. In firms with poor governance, managers experience less monitoring and are more likely to behave opportunistically. These managers are more likely to carry debt at a sub-optimal level because they do not want impose additional constraints on themselves in the form of fixed interest payments or be deprived of free cash flow that they have control over. Therefore, this view predicts that poor governance quality is associated with low leverage. In other words, governance quality has a positive impact on capital structure.

Second, leverage acts as a substitute for corporate governance. Debt helps alleviate agency costs; likewise, corporate governance is installed to mitigate agency conflicts. Thus, debt and governance play the same role and may substitute for each other. In firms with weak governance, the need for debt to act as a tool for controlling agency costs may be greater than in firms with strong governance. Hence, firms with poor governance quality should be more leveraged. In other words, governance quality negatively affects capital structure.

In order to determine which the actual relationship between leverage and corporate governance is, all we need to do is to test each of the hypotheses. As knowing how corporate governance affects leverage, we can construct a clear model to show the interactive impact of governance and capital structure on firm value.

The reminder of this paper is organized as follows. Section 2 summarizes the related literatures about the relation between corporate governance, agency costs, capital structure, and firm value. We also develop our hypothesis in the next section. Data description and model construction are introduced in Section 3. Section 4 contains the summary statistics for our sample and empirical results about the estimation. Some concluding remarks are offered in Section 5.

2. Literature review and hypothesis development

2.1 Corporate governance and firm value

Recent years, many researchers devote to investigate the effect of corporate governance on firm value. It is intuitional that managers of well-governed companies are restricted to more types of rules than of badly-governed companies. Managers monitored by both internal and external

mechanisms would more likely to take projects that maximizing the value of shareholders. As a result, good corporate governance should have a significantly positive effect on stock returns and firm value.

By looking into the relationship between corporate governance and firm value, this paper falls into the tradition established by the seminal paper by Gompers, Ishii and Metrick (2003) mentioned in the introduction. They find that firms with more anti-takeover provisions are associated with lower long-run stock returns and firm value. Bebchuk, Cohen, and Ferrell (2005) go beyond the GIM results by creating a more parsimonious index based on six key provisions, which they consider to be most important from a legal standpoint. Bebchuk, Cohen, and Ferrell (2005) show that their index has a stronger association with stock returns and firm value than G-index has. Finally, Bebchuk and Cohen (2004) focus on one key anti-takeover provision, specifically a staggered board, and find that it leads to significantly lower firm value.

The governance mechanisms that have been most extensively studied in the U.S. can be broadly characterized as being either internal or external to the firms. The internal mechanisms of primary interest are the board of directors and the equity ownership structure of the firm. The primary external mechanisms are the external market for corporate control, usually means the takeover market, and the legal system. Cremers and Nair (2005) investigate how the market for corporate control (external governance) and shareholder activism (internal governance) interact. They find that the complementary relationship between internal and external governance mechanisms is stronger in being associated with long-term abnormal returns and accounting measures of profitability in firms with low leverage. They also find some evidence that external mechanisms are more effective for small firms, suggesting that a larger firm size might reduce the quality of external governance (takeover vulnerability).

Since Gompers, Ishii, and Metrick (2003) and Cremers and Nair (2005) find the relationship between corporate governance, stock returns, and firm value, their findings encourage researchers to investigate how corporate governance influences the performance of these firms. Most of the studies support the ideas of these two papers; however, some researchers think of their findings as a puzzle.

Motivated by one of GIM's hypotheses used to explain their findings, Johnson, Moorman, and Sorescu (2005) use control-firm calendar-time regressions to examine whether the long-term abnormal return results are driven by non-governance factors or not. For each Democracy (Dictatorship) firm they select a control firm that is not a Democracy (Dictatorship), yet is similar

in size, book to market, momentum, and industry characteristics. They find long-term abnormal returns that are statistically insignificant and near zero in magnitude for portfolios sorted on governance. Their results imply that good governance positively affects firm value, that investors recognized and impounded that value into share prices quickly and accurately, and that it is safe to draw inferences from governance studies based on 1990s data.

2.2 Capital structure and firm value

The modern theory of capital structure began with the celebrated paper of Modigliani and Miller (1958). They (MM) pointed the direction that such theories must take by showing under what conditions capital structure is irrelevant. Since then, many economists have followed the path they mapped.

The central idea of optimal capital structure theory is to investigate in what degrees of leverage will maximum the firm value. The relation between leverage and firm value is interesting to many researchers. Debt issuance affects the total value of the firm in two ways. First, leverage is positively related to firm value, because debt increases firm value due to the tax deductibility of the interest payments. Second, leverage is negatively related to firm value because of possible bankruptcy costs.

The Harris and Raviv (1990) model predicts that firms with higher liquidation value, e.g., those with tangible assets, and/or firms with lower investigation costs will have more debt and will be more likely to default but will have higher market value than similar firms with lower liquidation value and/or higher investigation costs. The intuition for the higher debt level is that increases in liquidation value make it more likely that liquidation is the best strategy. Therefore, information is more useful and a higher debt level is called for. Similarly, decreases in investigation costs also increase the value of default resulting in more debt. The increase in debt results in higher default probability. Harris and Raviv also obtain results on whether a firm in bankruptcy is reorganized or liquidated. They show that the probability of being reorganized decreases with liquidation value and is independent of investigation costs. Using a constant-returns-to-scale assumption they show that the debt level relative to expected firm income, default probability, bond yield, and the probability of reorganization are independent of firm size.

Combining these results, Harris and Raviv argue that higher leverage can be expected to be associated with larger firm value, higher debt level relative to expected income, and lower probability of reorganization following default. The result that leverage is positively associated

with firm value us consistent with Hirshleifer and Thakor (1989), Harris and Raviv (1990a), and Stulz (1990).

2.3 Capital structure and agency costs

A significant fraction of the effort of researchers has been devoted to models in which capital structure is determined by agency costs. Research in this area was initiated by Jensen and Meckling (1976) building on earlier work of Fama and Miller (1972).

Jensen and Meckling identify two types of conflicts. Conflicts between shareholders and managers arise because managers hold less than 100% of the residual claim. Consequently, they do not capture the entire gain from their profit enhancement activities, but they do bear the entire cost of these activities. For example, managers can invest less effort in managing firm resources and may be able to transfer firm resources to their own, personal benefit. The manager bears the entire cost of refraining from these activities but captures only a fraction of the gain. As a result managers overindulge in these pursuits relative to the level that would maximize firm value. This inefficiency is reduced the larger the fraction of the firm's equity owned by the manager. Holding constant the manager's absolute investment in the firm, increasing in the fraction of the firm financed by debt increases the manager's share of the equity and mitigates the loss from the conflict between the manager and shareholders. Moreover, as pointed out by Jensen (1986), since debt commits the firm to pay out cash, it reduces the amount of "free" cash available to managers to engage in the type of pursuits mentioned above. This mitigation of the conflicts between managers and shareholders constitutes the benefit of debt financing.

Conflicts between debtholders and shareholders arise because the debt contract gives shareholders an incentive to invest sub-optimally. More specifically the debt contract provides that if an investment yields large returns, well above the face value of the debt, shareholders capture most of the gain. If, however, the investment fails, because of limited liability, debtholders bear the consequences. As a result, shareholders may benefit from investing in very risky projects, even if they are value-decreasing. Such investments result in a decrease in the value of the debt. The loss in value of the equity from the poor investment can be more than offset by the gain in equity value captured at the expense of debtholders. Shareholders bear this cost to debtholders, however, when the debt is issued if the debtholders correctly anticipate shareholders' future behavior. In this case, the shareholders receive less for the debt than they otherwise would. Thus, the cost of the incentive to invest in value-decreasing projects created by debt is borne by the shareholders who issue the debt. This effect, generally called the "asset

substitution effect," is an agency cost of debt financing.

Jensen and Meckling argue that an optimal capital structure can be obtained by trading off the agency cost of debt against the benefit of debt as previously described. A number of implications follow. First, one would expect bond contracts to include features that attempt to prevent asset substitution, such as interest coverage requirements, prohibitions against investments in new, unrelated lines of business, etc. Second, industries in which the opportunities for asset substitution are more limited will have higher debt levels. Thus, for example, the theory predicts that regulated public utilities, banks, and firms in mature industries with few growth opportunities will be more highly levered. Third, firms for which slow or even negative growth is optimal and that have large cash inflows from operations should have more debt. Large cash inflows without good investment prospects create the resources to consume perquisites, build empires, overpay subordinates, etc. Increasing debt reduces the amount of "free cash" and increases the manager's fractional ownership of the residual claim.

2.4 Corporate governance and agency costs

Any discussion of the efficacy of corporate governance mechanisms to entrench or control managers must address the issue of agency problems. As described above, because the conflict between shareholders and managers, it's intuitional that shareholders will tend to restrict the behavior of managers. In other words, firms with weak corporate governance (weak shareholder right) always suffer more agency costs.

GIM (2003) find a significant stock return on firms with strong shareholder rights than on firms with weak shareholder rights. In order to find out the explanations of this situation, they exam the empirical relationship of corporate governance with two other possible sources of agency costs: capital expenditure and acquisition behavior. They find that weak shareholder right firms have higher capital expenditure and acquisition count than do strong shareholder right firms.

Jiraporn, Kim, Davidson, and Singh (2005) examine the influence of shareholder rights both on the extent of diversification and on the excess value arising from diversification. They investigate the relation between the propensity to diversify and the strength of shareholder rights. They find evidence that firms where shareholder rights are weak are more likely to be industrially diversified. This evidence is in favor of the explanation that managers exploit the weak shareholder rights and diversify the firm unwisely. As a result, industrially diversified firms exhibit a reduction in value. All these evidence support our intuition that corporate governance is

contributive to improve agency problems.

2.5 Corporate governance and capital structure

The idea that debt could alleviate agency costs is firmly rooted in corporate finance theory. Jensen (1986) is concerned that managers will waste free cash flow on unprofitable investment projects or organizational inefficiencies. He recommends higher debt as a potential solution. Bebchuk et al. (1999) postulate that debt, which serves as a commitment device for firms, can play an important role in mitigating corporate governance problems. Another important paper supporting this view is Zwiebel (1996), which suggests that managers can take on debt and pay out the proceeds as dividends in order to commit not to undertake unprofitable investments.

Chiyachantana, Jiraporn, and Kitsabunnarat (2005) related to agency costs as an explanation for capital structure decisions. The empirical evidence in this paper shows that the relationship between capital structure and governance quality is non-linear. The association is found to be parabolic. At low governance quality, high debt ratios are associated with low governance scores. However, at high governance quality, high leverage is affiliated with high governance scores.

2.6 Hypothesis development

In this paper, we have some hypotheses about the relationship between corporate governance, agency problem and capital structure.

(i.) Corporate governance have influence on agency costs: managers of poorly governed firms tend to make decisions that benefit themselves but damage shareholders' right.

(ii.) Agency costs are concerned when firms face the decisions of the optimal capital structure.

(iii.) Self-interested managers may promote the adoption of anti-takeover provisions because the reducing of market control ability will accommodate them with conveniences to steal the wealth of shareholders.

(iv.) Leverage would alleviate agency costs in several ways. First, increasing the ownership of managers by financing with debt (Jensen and Meckling, 1976). Second, the use of debt increases the probability of bankruptcy and job loss that motivate managers to work hard (Grossman and Hart, 1982). Third, the obligation of interest payments resulting from the use of debt helps resolve the free cash flow problem (Jensen, 1986).

3. Data and Methodology

3.1 Data

The original sample is compiled from the Investor Responsibility Research Center (IRRC), which collects data on the governance index. Because the IRRC collects data only periodically, our index is restricted to the years in which the IRRC has data on corporate governance, e.g., 1998, 2000, and 2002. We assume that the adoption of anti-takeover provisions for every specific firm is stable and tends to be constant in the short run. According to this assumption, for the year that IRRC do not have any publication, we use the index recorded by IRRC at prior period to proxy for the missing data. Data of other variables are obtained from Compustat.

Two industries are traditionally heavily regulated: financial and utility. The nature of financial firms, particularly depository institutions, is such that leverage cannot be interpreted the same way as in industrial firms. In addition, because regulators already provide a certain degree of monitoring, managers of regulated firms should be less able to reap private benefits at the expense of shareholders (Booth, Cornett, and Tehranian, 2002; Kole and Lehn, 1997). Considering about the characteristics of these two industries, we exclude firms who's SIC code fall between 6000 to 6999, or 4000 to 4999. To drive out the influences of extreme samples, we exclude samples for every calculated variable which follows in the top 1% or in the bottom 1%.

3.2 Model selection

Before going through our regression analysis, we calculate the variation inflation factors (VIF) of the control variables to test for the existing of the multicolinearity. The explanatory variables with higher VIF have more serious multicolinearity problem. To avoid further estimated bias, we have to ensure that the multicolinearity problem is under controlled. The calculated VIFs of our control variables are less than 3, while most of them are under 1.5. This means the multicolinearity problem of the explanatory variables is not serious.

The objective of our cross-sectional tests is to draw inferences about the relation among corporate governance, agency cost, capital structure, and firm value, while controlling for a number of other factors. As mentioned before, the task is complicated because it can be argued that corporate governance, agency cost, capital structure, and firm value are all jointly determined. There exists a well-known problem of endogeneity bias in econometrics. Endogeneity bias happens in the situation that the relation between variables violates the major assumption of Original Least Squares (OLS) that explanatory variables are uncorrelated with the error terms. There are properly two reasons causing the endogeneity problem. One is the existing of omitted

variables which is another variable correlated with both dependent and explanatory variables. So that after fitting the OLS model, there is still a relationship with this other variable and the residuals. The other most important source of endogeneity is reverse causality. To truly be able to make a causal claim, we need a truly exogenous variable called instrumental variable which is not related to any of the other variables in the system, unobserved and observed. To test the endogeneity problem, we employ the Hausman test for our regression model. The result is significant and rejected the hypothesis, consist with our prediction of existing of endogeneity problem.

Since we wouldn't be able to use the OLS model to do our tests, the most common method for doing the actual estimation, three-stage least squares (3SLS), will help us clarify this issue. 3SLS is a statistical technique to analyze multivariate data. It combines two stage least squares (2SLS) with seemingly unrelated regression (SUR). Three stage least squares estimates are obtained by first estimating a set of nonlinear (or linear) equations with cross-equation constraints imposed, but with a diagonal covariance matrix of the disturbances across equations. This is the constrained two stage least squares estimator. The parameter estimates thus obtained are used to form a consistent estimate of the covariance matrix of the disturbances, which is then used as a weighting matrix when the model is reestimated to obtain new values of the parameters.

In addition, we employ the generalized method of moments (GMM) estimation which places no restrictions on either the unconditional or conditional variance matrix of the disturbance term. Under the GMM framework we can obtain the efficient estimator which has the minimum asymptotical covariance matrix without making any additional assumptions. In this paper, we use panel data to construct our regression analysis. The advantage of GMM that allow conditional heteroskedastic on the disturbance term accords with what we need to get the most robust results. We also use a J test to test for the overidentification while holding the GMM estimation. The results indicate that the instrument variables we use are efficient for dependent variables.

3.3 Regression analysis

Considering the potentially endogenous problem, we use 3SLS and GMM estimation models to test the relationship between corporate governance, firm value and leverage. The regression models are developed following:

$$Tobin'sQ_{i,t} = \alpha_0 + \alpha_1 CG_{i,t} + \alpha_2 Leverage_{i,t} + \alpha_3 Size_{i,t} + \alpha_4 GO_{i,t} + \alpha_5 Profitability_{i,t} + \alpha_6 S\&P500_{i,t} + \varepsilon_{1i,t} \quad (1)$$

$$CG_{i,t} = \beta_0 + \beta_1 Tobin'sQ_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 Size_{i,t} + \beta_4 GO_{i,t} + \beta_5 Competition_{i,t} + \beta_6 Unique_{i,t} + \varepsilon_{2i,t} \quad (2)$$

$$Leverage_{i,t} = \theta_0 + \theta_1 CG_{i,t} + \theta_2 Size_{i,t} + \theta_3 Profitability_{i,t} + \theta_4 FA\ \text{ratio}_{i,t} + \theta_5 GO + \theta_6 R\&D_{i,t} + \theta_7 NDTX_{i,t} + \varepsilon_{3i,t} \quad (3)$$

In equation (1), (2) and (3), firm value is given by $Tobin'sQ_{i,t}$, where t is a time subscript, i is refer to firm i. $CG_{i,t}$ is the measure of corporate governance. $Leverage_{i,t}$ is measured as the ratio of total debt to total assets. $Size_{i,t}$ is the scale of company measured by nature logarithm of sales. $GO_{i,t}$ is refer to growth opportunity. $Profitability_{i,t}$ is measured by the ratio of EBIT to sales. *S&P500* is a dummy variable, if the firm observed is included in S&P500, it is recorded 1, or 0 otherwise. $Competition_{i,t}$ is referred to product market competition, while $Unique_{i,t}$ is a proxy for product uniqueness. *FA* $\text{ratio}_{i,t}$ is referred to fixed asset divided by total assets. $R\&D_{i,t}$ is research and development expenditures scaled by sales. $NDTX_{i,t}$ means non-debt tax shields.

3.4 Variable construction

3.4.1 Firm value (Tobin's *Q*)

Our firm valuation measure is Tobin's *Q*, which has been used for this purpose in corporate-governance studies since the work of Demsetz and Lehn (1985) and Morck, Shleifer, and Vishny (1988). We follow Gompers, Ishii and Metrick (2003) method for the computation of Tobin's *Q* [the ratio of a firm's market value of assets over its book value of assets, where the market value of assets is computed as the book value of assets plus the market value of common stock less the sum of the book value of common stock and balance sheet deferred taxes]. Considering the industry effect, we also compute the median *Q* in each year in each of the 48 industries classified by Fama and French (1997) and subtract it from firms' specific Tobin's *Q* to obtain an industry-adjusted Tobin's *Q*.

3.4.2 Corporate governance (*CG*)

Takeovers and takeover threats are the source of corporate governance considered in this paper. A great deal of theory and evidence suggests that takeovers address governance problems (see, e.g., Jensen (1988) and Scharfstein (1988)). Takeovers also typically increase the combined value of the target and the acquiring firm, indicating that firm performance is expected to improve posttakeover (Jensen and Ruback (1983)). Moreover, it is generally poorly performing firms that are targeted (Morck, Shleifer, and Vishny (1989)). However, a poorly performing firm can resist a takeover by adopting anti-takeover provisions (ATPs) in its charter. For our proxy of

corporate governance, the main interest is in measuring the extent to which a firm is protected against a takeover. This protection can take the form of direct anti-takeover provisions as well as other devices that provide managerial protection by restricting shareholder power to change charter provisions, to call for a shareholder meeting, or to overrule the management during a takeover attempt.

We incorporate the firm-specific defense mechanisms in place by using the index compiled by GIM from the Investor Responsibility Research Center (IRRC) publications. GIM (2003) introduce G-index which ranges from 0 to 24 as the proxy of corporate governance. They consider 24 different provisions in five categories—tactics for delaying hostile bidders, voting rights, director/officer protection, other takeover defenses, and state laws. G-index is formed by adding one point for every specific defensive provision adopted to restrict shareholder rights for each firm. As G-index increases, firms are expected to experience bad corporate governance and decreasing firm value. The G-index does not require judgments about the efficacy or wealth effects of any of these provisions. GIM only consider the impact on the balance of power.

We view this index as a measure of anti-takeover protection. Following Cremers and Nair (2005), we simply use a linear transformation of this index, CG = 24 − *G-index*, for ease in exposition. As a result, a larger value of CG signifies a higher vulnerability to takeovers, in turn, signifies a higher level of corporate governance quality.

In the robust test, to ensure that our results are not driven by any alternative interpretation of this index, we also adopt E-index, as mentioned before, constructed by Bebchuk, Cohen, and Ferrell (2005), to be taken as the measure of corporate governance. As Bebchuk, Cohen, and Ferrell (2005) emphasized, the E-index is expected to have stronger effect on firm value than G-index has. For ease in exposition, as the same reason, we employ a transferred index, CG'= 6 − *E-index,* to measure corporate governance.

3.4.3 Capital structure (*Leverage*)

Following Harvey, Lins, and Roper (2004), we use leverage (the ratio of total debt to total asset) as the measure of capital structure. Since Barclay et al. (2003) argue that book leverage is an instrument for the ratio of debt to a firm's assets in place, we use leverage measured using book values throughout our analysis. We treat each year as a separate observation in order to allow for the possibility that leverage determinants like size and performance may change over time.

3.4.4 Instrument variables in equation (2)

One shortcoming of any instrumental variable technique is that it requires the identification of some number of exogenous variables that plausibly affect only value, or leverage, or ownership, but not all three. Here we want to find a instrument variable that affects only corporate governance.

Managers of firms operating in more competitive industries are less likely to shirk or put valuable corporate resources into inefficient uses, since the margin for error is thin in these industries and any missteps can be quickly exploited by competitors, which seriously jeopardizes firms' prospects for survival and managers' prospects for keeping their jobs.

The competitive environment can affect corporate governance structures in positive directions. If product market competition disciplines managers, then the marginal benefit of additional governance would be low, as competition would substitute for other mechanisms (Leibenstein, 1966; Hart, 1983). Alternatively, a competitive environment could raise the marginal cost of poor managerial decisions, resulting in a positive association between competition and internal governance strength.

Following Gillan, Hartzell, and Starks (2003), we try to capture the competitive structure of an industry with two different measures. The first is the Herfindahl index, calculated as the sum of squared market shares of all COMPUSTAT firms in each Fama-French (1997) industry. The second is each industry's median ratio of selling expenses to sales, which Titmanand and Wessels (1988) argue acts as a proxy for product uniqueness.18 Industries with lower Herfindahl indices and industries where member firms have similar products have more competitive product markets. For each year, we define an industry as competitive (unique) if the industry's Herfindahl index (median ratio of selling expense to sales) is in the bottom (top) quartile of all 48 Fama-French industries. Both these two measures are used as the proxies for product market competition.

3.4.5 Control variables of *Leverage*

Numerous studies have argued that leverage may be positively affected by firm size. Following Titman and Wessels (1988) and Johnson (1997), we use the natural logarithm of sales as a proxy for firm size. The composition of the firm's assets has been found to affect capital structure decisions (Titman and Wessels, 1988 and Mehran, 1992). Hence, we include the fixed-asset ratio in the regression analysis. As in Johnson (1997), the fixed-asset ratio is property, plant, and equipment to total assets. Myers (1977) identifies growth opportunities as a significant determinant of capital structure. Similarly, Rozeff (1982) finds empirical support for growth

opportunities as a relevant variable. Profitability may be relevant to capital structure decisions. Myers (1984) suggests that managers have a pecking order in which retained earnings represent the first choice, followed by debt financing, then equity. Thus, the pecking order hypothesis would imply a negative relationship between profitability and leverage. We employ the earnings before interest and taxes (EBIT) to sales ratio to control for profitability. DeAngelo and Masulis (1982) contend that non-debt tax deductions substitute for the tax shield benefits of debt. As a result, firms with greater non-debt tax shield would be expected to have lower levels of debt. We define non-debt tax shields as the ratio of the sum of depreciation and amortization to total assets.

4. Empirical Results

4.1 Summary statistics and correlations

Table 1 provides descriptive statistics for the samples used in our tests. The sample has a mean industry-adjusted Tobin's Q of 0.49634. The minimum G-index is 1, while the maximum G-index is presented as 19, broadly consistent with the numbers shown by GIM (2003) for firms in the United States from period 1990 to 1998. It means that the assumption we made about the stability of changing in anti-takeover provisions is reasonable. The same situation is shown as E-index. The average total debt to total assets ratio is 0.21942, consistent with the values found by Rajan and Zingales (1995) for firms in developed countries. From Table 1 we can observe that the mean profitability, measured as EBIT divided by sales, is quite small. The estimated coefficient of profitability might be difficult to explain due to a great deal of negative EBIT.

Table 2 shows the Pearson correlation coefficients of all variables used. The strong relation between Tobin's Q and the proxy for shareholder rights implies that corporate governance and firm value are significantly related in positive way. It's most important to see the correlation between leverage and governance quality. As presented in Table 2, leverage is negatively related to corporate governance and significant, indicating a substitute relation between these two corporate governance mechanisms. Detail descriptions about other variables are shown in Table 1 and Table 2.

4.2 Regression analysis

The objective of our tests is to draw inferences about the relation between firm value, leverage, and the strength of shareholder rights, while controlling for a number of other factors. The task is complicated because it can be argued that firm value, leverage, and corporate governance are all jointly determined.

We address the potentially endogenous relation among these variables (and account for other factors that could affect each of them) by estimating a three-stage least squares regression model. Moreover, because the test we construct is not just a cross- sectional test but also a panel data test, the most appreciate model might be the GMM model.

Equation (1) controls for firm size, measured as the natural logarithm of sales. We include the ratio of capital expenditures to assets as a proxy for growth opportunities (GO); however, if managers routinely overinvest, this ratio will instead pick up inefficient investment choices. The direction of GO's coefficient is uncertain. Profitability measured as the ratio of earnings before interest and taxes to sales is also suggested to positively affect firm value. We also include two dummy variables, S&P500 and Delaware, in our valuation equation. Firms included in S&P500 are expected to experience better operating performance, and have positive influences on firm value.

The governance equation uses shareholder rights as the dependent variable, Tobin's *Q* and leverage as simultaneously determined variables, and controls. According to Zheka (2006), some firm-level factors, like firm size and growth opportunity, could be the determinants of corporate governance. They suggest that firm size is significantly related to the level of corporate governance quality. We control over these two variables, firm size and growth opportunity, and use product market competition as the instrument variables following Gillan, Hartzell, and Starks (2003).

The leverage equation uses the debt-to-assets ratio as the dependent variable, shareholder right as the simultaneously determined variable. We include six determinants of leverage: firm size, profitability (EBIT-to-sales), fixed-asset ratio (net property, plant, and equipment divided by total assets), growth opportunity (the ratio of capital expenditures to total assets), research and development expenditures (divided by sales), and non-debt tax shield (depreciation and amortization divided by total assets). Shareholder rights could be negatively related to leverage, since managers of firms with bad corporate governance might use financial leverage to augment the assets under their control.

Table 3, 4, 5 reports the results of the OLS, 3SLS, and GMM estimation for the regression analysis from period 1998 to 2003. Table 3 shows the results of estimating for equation (1), while G-index and E-index are both used to proxy for corporate governance. For convenience to explain the quality of corporate governance, we use CG = 24-*G-index* and CG' = 6-*E-index* to measure the strength of shareholder rights. As shown by Table 3, the coefficient of CG is

significantly positive in all estimation models, which indicates that firms with good corporate governance show distinctly higher firm value than firms with poor corporate governance. This result is consistent with GIM (2003), BCF (2005), and Cremers and Nair (2005).

In the best known test of an optimal capital structure model, Miller-Modigliani (1958) reported evidence of a positive relationship between firm value and leverage which they attributed to a debt tax shield effect. Our result is the same with the view of optimal capital structure model constructed by Miller-Modigliani. Table 3 shows a significantly positive coefficient on leverage both in 3SLS and GMM estimation model. Since we have known about the existence of estimation bias by OLS model in our investigation, the contrary direction of the coefficient on leverage is not surprising. The result that firm value and leverage are positively related follows from the fact that these two endogenous variables move in the same direction with changes in the exogenous factors (Hirshleifer and Thakor (1989), Harris and Raviv (1990a), Stulz (1990)). Therefore, leverage increasing (decreasing) changes in capital structure caused by a change in one of these exogenous factors will be accompanied by firm value increases (decreases).

The way how the scale of a firm relates to its firm value is uncertain on directions. As can be seen in Table 3, the coefficient of *Size* in GMM estimation model is significantly positive with the governance proxy of CG, consistent with the finding of Kadyrzhanova (2007). As mentioned before, growth opportunity is always positively related to firm value. But overinvestment by managers might affect firm value in undesired way, as GMM estimation model shows, using CG as a proxy for corporate governance. The same as we predicted before, profitability and inclusion in S&P500 have significantly positive influences on firm value.

Table 4 shows the analysis results of governance equation (equation (2)). Consistent with our finding on the relationship between corporate governance and firm value in previous analysis, firm value is significantly related to shareholder rights in the positive way. More important for our analysis, this significantly positive result is consistent under our three estimation model (OLS, 3SLS, and GMM) and robustness test of different governance definitions, which indicates that firm value and corporate governance do have strong influences on each other, supporting our endogeneity assumptions between central variables. As can be seen in Table 4, leverage is negatively related to corporate governance. Although the coefficient is not significant in 3SLS and GMM estimation model with CG' as the proxy for corporate governance, we could have a general view about the relationship between corporate governance and leverage.

The coefficient of firm size is negative and highly significant. It implies that smaller size of firm is facing fewer anti-takeover provisions and associated with better corporate governance. As can be seen, growth opportunity is positively related to corporate governance. Masulis, Wang, and Xie (2006) argue that managers of firms operating in more competitive industries are less likely to shirk or put valuable corporate resources into inefficient uses. In other words, firms in competitive environment can contribute to improve governance quality. Consistent with our prediction, product market competition can affect corporate governance in positive directions, when CG' is used to proxy for governance. Since governance index constructed by BCF (2005) is argued to be a more efficient proxy for governance than G-index, we should pay more attention on the results of analysis with CG' when estimating equation (2).

Table 5 shows the most important results of our analysis on equation (3). The central idea of this paper is to determinant the way how corporate governance affects leverage. As showed in Table 5, the coefficient of governance is negative and highly significant in all estimation models, indicating that firms with higher governance quality exhibit lower levels of debt. Hence, the GMM regression results strongly support our hypothesized inverse association between leverage and the strength of shareholder rights. The result is consistent with the finding of Jiraporn and Gleason (2005). Our finding also supports the agency theory, which predicts that firms where shareholder rights are more limited (and, therefore, where agency costs are more acute) should adopt higher debt to mitigate the higher agency costs.

The leverage equation indicates that leverage is positively related to firm size. This finding is consistent with our predictions and with the findings of Kim and Sorensen (1986) for U.S. firms. Warner and Ang, Chua, and McConnell provide evidence that suggests that direct bankruptcy costs appear to constitute a larger proportion of a firm's value as that value decreases. It is also the case that relatively large firms tend to be more diversified and less prone to bankruptcy. These arguments suggest that large firms should be more highly leveraged. As Titman and Wessels (1988) point out, firms with assets that can be used as collateral may be expected to issue more debt to take advantage of this opportunity. Fixed-asset ratio has a positive but not significant influence on leverage, which is consistent with Marsh (1982), and Long and Hasbrouck (1988). Profitability, growth opportunity, R&D expenditures, and non-debt tax shields, as shown in Table 5, have significantly positive influences on debt ratio. The results are consistent with Bradley, et al. (1984), Castanias (1983), Long and Malitz (1985), Kester (1986), Marsh (1982), and Titman and Wessels (1988). These studies generally agree that leverage increases with fixed assets, non-debt tax shields, growth opportunities, and firm size

5. Conclusion

We link agency costs to capital structure by examining how the strength of shareholder rights influences capital structure decisions. Given that agency conflicts are derived from the divergence of ownership and control, firms where shareholder rights are severely restricted are likely to suffer higher agency costs because managers are better able to exploit weak shareholder rights and place their private benefits ahead of shareholders' interests.

Considering endogeneity problems between corporate governance, capital structure, and firm value, we employ 3SLS and GMM estimation models for our analysis. We also use another governance proxy for robust test. The empirical results reveal an inverse relationship between capital structure and the strength of shareholder rights. Debt seems to help mitigate agency costs in firms where shareholder rights are restricted. In these firms, the debt ratio is positively related to the degree of restrictiveness of corporate governance – the more suppressive the governance, the weaker the shareholder rights and the higher the debt ratio.

Our empirical results also support the contention that corporate governance will reflect on firm values in a positive way. Managers suffer from external takeover threats tend to make decisions that benefit shareholders and increase firm values. The idea is consistent with agency theory. Finally, we find that leverage is positively related to firm value. It's intuitive that debt financing is cheaper than equity financing because of debt tax shields. In addition, debt which helps alleviate agency problems can play as another role of governance mechanisms, hence, increase firm values.

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Table 1 Descriptive Statistics

This table provides the descriptive statistics of our endogenous variables and their control variables. The sample consists of 4027 observations, where the sample period is from 1998 to 2003. The financial and accounting data are collected from Compustat. Tobin's Q is measured as the ratio of a firm's market value of assets over its book value of assets, where the market value of assets is computed as the book value of assets plus the market value of common stock less the sum of the book value of common stock and balance sheet deferred taxes. CG is defined as the strength of shareholder rights and has two alternative proxies: 24-(G-index) and 6-(E-index). Leverage is the ratio of total debt to total assets. Size is the nature log of sales. GO is the ratio of capital expenditures to total assets. Profitability is defined as EBIT divided by sales. S&P500 is a dummy variable, if the firm observed is included in S&P500, it is recorded 1and 0 otherwise. FA ratio is referred to fixed asset to total assets ratio. GO is the ratio of capital expenditures to total assets. R&D is research and development expenditures scaled by sales. NDTX means non-debt tax shields, measured as depreciation and amortization divided by total assets.

Summary Statistics					
Variable	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
Tobin's Q	4027	0.49634	1.25928	-1.94188	7.05341
CG (24-G)	4027	15.05463	2.69680	5	23
CG' (6-BCF)	4027	3.69729	1.31407	0	6
Leverage	4027	0.21942	0.19491	0	2.59949
Size	4027	7.01749	1.58740	1.54543	12.26998
GO	4027	0.05300	0.04665	0.0006715	0.90376
Profitability	4027	0.03508	0.29291	-3.86189	0.38475
S&P500	4027	0.25875	0.43800	0	1
Competition	4027	0.47877	0.49961	0	1
Unique	4027	0.42364	0.49420	0	1
FA ratio	4027	0.26517	0.18046	0.00358	0.96622
R&D	4027	0.09380	0.22166	0	2.75839
NDTX	4027	0.05054	0.04831	0.00506	1.61341

Table 2 Pearson correlations

This table presents the Pearson correlations between all variables used. The p-values are shown in parenthes

	Tobin's Q	CG	CG'	Leverage	Size	GO	Profitability	S&P500	Competition	Unique	FA ratio	R&D	NDTX
Tobin's Q	1.00000												
CG	**0.07696 (<.0001)**	1.00000											
CG'	**0.12784 (<.0001)**	**0.76669 (<.0001)**	1.00000										
Leverage	**-0.15271 (<.0001)**	**-0.12910 (<.0001)**	**-0.10975 (<.0001)**	1.00000									
Size	**0.08469 (<.0001)**	**-0.24816 (<.0001)**	**-0.05704 (0.0003)**	**0.22004 (<.0001)**	1.00000								
GO	**0.15399 (<.0001)**	**0.05923 (0.0002)**	**0.04282 (0.0066)**	-0.01108 (0.4820)	**0.08269 (<.0001)**	1.00000							
Profitability	**0.16246 (<.0001)**	**-0.11218 (<.0001)**	**-0.07141 (<.0001)**	**0.03456 (0.0283)**	**0.36488 (<.0001)**	**0.05333 (0.0007)**	1.00000						
S&P500	**0.26325 (<.0001)**	**-0.14445 (<.0001)**	0.02478 (0.1159)	**0.03836 (0.0149)**	**0.57864 (<.0001)**	0.00767 (0.6267)	**0.15518 (<.0001)**	1.00000					
Competition	0.02648 (0.0929)	**0.09580 (<.0001)**	**0.08763 (<.0001)**	**-0.13463 (<.0001)**	**-0.08498 (<.0001)**	**0.04203 (0.0076)**	**-0.06873 (<.0001)**	**-0.06683 (<.0001)**	1.00000				
Unique	**0.04786 (0.0024)**	**0.16285 (<.0001)**	**0.17036 (<.0001)**	**-0.27041 (<.0001)**	**-0.32757 (<.0001)**	**-0.12795 (<.0001)**	**-0.16820 (<.0001)**	0.02360 (0.1343)	0.01330 (0.3988)	1.00000			
FA ratio	-0.02306 (0.1435)	**-0.07720 (<.0001)**	**-0.07050 (<.0001)**	**0.22343 (<.0001)**	**0.25476 (<.0001)**	**0.51195 (<.0001)**	**0.14964 (<.0001)**	**0.05827 (0.0002)**	**-0.03319 (0.0352)**	**-0.44368 (<.0001)**	1.00000		
R&D	0.02655 (0.0921)	**0.14588 (<.0001)**	**0.12824 (<.0001)**	**-0.10281 (<.0001)**	**-0.41050 (<.0001)**	**-0.06038 (0.0001)**	**-0.74869 (<.0001)**	**-0.05744 (0.0003)**	-0.00812 (0.6067)	**0.37996 (<.0001)**	**-0.24915 (<.0001)**	1.00000	
NDTX	-0.02209 (0.1610)	**0.06902 (<.0001)**	**0.05393 (0.0006)**	0.00487 (0.7573)	**-0.08147 (<.0001)**	**0.19255 (<.0001)**	**-0.33747 (<.0001)**	**-0.05472 (0.0005)**	**0.10792 (<.0001)**	**0.09509 (<.0001)**	**0.14187 (<.0001)**	**0.03784 (0.0163)**	1.00000

Table 3 Regression results of equation (1)

The effect of corporate governance and leverage interact on firm value. Three-stage least squares (3SLS) and generalized method of moments (GMM) analysis of the jointly determined system (Tobin's Q, leverage, and shareholder rights). Ordinary least squares (OLS) is used for robustness test. Tobin's Q is measured as the ratio of a firm's market value of assets over its book value of assets, where the market value of assets is computed as the book value of assets plus the market value of common stock less the sum of the book value of common stock and balance sheet deferred taxes. CG is defined as the strength of shareholder rights and has two alternative proxies: 24-(G-index) and 6-(E-index). Leverage is the ratio of total debt to total assets. Size is the nature log of sales. GO is the ratio of capital expenditures to total assets. Profitability is defined as EBIT divided by sales. S&P500 is a dummy variable, if the firm observed is included in S&P500, it is recorded 1and 0 otherwise. The p-values are shown in parentheses.

$$Tobin'sQ_{i,t} = \alpha_0 + \alpha_1 CG_{i,t} + \alpha_2 Leverage_{i,t} + \alpha_3 Size_{i,t} + \alpha_4 GO_{i,t} + \alpha_5 Profitability_{i,t} + \alpha_6 S\&P500_{i,t} + \varepsilon_{1i,t}$$

	CG = 24-*G-index*			**CG' = 6-*E-index***		
	1998-2003			1998-2003		
	OLS	3SLS	GMM	OLS	3SLS	GMM
CG	0.0400***	1.0507***	1.8622***	0.0993***	1.1689***	1.4451***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Leverage	-0.8421***	3.1321***	4.5075**	-0.8206***	1.6203**	1.9297*
	(<.0001)	(0.0048)	(0.0479)	(<.0001)	(0.0463)	(0.0718)
Size	-0.1007***	0.2619***	0.6469***	-0.1108***	-0.0826***	-0.0247
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0055)	(0.5241)
GO	3.9602***	-0.3169	-4.1705**	4.0034***	2.7767***	0.8361
	(<.0001)	(0.7308)	(0.0260)	(<.0001)	(<.0001)	(0.2942)
Profitability	0.7061***	0.6889***	0.6899***	0.7212***	0.6848***	0.6882***
	(<.0001)	(<.0001)	(0.0004)	(<.0001)	(<.0001)	(<.0001)
S&P500	0.9414***	0.7391***	0.7122***	0.9176***	0.6787***	0.5350***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Number of firms	4027	4027	4027	4027	4027	4027

*, **, and *** statistically significant at the 10%, 5%, and 1% levels, respectively.

Table 4 Regression results of equation (2)

The effect of firm value and leverage interact on corporate governance. Three-stage least squares (3SLS) and generalized method of moments (GMM) analysis of the jointly determined system (Tobin's Q, leverage, and shareholder rights). Ordinary least squares (OLS) is used for robustness test. Tobin's Q is measured as the ratio of a firm's market value of assets over its book value of assets, where the market value of assets is computed as the book value of assets plus the market value of common stock less the sum of the book value of common stock and balance sheet deferred taxes. CG is defined as the strength of shareholder rights and has two alternative proxies: 24-(G-index) and 6-(E-index). Leverage is the ratio of total debt to total assets. Size is the nature log of sales. GO is the ratio of capital expenditures to total assets. Competition is the Herfindahl index, calculated as the sum of squared market shares of all COMPUSTAT firms in each Fama-French (1997) industry. Unique is each industry's median ratio of selling expenses to sales. dummy variables proxies for product market competition. We define an industry as competitive (unique) if the industry's Herfindahl index (median ratio of selling expense to sales) is in the bottom (top) quartile of all 48 Fama-French industries. The p-values are shown in parentheses.

$$CG_{i,t} = \beta_0 + \beta_1 Tobin'sQ_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 Size_{i,t} + \beta_4 GO_{i,t} + \beta_5 Competition_{i,t} + \beta_6 Unique_{i,t} + \varepsilon_{2i,t}$$

	CG = 24- *G-index*			**CG' = 6- *E-index***		
	1998-2003			1998-2003		
	OLS	3SLS	GMM	OLS	3SLS	GMM
Tobin's Q	0.1553***	0.4856***	0.3836***	0.1104***	0.3391***	0.3267***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
DAT	-0.5101**	-2.5783*	-3.7827***	-0.2670**	-0.1152	-0.3653
	(0.0224)	(0.0773)	(0.0032)	(0.0161)	(0.8786)	(0.6178)
Size	-0.3710***	-0.3788***	-0.4394***	-0.0022	-0.0391*	-0.0561***
	(<.0001)	(<.0001)	(<.0001)	(0.8748)	(0.0643)	(0.0084)
GO	4.2780***	2.5201***	2.1312**	1.2224***	0.1867	0.0845
	(<.0001)	(0.0056)	(0.0116)	(0.0057)	(0.6891)	(0.8476)
Competition	0.3568***	-0.0117	-0.2433***	0.1982***	0.1121***	0.0808**
	(<.0001)	(0.8892)	(0.0091)	(<.0001)	(0.0090)	(0.0135)
Unique	0.4718***	0.1198	-0.2805*	0.4209***	0.2479***	0.1589**
	(<.0001)	(0.3549)	(0.0606)	(<.0001)	(0.0004)	(0.0125)
Number of firms	4027	4027	4027	4027	4027	4027

*, **, and *** statistically significant at the 10%, 5%, and 1% levels, respectively.

Table 5 Regression results of equation (3)

The effect of corporate governance act on leverage. Three-stage least squares (3SLS) and generalized method of moments (GMM) analysis of the jointly determined system (Tobin's Q, leverage, and shareholder rights). Ordinary least squares (OLS) is used for robustness test. CG is defined as the strength of shareholder rights and has two alternative proxies: 24-(G-index) and 6-(E-index). Leverage is the ratio of total debt to total assets. Size is the nature log of sales. Profitability is defined as EBIT divided by sales. FA ratio is referred to fixed asset to total assets ratio. GO is the ratio of capital expenditures to total assets. R&D is research and development expenditures scaled by sales. NDTX means non-debt tax shields, measured as depreciation and amortization divided by total assets. The p-values are shown in parentheses.

$$Leverage_{i,t} = \theta_0 + \theta_1 CG_{i,t} + \theta_2 Size_{i,t} + \theta_3 Profitability_{i,t} + \theta_4 FA\ \text{ratio}_{i,t} + \theta_5 GO + \theta_6 R\&D_{i,t} + \theta_7 NDTX_{i,t} + \varepsilon_{3i,t}$$

	CG = 24- *G-index*			**CG' = 6- *E-index***		
	1998-2003			1998-2003		
	OLS	3SLS	GMM	OLS	3SLS	GMM
CG	-0.0045***	-0.2124***	-0.3613***	-0.0113***	-0.3105***	-0.3417***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Size	0.0207***	0.0587***	0.1325***	0.0225***	0.0201***	0.0126**
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0110)
Profitability	-0.0725***	0.1290***	0.1659***	-0.0696***	0.1567***	0.1510***
	(<.0001)	(<.0001)	(0.0007)	(<.0001)	(<.0001)	(<.0001)
FA ratio	0.2779***	0.0047	0.0889	0.2749***	0.0380	0.0342
	(<.0001)	(0.8876)	(0.1924)	(<.0001)	(0.2367)	(0.4098)
GO	-0.6116***	0.7714***	1.5031***	-0.6131***	0.1301	0.2678*
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.3240)	(0.0932)
R&D	-0.0440**	0.2336***	0.2447***	-0.0361	0.3202***	0.2735***
	(0.0453)	(<.0001)	(0.0005)	(0.1021)	(<.0001)	(<.0001)
NDTX	-0.0819	0.4497***	0.5056***	-0.0714	0.5305***	0.5032***
	(0.2433)	(<.0001)	(0.0021)	(0.3088)	(<.0001)	(<.0001)
Number of firms	4027	4027	4027	4027	4027	4027

*, **, and *** statistically significant at the 10%, 5%, and 1% levels, respectively.