The Role of Capital Expenditure Forecasts in Debt Contracting*

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ABSTRACT

This study examines whether firms issue capital expenditure forecasts as a commitment to not engage in expropriation of lenders through opportunistic investment activities. We find that firms with higher leverage and lower credit quality are more likely to issue capital expenditure forecasts and deviate less from the forecasts. Furthermore, for firms that issue capital expenditure forecasts, loan spreads are lower and investment efficiency is greater. We do not find similar results for earnings forecasts. These results suggest that firms use capital expenditure forecasts as a commitment mechanism to reduce contracting costs with creditors.

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1. Introduction

Prior literature has identified several economic forces that shape corporate disclosure, including capital market factors, such as the cost of capital, liquidity, and risk-sharing, litigation costs, and proprietary costs of providing competitors with valuable information.[1] In this paper, we take a novel perspective and argue that firms use certain public disclosure as a commitment mechanism to reduce contracting costs with lenders (Jensen and Meckling 1976). In particular, we propose and test the hypothesis that firms issue capital expenditure forecasts as a commitment to not expropriate lenders through opportunistic investment activities.

Corporate finance theories suggest that the agency conflict between shareholders and creditors could lead to inefficient investment activities (e.g., Jensen and Meckling 1976; Myers 1977; Smith and Warner 1979). Borrowers have incentives to either overinvest or underinvest when they have large amount of debt relative to their assets. Borrowers may invest in negative net present value (NPV) projects, because they reap the benefits from successful outcomes, while losses from unsuccessful outcomes are borne by lenders (Jensen and Meckling 1976). Borrowers may also reject positive NPV projects if the benefit from accepting the project would accrue to the lenders (Myers 1977). As lenders will price protect their claims in anticipation of this type of behavior, borrowers are willing to incur monitoring and bonding costs ex ante to restrict their ability to engage in such behaviors (Jensen and Meckling 1976; Armstrong et al. 2010).

We propose that issuing capital expenditure forecasts could be one such bonding mechanism that mitigates shareholder-debtholder conflict with respect to investment decisions. We argue that a firm that issues capital expenditure forecasts, which generally contain the amount and often a narrative of the type of investments, is less likely to expropriate lenders

[1] See Healy and Palepu (2001), Verrecchia (2001), and Beyer et al. (2010) for excellent reviews.

through opportunistic investments.[2] Specifically, a capital expenditure forecast would discourage the borrower from making opportunistic investments in response to changes in economic conditions during the forecast period, as such an action would prove the forecasts inaccurate. Forecast inaccuracy can have adverse consequences in terms of higher cost of capital for the firm and a loss of reputation for the managers (Truman 1988; Stocken 2000; Graham, Harvey, and Rajgopal, 2005; Feng, Gu, Li. 2009; Lee, Matsunaga, and Park, 2012; Cao, Myers, Tsang, and Yang, 2017). Forecast inaccuracy related deterrence may not apply however, if the borrower's incentive to make opportunistic investments kicks in before the forecast for the period is made, because the firm can include this factor in the forecast. We argue that it is costly for the firm to make such a forecast, because the added transparency would draw attention to the firm's opportunistic behavior, and would likely contribute towards damaging its reputation in the credit market. The costs associated with inaccurate forecasts or a greater transparency resulting from capital expenditure forecasts can be avoided by the firm planning to make an opportunistic investment by not providing a forecast for the period. But such a behavior can also be costly for the firm, as the market would view such actions skeptically, resulting in a loss of reputation of the firm/managers in the capital/labor market (e.g., Graham et al. 2005; Zhang 2008; Beyer and Dye 2010). Thus, a firm that issues capital expenditure forecasts prior to the loan initiation would be viewed by the lenders as committed to making the forecasts in the future periods as well, which in turn would reduce the likelihood that it would expropriate lenders through opportunistic investments.[3] To the extent that any of the above arguments are not valid, the empirical predictions we propose below based on the

[2] About 97% of the capital expenditure forecasts take the forms of point ("about") or range ("between") estimates per IBES Guidance classifications. Also, for a random sample of 50 capital expenditure forecasts from IBES Guidance that we are able to trace back to company filings (e.g., 10-K, 10-Q, and 8-K), we find that 64% are accompanied with discussions of specific capital expenditure plans. This frequency is close to the frequency of managers providing supplementary disclosures with their earnings forecasts (Hutton et al. 2003).

[3] In our sample, for firms that issue at least one capital expenditure forecast in the one-year period prior to the loan initiation date, the likelihood of issuing at least one capital expenditure forecast in the one-year period after the loan initiation date is 89%. The corresponding likelihood for the second to fifth year are 87%, 86%, 85%, and 83%, respectively.

notion that capital expenditure forecasts can be an effective bonding mechanism to mitigate debtholder-shareholder conflict would not be supported by the data.

Next, we discuss our predictions and the results from the empirical tests of these predictions. First, we predict that firms with more severe agency conflicts with creditors are more likely to issue capital expenditure forecasts, because these firms will reap greater benefits from disciplining themselves from opportunistic investment activities. Our measures of the severity of shareholder-creditor conflicts are: leverage ratios (e.g., Jensen and Meckling 1976; Myers 1977), including book leverage and market leverage, and measures of credit quality (e.g., Nini et al. 2009), including credit ratings and the expected default frequency (EDF) (Merton 1974). Firms with higher leverage ratios and lower credit quality are expected to have more severe agency conflicts with creditors.

To test the above prediction, we use a sample of 34,780 firm-quarters that have at least one issuance of management forecast of any type (e.g., capital expenditure, earnings, sales, gross margin, EBITDA etc.).[4] The sample is from 2008 to 2014 and comprises of 2,700 firms. We find that firms with higher leverage ratios and lower credit quality are significantly more likely to issue capital expenditure forecasts. The above results could simply be due to highly leveraged firms and/or lower credit quality firms having stronger incentives to provide forecasts on important dimensions of corporate outcomes, due to higher information demand from creditors. However, we find that our measures of leverage and credit quality are not positively related to the likelihood of the issuance of earnings forecasts, arguably the most important dimension of corporate outcomes. This result mitigates the above concern.[5]

Second, if issuing capital expenditure forecasts is an effective self-commitment

[4] By restricting the sample to firm-quarters with at least one management forecast of any type, we control for the firms' *general* incentives to issue forecasts. The results are robust to using a sample without this restriction (see footnote 10).

[5] When we use management sales forecasts as another benchmark in place of earnings forecasts, we find similar results. We also find this to be the case for other analyses in the paper, where we use earnings forecasts as a benchmark to differentiate the effect of capital expenditure forecasts.

mechanism to restrict opportunistic investment activities, we expect it will be reflected in debt pricing. In particular, lenders will charge lower interest spread if the borrower firms provide capital expenditure forecasts. Consistent with this prediction, we find that loan spreads are significantly lower for borrowers who issue capital expenditure forecasts prior to the loan origination dates than borrowers who do not. Further, the effect is stronger for smaller firms and firms with non-investment credit ratings, and is weaker in the presence of prior lending relationship. To rule out the alternative explanation that the debt pricing effect of capital expenditure forecasts may be due to lower loan spread associated with more disclosures on important dimensions of corporate outcomes, we once again use earnings forecasts as a benchmark. We find that earnings forecasts are not associated with loan spreads.

Third, we examine the association between capital expenditure forecasts and firms' investment efficiency. If capital expenditure forecasts are effective in restricting inefficient investment activities, we expect firms that issue capital expenditure forecasts will have higher investment efficiency than firms that do not. Measuring investment efficiency with Goodman et al.'s (2014) approach, we find firms that issue capital expenditure forecasts have higher investment efficiency than firms that do not. Once again, we do not find similar results for earnings forecasts.

Finally, we investigate the accuracy of capital expenditure forecasts. This examination is useful given the assumption underlying our proposition that the forecasted capital expenditure amount disciplines the firm's future capital expenditure, because the reputation of issuing accurate forecasts is important to the firm. To provide evidence on this issue, we calculate forecast accuracy as the difference between realized capital expenditure of the forecast period *t* and the forecasted amount, scaled by lagged net property, plant, and equipment (PPE). Following Nini et al. (2009), we compare it with a counterfactual measure, the difference between the capital expenditure one year before the forecasted period *t* and the

forecasted amount for *t*, scaled by lagged net PPE. We find that relative to the counterfactual measure, the difference between the realized and the forecasted amount is more concentrated at zero, suggesting that the capital expenditure forecasts help discipline firms' future capital expenditure. In addition, we show that firms with higher leverage ratio or expected default frequency exhibit smaller deviation of capital expenditure from the forecasted amount. This finding is consistent with firms' having greater incentives to align their future capital expenditure to the forecasted amount when the shareholder-creditor conflicts are more severe.

Our study makes several contributions. First, we contribute to the literature on voluntary disclosure by proposing and showing that firms use public disclosure as a commitment mechanism to reduce contracting costs with lenders. In particular, we show that firms issue capital expenditure forecasts as a commitment to not expropriate lenders through opportunistic investment activities. This perspective is fundamentally different from the commonly used argument in the disclosure literature that firms provide voluntary disclosures to inform the market in order to reduce information asymmetry (Healy and Palepu 2001; Beyer et al. 2010).

Second, our study contributes to the debt contracting literature by documenting a new bonding mechanism which mitigates shareholder-creditor agency conflicts. In particular, we show that by voluntarily providing capital expenditure forecasts, managers effectively commit that they will not engage in opportunistic investment activities to expropriate lenders. In this mechanism, monitoring of borrowers is effectively delegated to the market through a reputational channel. This commitment mechanism is therefore quite distinct from the widely examined covenant restrictions (e.g., Nini et al. 2009; Billett et al. 2007).

Finally, our study also adds to the research that examines the determinants of non-earnings management forecasts, in particular, capital expenditure forecasts (e.g., Li 2010; Lu

and Tucker 2012). Despite the vast literature on management earnings forecasts, research on the determinants of capital expenditure forecasts is quite limited. Li (2010) shows that capital expenditure forecasts are influenced by product market competition. Lu and Tucker (2012) find that firms with high long-term institutional ownership tend to provide capital expenditure forecasts. Our study shows that the agency conflict between borrowers and lenders is another important determinant of capital expenditure forecasts. Moreover, we show that this determinant is not related to other common voluntary corporate disclosures, such as earnings forecasts or sales forecasts.

The rest of the paper is organized as follows. Section 2 develops the hypothesis and empirical predictions. Section 3 presents the empirical analysis. Section 4 concludes.

2. Hypothesis Development

Agency theory suggests that the incentive conflict between shareholders and creditors can lead to inefficient investment decisions. Jensen and Meckling (1976) argue that when a firm has risky debt outstanding and when the manager acts to maximize equity value rather than total firm value, the manager has incentive to overinvest in negative NPV projects because shareholders reap the benefits from successful outcomes, while losses from unsuccessful outcomes are borne by the lenders. The manager can also have incentive to forgo positive NPV projects if the benefit from the project accrues to the lenders, resulting in an underinvestment problem (Myers 1977).

To the extent lenders can rationally anticipate these conflicts of interests, they can price protect themselves by requiring higher interest rates. It is therefore in the borrower's interest to

adopt certain bonding and monitoring activities to limit corporate decisions that reduce the value of debtholders' claims (Jensen and Meckling, 1976). Monitoring activities include lenders observing, measuring, and controlling the borrower's behavior. Bonding activities guarantee that the borrower will not take certain actions that would harm the lenders and to ensure that the lenders will be compensated if the borrower does take such actions. A covenant restricting capital expenditure in a loan contract and the enforcement of the covenant are examples of such bonding and monitoring activities, respectively.

We propose that voluntary issuance of capital expenditure forecasts by borrowers can also be a bonding mechanism that mitigates the shareholder-creditor conflict with respect to investment decisions. We argue that firms that issue capital expenditure forecast, which generally contain the amount and often a narrative of the type of investments, are less likely to expropriate lenders through opportunistic investments. We develop this argument below.

The capital expenditure budgeting process is likely to be the source of information for capital expenditure forecasts, and the forecast is likely to reflect the investment opportunities available to the firm on the forecast date. Such a forecast would discourage the firm from making opportunistic investments in response to changes in economic conditions during the forecast period, becasue such an action would prove the forecast to be inaccurate. Forecast inaccuracy can hurt the firm's reputation in the capital market. Feng et al. (2009) find a negative association between earnings forecast accuracy and the cost of equity. Graham et al. (2005) suggest that executives believe that reputation for not providing accurate voluntary disclosures can lead to underpricing of a firm's stock. Managers' labor market concerns may also motivate them to make accurate forecasts. Stocken (2000) shows that managers' concern

with the credibility of their disclosure is often sufficient to ensure that they will almost always truthfully reveal their private information. Theoretical work and empirical evidence suggest that managers are more likely to experience career related costs when their forecasts prove inaccurate (Truman 1988; Zamora 2009; Lee et al. 2012).

If a firm's incentive to make opportunistic investment kicks in before the forecast for the period is made, the firm can include this factor in the forecast, and the forecast will then turn out to be accurate. We argue that it would be costly for the firm to make such a forecast, because it will alert the lenders about the firm's plan to invest opportunistically, enabling them to question the firm's investment plan in a timely manner. Without an explicit investment restriction (say in the form of a covenant), the lenders cannot legally prevent the firm from going ahead with the planned investment. However, the capital expenditure forecast will draw extra attention to the firm's opportunistic behavior and can therefore contribute towards hurting the reputation of the firm not only with the current lenders but perhaps in the broader lending market as well. In other words, a firm that intends to engage in opportunistic investment activities would prefer that it does not draw unnecessary attention, and would therefore prefer not to make a capital expenditure forecast for that period. However, not making a capital expenditure forecasts for the period can also be costly for the firm. Beyer and Dye (2010) argue that when a firm makes a public forecast, it raises expectation in the capital market that the firm will continue to make such forecasts regularly, and the market may view the lack of a forecast in a given period skeptically. Graham et al.'s (2005) survey evidence also supports this argument. Thus, a firm that issues capital expenditure forecasts prior to the loan initiation would be viewed by the lenders as committed to making the forecasts in the future

periods as well. This point is important because debt maturity period can be much longer than the capital expenditure forecast horizon, which tends to be shorter than a year.

A capital expenditure covenant in a debt contract is another mechanism that can help restrict borrower's investment activities. However, capital expenditure forecasts differ from capital expenditure covenants in several aspects. First, a capital expenditure covenant typically specifies an upper limit of the allowed investment amount, which can help mitigate overinvestment but not underinvestment. In contrast, a capital expenditure forecast, which is in the form of a point or a range estimate, can likely limit both. In addition, firms tend to release detailed capital expenditure plans along with the forecasts, which can help restrict not only the amount but also the type of capital expenditure.[6] Second, the cost to the firm of deviating from a forecast is arguably lower than the cost of violating a contractual restriction, as a covenant violation legally transfers the control right to the lender. Thus, compared to a capital expenditure covenant, capital expenditure forecasts provides the borrower with more flexibility in investment decisions, and hence the related bonding benefits are likely to be lower. Finally, for a long-term debt, a pre-specified upper limit of capital expenditure in the covenant on the debt initiation date is unlikely to remain optimal for the duration of the debt term, because the investment opportunities may change over time. Capital expenditure forecasts on the other hand are made periodically and thus provide a dynamic restriction that can be more responsive to changes in firms' investment opportunities.

Just as a covenant on capital expenditure can improve contracting efficiency, issuing capital expenditure forecasts can improve the efficiency of debt contracting if the benefits from

[6] Restrictions on specific types of investment activities are rare in capital expenditure covenants. We examine a random sample of loan contracts with capital expenditure covenants and find only 6% include such restrictions.

restricting inefficient investment activities of the borrowing firm and its other capital market related benefits outweigh the costs, including the costs of revealing confidential investment plans to competitors and of reduced flexibility to make optimal (firm-value maximizing) changes to investments plans during the forecast horizon. The benefits from restricting inefficient investment activities are likely to be larger when the shareholder-creditor conflicts are more severe (Jensen and Meckling 1976). Thus, we predict:

P1: Firms with more severe agency conflicts between shareholders and lenders are more likely to issue capital expenditure forecasts.

Given the benefits from restricting inefficient investment partially or fully accrue to the borrowers, we also predict:

P2: Lenders will charge a lower interest rate for borrowers who issue capital expenditure forecasts than for borrowers who do not provide such forecasts, and that this effect is more pronounced when the agency cost of debt is higher.

Finally, since capital expenditure forecasts would help restrict managers' inefficient investment activities, we predict: [7]

P3: Firms that provide capital expenditure forecasts have greater investment efficiency than firms that do not provide such forecasts.

3. Empirical Analysis

[7] The incentive to maintain forecast accuracy can lead to inefficient investment in a given period, if after making the forecast, the firm's investment opportunity set changes, such that the forecasted amount becomes suboptimal. This would be a cost that the firm will bear for using capital expenditure forecasts as a bonding mechanism. We argue that firms that decide to use capital expenditure forecasts as a bonding mechanism expect that such costs will be outweighed by the benefits associated with using the forecast. In a situation when the forecasted amount is grossly suboptimal, the firm may deviate from the forecast, and then avoid any adverse consequences associated with the inaccurate forecasts by explaining to the market the reasoning behind their action.

3.1 Shareholder-creditor conflicts and the issuance of capital expenditure forecasts

For our sample, we begin with all non-financial firms covered by IBES Guidance for the period 2008 to 2014. Our sample period starts from 2008 because the coverage of capital expenditure forecasts in IBES Guidance was relatively incomplete prior to that year. We drop forecasts issued after the forecasted fiscal period end date to eliminate preannouncements of accounting numbers (Houston et al. 2010). We further restrict our sample to firm-quarters with at least one management forecast of any type (i.e., capital expenditure, sales, earnings, gross margin, EBITDA, etc.) in IBES Guidance. This criterion helps control for a firm's general incentive to issue forecasts, and would suggest that our results are driven by capital expenditure forecasts serving a purpose that is distinct from other types of management forecasts.[8]

We convert the forecast level data into firm-quarter level data by creating an indicator variable for whether a firm issues any capital expenditure forecast in a given quarter (*Capex_Forecast*). After requiring availability of variables used in the regression analysis, the final sample consists of 34,780 firm-quarters with at least one management forecast for 2,700 firms. Table 1, Panel A summarizes the sample construction process.

Following the empirical corporate finance literature (e.g., Gilje 2017; Cai and Zhang 2011; Nini et al. 2009), we measure the severity of shareholder-creditor conflicts with two set of measures: leverage ratios, including book leverage (*BookLev*) and market leverage

[8] In robustness analysis, we replicate the determinant tests of capital expenditure forecasts and the analyses of loan spread and investment efficiency using the following two alternative samples: (i) all Compustat firms and (ii) firms with at least one forecast covered by IBES Guidance. We find qualitatively similar results for both the samples.

(*MktLev*), and measures of credit quality, including credit ratings and the expected default frequency (*EDF*), as in Merton (1974). Firms with higher leverage ratios and lower credit quality are expected to have more severe agency conflicts with creditors. We measure *BookLev* as total debt scaled by book value of total assets, and *MktLev* as total debt scaled by market value of total assets (Leary and Roberts 2014). *EDF* is calculated using the approach of Bharath and Shumway (2008).[9] We use S&P's issuer ratings and create indicator variables for the following rating groups: BBB (*BBB rated*), BB (*BB rated*), B (*B rated*), CCC or below (*CCC rated or worse*), and unrated firms (*Unrated*). Detailed definitions of these variables are provided in the Appendix.

To examine the impact of shareholder-creditor conflicts on the likelihood of issuing capital expenditure forecasts, we estimate following probit regression:

$$Capex\_Forecast = \alpha + \beta Agency\ Conflicts + \gamma\ Controls + Industry\ FE + Year\text{-}quarter\ FE + \varepsilon, \quad (1)$$

where *Capex_Forecast* is as defined above and is measured at quarter *t+1*, and *Agency Conflicts* is one of our measures of the agency conflicts of debt (*BookLev*, *MktLev*, *EDF*, and credit rating indicators), measured at quarter *t*. We predict β to be positive for *BookLev*, *MktLev*, and *EDF*. When the credit rating dummies are used to measure the agency conflicts of debt, as the benchmark case is firms with AAA, AA, and A ratings, we expect positive coefficients on *BBB rated*, *BB rated*, *B rated*, and *CCC rated or worse*, and that the coefficient on *CCC rated or worse* is greater than that on *BBB rated*.

We follow prior studies (e.g., Vashishtha 2014; Li 2010; Lu and Tucker 2012) to control

[9] Merton's (1974) model calculates EDF by viewing equity as a call option on the value of a firm with the strike price equal to the face value of debt. Using the iterative approach in Bharath and Shumway (2008), we calculate the value of the firm and its volatility by using the equity and debt values of the firm, along with the volatility of equity.

for the following firm characteristics: Tobin's Q (*Q*), asset tangibility (*Tangibility*), profitability (*ROA*), the natural logarithm of total assets (*LogAsset*), quarterly stock return (*Return*), an indicator variable for negative return (*BadNews*), return volatility (*Volatility*), analyst following (*NumAnalysts*), the number of business segments (*NumSegments*), the existence of block holders (*Block*), analyst earnings forecast dispersion (*Dispersion*), and volatility of capital expenditure (*Std_Capex*). The Appendix provides detailed definitions of these variables.

Q, measured as the market value of assets scaled by their book values at the end of quarter *t*, is to control for firms' investment opportunity set. *Tangibility* is net PP&E scaled by total assets at the end of quarter *t*. Investors are more likely to demand information about capital expenditure if a firm is capital intensive. We include *ROA* and *Return* to control for the influence of firm performance on management forecasts. Prior studies show that larger firms are more likely to issue management forecasts (e.g., Li 2010), presumably because the costs of issuing forecasts (relative to firm size) are lower for these firms. We include *Volatility* and *Dispersion* to control for the effect of firm performance uncertainty.

We include *NumAnalysts* and *Block* to control for information demand from financial analysts and block holders, respectively. The indicator variable for negative return, *BadNews*, is to control for potential litigation risk, because it is large stock price drops and not price increases that lead to shareholder lawsuits. We include *NumSegments* to control for complexity of firm operations. We control for *Std_Capex* because when a firm's investment activities are more variable and less predictable, the firm may be less likely to provide capital expenditure forecasts. Finally, we include industry (2-digit SIC) fixed effects and year-quarter fixed effects to control for the effects of time-invariant industry characteristics and time trend that is due to

economy wide factors, such as macroeconomic conditions. We cluster standard errors by firm for equation (1) and all subsequent analyses to account for possible within-firm correlation of error terms.

As we discuss in Section 2, we use management earnings forecasts as a benchmark to test our prediction that firms with more severe agency conflicts of debt are more likely to issue capital expenditure forecasts. We define an indicator variable, *EPS_Forecast*, for firm-quarters with at least one earnings forecast. We use this indicator variable as the dependent variable for equation (1) and expect that its association with the measures of the agency conflicts of debt would be significantly different from when the dependent variable is *Capex_Forecast*.

Table 2, Panel A reports the summary statistics for the sample of 34,780 firm-quarters. The average frequency of firm-quarters with at least one capital expenditure forecast (*Capex_Forecast*) is 52.6%, which is comparable to the average frequency for EPS forecasts (*EPS_Forecast*, 54.2%). The average book leverage (*BookLev*) and market leverage (*MktLev*) are 21.9% and 20.3%, respectively. The average expected default frequency (*EDF*) is 4.2%. Around 60% of firm-quarters have no credit ratings (*Unrated*); 21% have investment grade ratings and the remaining 19% have non-investment grade ratings (*Junk rated*).

We report in Table 2, Panel B the correlations of *Capex_Forecast* with the two leverage measures and *EDF*. The numbers above (below) the diagonal of the matrix are Pearson (Spearman) correlations and related *p*-values. As expected, *Capex_Forecast* is positively and significantly correlated with *BookLev*, *MktLev*, and *EDF*. In contrast, *EPS_Forecast* is negatively and significantly correlated with each of these three measures. These correlations provide preliminary evidence that firms with more severe agency conflicts of debt are more

likely to issue capital expenditure forecasts than other firms.

We report in Table 2, Panel C the average likelihood of issuing capital expenditure forecasts for major rating categories. There is a clear pattern that firms become more likely to issue capital expenditure forecasts as their credit ratings deteriorate. The average capital expenditure forecast likelihood is 28.5% for firms rated AAA and AA, and it increases monotonically to 85.4% for firms rated CCC or worse. In contrast, we observe an opposite pattern for earnings forecasts. These univariate results further suggest that firms with more severe agency conflicts of debt are more likely to issue capital expenditure forecasts than other firms.

Table 3 presents the results of estimating equation (1). Panels A and B report results for capital expenditure forecasts and earnings forecasts, respectively. To facilitate interpretation, we report estimated marginal effects of independent variables. In column 1 of Panel A, we find that the effect of book leverage (*BookLev*) is positive and significant (0.091, *z*-statistic = 2.19). The estimated effect of 0.091 suggests that an inter-quartile increase in book leverage (32.2%) increases the likelihood of issuing capital expenditure forecasts by 3.0 percentage points. This effect amounts to 5.7% of the average likelihood of capital expenditure forecasts in our sample (52.6%). In column 2, we find qualitatively similar results using *MktLev* as the leverage measure. An inter-quartile change in market leverage increases the likelihood of capital expenditure forecasts by 4.1 percentage points, which represents 7.8% of the average likelihood of a firm issuing capital expenditure forecasts in our sample.[10] In column 3, we use *EDF* to measure the agency conflict of debt. The estimated effect of *EDF* is also positive and

[10] In Section 6.1, we show that the effects of *BookLev* and *MktLev* are larger for firms with low (below the sample median) asset tangibility: 0.210 for *BookLev* and 0.265 for *MktLev*. In addition, the effects are larger for long-term leverage: for long-term book leverage, the effect is 0.170; for long-term market leverage, the effect is 0.189.

significant (0.124, *z*-statistic = 3.38). A one standard deviation increase in *EDF* (14.7%) is associated with 2.3 percentage points increase in the likelihood of issuing capital expenditure forecasts, which accounts for 4.3% of the average likelihood of capital expenditure forecasts in our sample.

In column 4, we use credit ratings to measure the agency conflicts of debt. The estimated effects of *BBB rated*, *BB rated*, *B rated*, and *CCC rated or worse* are all positive and significant, consistent with firms with more severe agency conflicts of debt being more likely to issue capital expenditure forecasts. The estimated effect of *CCC rated or worse* suggests that moving from A- or above ratings to CCC+ or worse ratings leads to an increase in the likelihood of capital expenditure forecasts of 25.0 percentage points, which represents 47.5% of the average likelihood of capital expenditure forecasts in our sample. We also find that the effect of *CCC rated or worse* (0.250) is larger than that of *BBB rated* (0.115) and the difference is statistically significant (*p*-value = 0.062), based on an untabulated test. Collectively, the results in Table 3, Panel A are consistent with our prediction that firms with more severe agency conflicts of debt are more likely to issue capital expenditure forecasts.

With respect to the effects of control variables, we find that firms with more tangible assets (*Tangibility*), better performing firms (*ROA* and *BadNews*), larger firms (*LogAsset*), more complex firms (*NumSegments*), and firms with block holders (*Block*) are more likely to issue capital expenditure forecasts. Firms with more volatile capital expenditure are less likely to issue capital expenditure forecasts. These results are generally consistent with firms' tendency to issue capital expenditure forecasts being driven by the related costs and benefits. For instance, there is a higher demand for information on future investment when the firm has

more fixed assets and has more complex operations, while the costs of forecasts will be larger when capital expenditure is more volatile and thus is more difficult to forecast.

In Panels B, we repeat the analyses in Panel A using *EPS_Forecast* as the dependent variable, in order to see if the predicted relations that we observe for capital expenditure forecasts are observed for earnings forecasts. The results will further indicate whether capital expenditure forecasts serve a purpose that is distinct from earning forecasts. To conserve table space, we omit the effects of control variables. For each treatment variable, we also report the *p*-value for testing whether the estimated coefficient is different from the corresponding one in Panel A. In Panel B, the effects of *BookLev* and *MktLev* are both negative and significant, while the effect of *EDF* is negative but insignificant. The effects of *BB rated*, *B rated*, and *CCC rated or worse* are all negative and the latter two are significant. The effects of these variables are all inconsistent with those in Panel A and the differences across the two panels for corresponding variables are statistically significant. The only variable whose effect is consistent with that in Panel A is *BBB rated*. These results suggest that the effects of agency conflicts of debt on the likelihood of earnings versus capital expenditure forecasts are significantly different.

One alternative explanation of our results in Table 3, Panel A is that firms that have good investment opportunities and expect to make more capital expenditure may choose to raise debt capital and also issue capital expenditure forecasts to meet the market demand for that information. Our analysis in Panel A controls for Tobin's Q (*Q*) and its coefficient is insignificant. This control variable and its insignificant effect mitigate the above concern to

some extent.[11] We conduct several additional tests (untabulated) to further explore this issue. First, if our results in Panel A are due to the above alternative explanation, the effect of leverage will be stronger for firms with higher information asymmetry. Measuring information asymmetry with analyst forecast dispersion and the bid-ask spread, we are able to rule out the related alternative explanation. Second, we add to equation (1) as control variables realized capital expenditures in future quarters (up to four quarters) to control for the possibility that firms expecting to make large capital expenditure raise debt capital and are more likely to issue capital expenditure forecasts, because firms are more likely to disclose material information in a timely manner. Our results are robust to this additional control variable. Third, if our results are due to the above alternative explanation, we expect the effect to be more pronounced for leverage due to public debt than for leverage due to private debt, because public debt holders rely more on public information than private debt holders. However, using the debt structure data provided by Capital IQ, we do not find such a difference. Collectively, the evidence from these analyses suggests that the above explanation is unlikely to drive our finding in Panel A.

3.2 Capital expenditure forecasts and loan spreads

Next, we examine whether borrowers who issue capital expenditure forecasts before loan originations have lower loan spreads than borrowers who do not. We obtain loan information from Dealscan and conduct the analysis at the loan facility level. We focus on

[11] We also perform two additional analyses using Tobin's Q as a measure of investment opportunities. First, we sort firms into high and low leverage groups and match each high leverage firm with a control firm from the low leverage group based on industry membership, size, and Tobin's Q. We estimate equation (1) using this matched sample and continue to find that the high leverage firms are more likely to issue capital expenditure forecasts. Second, we include the interaction term of Tobin's Q and each of the leverage measures in equation (1) and find that its coefficient is insignificant. These results further mitigate the concern of the above alternative explanation.

loans issued between 2009 and 2014 to ensure the availability of capital expenditure forecast information in the one-year period prior to the loan initiation date. We further require the borrower to make at least one management forecast, recorded in IBES Guidance, within one year prior to the loan origination date. The final sample for this analysis consists of 3,608 loan facilities for 1,193 firms. Table 1, Panel B describes the detailed sample selection procedure.

For this analysis, we define *Capex_Forecast* as an indicator variable that equals to 1 if the borrower issues at least one capital expenditure forecast within one year prior to the facility initiation date and 0 otherwise, and estimate the following OLS regression:

$$Spread = \alpha + \beta Capex\_Forecast + \gamma Controls + Rating\ FE + Lead\ Arranger\ FE + Industry\ FE + Year\ FE + \varepsilon, \quad (2)$$

where *Spread* is the loan spread over LIBOR (London Interbank Offered Rate). A negative value of β is consistent with borrowers who issue capital expenditure forecasts before loan originations having lower loan spreads than borrowers who do not.

We follow prior studies to control for a variety of borrower and loan characteristics (e.g., Zhang 2008; Costello and Wittenberg-Moerman 2011; Li et al. 2016). Specifically, we include the following borrower characteristics: firm size (*LogAsset*), book leverage ratio (*BookLev*), returns on assets (*ROA*), earnings volatility (*Std_ROA*), asset tangibility (*Tangibility*), Tobin's Q (*Q*), and credit ratings fixed effects. The loan characteristics we control for include the number of financial covenants (*NumCov*), facility amount scaled by total assets (*LoanSize*), facility maturity (*Maturity*), indicator variables for collateral requirement (*Security*), revolving loans (*Revolver*), and the use of performance pricing grids (*PP*), and lead arranger fixed effects. Detailed definitions of these variables are provided in the Appendix.

Finally, we control for industry and year fixed effects and cluster standard errors for each firm.

As in the analysis in Section 3.1, we also use earnings forecasts as a benchmark for evaluating the effect of capital expenditure forecasts on loan spreads. We define *EPS_Forecast* as an indicator variable that equals to 1 if the borrower issues at least one earnings forecast within one year prior to the facility initiation date and 0 otherwise. We replace *Capex_Forecast* with *EPS_Forecast* in equation (2) and compare the effect of *EPS_Forecast* with that of *Capex_Forecast*. We expect the coefficient on *Capex_Forecast* to be more negative.

Table 4, Panel A presents summary statistics for this analysis. The average loan spread is 243 basis points above LIBOR. Seventy-seven percent of borrowers issue at least one capital expenditure forecasts in the one-year period before the loan initiation date. This frequency is much higher than the frequency of borrowers issuing earnings forecasts (58%) in the same period. Given that the frequencies of these two forecasts are not that different in the full sample (52.6% and 54.2%, respectively, see Table 2, Panel A), the above results suggest that firms that issue loans are more likely to issue capital expenditure forecasts, consistent with our argument that capital expenditure forecasts help mitigate the agency conflicts between shareholders and creditors.

Table 4, Panel B presents the results of estimating equation (2). Columns 1 and 2 report results with *Capex_Forecast* and *EPS_Forecast* as the test variable, respectively. In column 1, the estimated coefficient on *Capex_Forecast* is negative and significant (-17.191, *t*-statistic = -3.07). Compared to firms that issue no capital expenditure forecasts in the one-year period before the loan initiation date, firms that issue capital expenditure forecasts have lower loan spreads of 17 basis points, which accounts for around 7% of the average spread in our

sample.[12] In contrast, in column 2, the coefficient on *EPS_Forecast* is insignificant (-0.757, *t*-statistic = -0.14), and it is significantly different from the coefficient on *Capex_Forecast* in column 1 (*p*-value = 0.03).[13] This result suggests that the effect of *Capex_Forecast* is unlikely to be due to capital expenditure forecasts reducing information asymmetry between borrowers and lenders, because earnings forecasts also reduce information asymmetry. To further rule out that reducing information asymmetry is an alternative explanation for our finding, we show in an untabulated analysis that the effect of *Capex_Forecast* on loan spreads is not sensitive to the borrower's information environment, measured with analyst forecast dispersion and the bid-ask spread.

The effects of control variables are broadly consistent with prior studies (e.g., Costello and Wittenberg-Moerman 2011; Li et al. 2016). We find that loans of larger firms and firms with higher Tobin's Q, revolving loans, and loans with performance pricing grids have lower spreads, while loans of firms with higher leverage ratios and more volatile earnings and secured loans have higher spreads.

The median horizon of capital expenditure forecasts is 8 months in our sample, whereas the median loan maturity is 5 years. One may argue that if capital expenditure forecasts are to discipline inefficient investment activities due to agency conflicts of debt, the forecast horizon should be similar to the length of the debt term. We argue that a long horizon forecast (e.g., 5 years) is likely to be fairly inaccurate, which reduces its information content and may lead to

[12] In Section 6.2, we show that the effect of capital expenditure forecasts on loan spread is larger in magnitude for firms with higher agency costs of debt. In particular, capital expenditure forecasts reduce loan spread by 28 basis points for noninvestment grade firms, by 38 basis points for firms without prior relationship with the lender, and by 33 basis points for small firms (total assets below the sample median).

[13] In an untabulated test, we include both *Capex_Forecast* and *EPS_Forecast* into the regression and find similar results: the effect of *Capex_Forecast* is significantly negative whereas that of *EPS_Forecast* is insignificant and the difference is significant.

the loss of forecast credibility. If the firm sticks to such a long horizon forecast, it will reduce investment efficiency in the forecasted period, because investment opportunities are hard to anticipate several years in advance. A theoretically more efficient alternative is to issue short horizon forecasts and commit to the policy. In a repeated relationship, firms have incentives to comply with their commitment due to reputation concerns (e.g., Graham et al. 2005; Zhang 2008). Our evidence supports this argument. For a firm that issues at least one capital expenditure forecast in the one-year period prior to the loan initiation date (denoted as year *t*), the likelihood of issuing at least one capital expenditure forecast in the one-year period after the loan initiation date (year *t+1*) is 89%. The likelihoods of issuing capital expenditure forecasts in *t+2*, *t+3*, *t+4*, and *t+5* are 87%, 86%, 85%, and 83%, respectively.

3.3 Capital expenditure forecasts and investment efficiency

We next examine whether firms that provide capital expenditure forecasts have higher investment efficiency than other firms. For this analysis, we follow Goodman et al.'s (2014) methodology, which is built on several prior studies (e.g., McNichols and Stubben 2008; Biddle et al. 2009). We estimate a firm-specific model of capital expenditure as a function of growth opportunity, measured with the natural logarithm of sales growth in the previous year, for each industry-year, and use the absolute value of residual as a firm-specific proxy for deviation from expected level of investment.[14] To mitigate the measurement error in the proxy for investment efficiency (Erickson and Whited 2000), we follow Goodman et al. (2014) and define *InvestEfficieny* as a dummy variable that equals one if the absolute value of the residual

[14] The results are similar if we additionally use lagged Tobin's Q, cash flow from operations, lagged asset growth and lagged capital expenditure as proxies for growth opportunities (McNichols and Stubben 2008).

is lower than the sample median and zero otherwise. A firm with *InvestEfficieny* equal to 1 is more likely to have efficient investment activities.

We estimate the following probit model:

$$InvestEfficiency = \alpha + \beta Capex\_Forecast + \gamma Controls + Industry\ FE + Year\ FE + \varepsilon, \quad (3)$$

where *Capex_Forecast* is defined for this analysis as an indicator variable that equals to 1 if a firm issues at least one capital expenditure forecast for a fiscal year or a quarter in that fiscal year. We expect β to be positive. We follow prior studies (e.g., Biddle et al. 2009) to control for the following firm characteristics: institutional ownership (*Institutions*), analyst following (*NumAnalysts*), accounting quality measure constructed following Dechow and Dichev (2002) (*AQ*), firm size (*LogAsset*), Tobin's Q (*Q*), return on assets (*ROA*), earnings volatility (*Std_ROA*), cash flow volatility (*Std_CFO*), sales volatility (*Std_Sales*), capital expenditure volatility (*Std_Capex*), default probability (*Z_Score*), asset tangibility (*Tangibility*), capital structure (*MktLev*), industry capital structure (*Ind_MktLev*), the ratio of cash flow to sales (*CFO/Sale*), the ratio of cash to assets (*Cash/Asset*), dividend payment (*Dividend*), firm age (*Age*), operating cycle (*OperatingCycle*) and loss status (*Loss*). Detailed definitions of these variables are provided in the Appendix. In addition, we control for industry and year fixed effects and cluster standard errors for each firm. Once again, we use earnings forecasts as a benchmark to evaluate the effect of capital expenditure forecasts. We replace *Capex_Forecast* in equation (3) with *EPS_Forecast*, and expect the coefficient on *Capex_Forecast* to be more positive than that on *EPS_Forecast*.

We follow the same procedure as in Section 3.1 to construct the sample for this analysis, except that this analysis is conducted at the firm-year level (see Table 1, Panel C).

The final sample consists of 10,781 observations for 2,383 firms. Table 5, Panel A reports summary statistics for this analysis. By construction, the mean of *InvestEfficiency* is 50%. The frequencies of firm-years with capital expenditure forecasts and earnings forecasts are 63.5%, and 52.6%, respectively. We report the results of estimating equation (3) in Table 5, Panel B. Columns 1 and 2 report results with *Capex_Forecast* and *EPS_Forecast* as the test variable, respectively. To facilitate interpretation, we report the estimated marginal effects of independent variables. In column 1, the estimated effect of *Capex_Forecast* is positive and significant (0.040, *z*-statistic = 3.03). In contrast, the estimated effect of *EPS_Forecast* in column 2 is insignificant (0.008, *z*-statistic = 0.60), and this effect is significantly different from the effect of *Capex_Forecast* in column 1 (*p*-value = 0.09).[15] These results suggest firms that issue capital expenditure forecasts have greater investment efficiency than other firms.

We further conduct two robustness tests. First, we restrict the sample to firms with debt (83% of the sample) and find similar results. Second, we restrict the sample to firms with outstanding loans (56% of the sample) and control for the existence of a capital expenditure covenant; the results are qualitatively similar.

3.4 Do firms deviate from the forecasted capital expenditure amounts?

We argue that firms that issue capital expenditure forecasts will have more limited opportunities to expropriate lenders through opportunistic investment activities. An assumption underlying this argument is that managers avoid deviating from their forecasts and thus the capital expenditure forecasts discipline firms' future capital expenditure. In this subsection, we

[15] In an untabulated test, we include both *Capex_Forecast* and *EPS_Forecast* into the regression and find similar results: the effect of *Capex_Forecast* is significantly positive whereas that of *EPS_Forecast* is insignificant and the difference is significant.

test the validity of this assumption. First, we follow Nini et al.'s (2009) approach and compare the deviation of capital expenditures from the forecasted amount, *Capex_Deviation*, with a counterfactual measure, *Deviation_Counterfactual*.[16] *Capex_Deviation* is defined as the actual capital expenditure in fiscal year/quarter *t* minus the forecast for the same period, scaled by net PP&E at the end of the previous year.[17] *Deviation_Counterfactual* is calculated similarly but with the actual capital expenditure in year *t* (quarter *t*) replaced with the actual amount in year *t-1* (quarter *t-4*).[18] Because the forecast for year/quarter *t* "disciplines" the capital expenditure in that period, not the period one year before, we expect the distribution of *Capex_Deviation* to be more concentrated around 0 than the distribution of *Deviation_Counterfactual.* We plot the distribution of these two variables in Figure 1. As expected, the frequencies of *Capex_Deviation* are much higher in the three bins around 0 and lower in other bins than those of the counterfactual measure. Consistent with Figure 1, we find that the mean and median of the absolute value of *Capex_Deviation*, 4.1% and 2.5%, respectively, are significantly smaller than those of the counterfactual measure, which are 5.8% and 4.4%, respectively.

We also examine whether agency conflict of debt is associated with firms' deviation from the capital expenditure forecasts. We predict that firms with more severe agency conflicts of debt deviate less from the forecasts in order to gain greater bonding benefits. If on the other hand, firms issue forecasts only when they are less uncertain and so the expected forecast

[16] Nini et al. (2009) follow a similar logic to construct a counterfactual measure to test whether capital expenditure covenants in loan contracts constrain firms' capital expenditure.

[17] For this analysis, we include both annual and quarterly forecasts. We obtain similar results when focusing on only annual forecasts, which account for 93% of our sample.

[18] For this analysis, we restrict the sample of capital expenditure forecasts to those issued by firms that do not have capital expenditure forecasts for the year or quarter one year before such that capital expenditure in the prior year/quarter is not "disciplined." Otherwise, the capital expenditure amount one year before will not be valid for constructing the counterfactual measure if the forecast one year before is correlated with the forecast of this year or quarter.

errors fall within a certain range, we will not observe the predicted effect. In addition, if our measures of agency conflicts for any reason are correlated with uncertainty of investment policy, we will observe a positive association between these measures and deviation from capital expenditure forecasts.

We regress the absolute value of *Capex_Deviation* on each of our measures of agency conflicts of debt after including the same set of control variables used in Table 3, measured for the quarter prior to the issuance date of capital expenditure forecasts. Table 6, Panel A reports the results of this analysis. While the coefficients on the rating dummies are generally insignificant (column 4), the coefficients on *BookLev*, *MktLev*, and *EDF* are all negative and significant (columns 1 to 3), suggesting that firms with more severe shareholder-creditor conflicts are more likely to "comply with" forecasted capital expenditure. These results suggest that firms use capital expenditure forecasts as a bonding mechanism to commit to reducing opportunistic investments that may result from shareholder-creditor conflicts.

We also use earnings forecasts as a benchmark for evaluating the effect of agency conflicts of debt on firms' deviation from the capital expenditure forecasts. For the sample of earnings forecasts, we define *EPS_Deviation* as the actual EPS in fiscal year/quarter *t* minus the forecast for the same period, scaled by the stock price three days prior to the forecast issuance date, and estimate the model in Table 6, Panel A using the absolute value of *EPS_Deviation* as the dependent variable. Table 6, Panel B reports mixed results for this analysis. The estimated coefficient on *BookLev*, *MktLev*, and *EDF* are all positive and significant (columns 1-3), which is the opposite to the findings for capital expenditure forecasts in Panel A, whereas the effects of *BBB rated*, *BB rated*, and *CCC rated or worse* are

negative and significant. These results suggest that firms' deviation from earnings forecasts are generally not negatively associated with the agency conflicts of debt.

3.5 Additional analysis

3.5.1 Firm Leverage and Capital Expenditure Forecasts: Cross-Sectional Tests

To provide further evidence that firms with more severe agency conflicts of debt are more likely to use capital expenditure forecasts as a bonding mechanism to reduce the agency cost of debt, we explore cross-sectional variations in the effect of firm leverage on the likelihood of issuing capital expenditure forecasts. First, we examine how the effect varies with firms' asset tangibility. Asset tangibility can also mitigate the contractibility problem of debt, because it increases the value that can be captured by creditors in default states (Almeida and Campello 2007). As a result, we predict that asset tangibility mitigates the effect of firm leverage on the likelihood of issuing capital expenditure forecasts. We test this prediction by creating an indicator variable, *High Tangibility*, for firms with high asset tangibility (above the sample median), and including in equation (1) this variable and its interaction with each of the leverage measures (*BookLev* and *MktLev*). The results reported in Panel A of Table 7 indicate that the estimated coefficient on the interaction term is negative and significant for both leverage measures, -0.185 (z-statistic = -2.70) for book leverage and -0.178 (z-statistic = -2.70) for market leverage, consistent with our prediction. The estimated effects of *BookLev* and *MktLev*, which represent the effects of book leverage and market leverage on the likelihood of issuing capital expenditure forecasts for firms with low asset tangibility, are 0.210 and 0.265, respectively, much larger than the corresponding estimates based on the full sample in Table 3, Panel A (0.091 for *BookLev* and 0.128 for *MktLev*).

Second, higher refinancing frequency of short term debt is another mechanism that mitigates the agency problems between borrowers and lenders (e.g., Myers 1977; Childs et al. 2005; Gilje 2016). Thus, we predict that the effect of firm leverage on the likelihood of issuing capital expenditure forecasts is primarily driven by long-term debt. For this analysis, we decompose book leverage and market leverage into short-term leverage (*BookLev_ST* and *MktLev_ST*) and long-term leverage (*BookLev_LT* and *MktLev_LT*), and replace the total leverage measure in equation (1) with the corresponding short term and long term leverage measures. Following Johnson (2003), we classify debt maturing within three years as short-term debt and other debt as long-term debt. Due to data availability constraint, both short-term leverage and long-term leverage are measured annually.[19] We predict the coefficient on long-term leverage to be more positive than the coefficient on short-term leverage. Table 7, Panel B reports the results of this analysis. Consistent with our prediction, the effects of *BookLev_LT* and *MktLev_LT* are positive and significant, whereas the effects of *BookLev_ST* and *MktLev_ST* are insignificant. In addition, the difference between the effects of short-term and long-term leverages is significant for both book and market leverages, and the effects of long-term leverages are larger in magnitude than those of the aggregate leverage measures in Table 3, Panel A (0.170 vs. 0.091 for book leverage; 0.189 vs. 0.128 for market leverage).

3.5.2 Capital Expenditure Forecasts and Loan Spreads: Cross-Sectional Tests

If capital expenditure forecasts reduce loan spreads by restricting inefficient investment activities, we expect the effect to be more pronounced when the agency costs of debt are

[19] The debt maturity data are not available in the quarterly file of Compustat.

higher. To test this prediction, we examine how the effect of capital expenditure forecasts on loan spreads varies with borrower size, credit ratings, and the prior borrower-lender relationship. We expect the effect to be stronger for smaller firms, firms with worse credit ratings, and firms without prior borrowing relationship with the lenders. Smaller firms generally have worse information environments and thus greater agency problems with creditors. Petersen and Rajan (2002) argue that large firms are usually relatively old with sufficient track record about the trustworthiness of the management and thus have less severe moral hazard issues. Firms with worse ratings are more likely to have agency conflicts with creditors. The relationship lending provides lenders with private information and superior control rights through potential future lending (Petersen 1999). Firms with repeated relationship with the lender have more reputational capital and fewer agency conflicts with the lender (e.g., Diamond 1989, 1991; Bharath et al. 2011).

The results of this analysis are reported in Table 8. In column 1, we add to equation (2) the interactions of *Capex_Forecast* with *Junk rated* (an indicator for noninvestment grade ratings) and *Unrated*.[20] As expected, the estimated coefficient on *Capex_Forecast* × *Junk rated* is negative and significant (-31.930, *t*-statistic = -2.21), suggesting that capital expenditure forecasts reduce loan spread more for borrowers with noninvestment grade ratings than for borrowers with investment grade ratings. For noninvestment grade firms, loan spreads of borrowers that issue capital expenditure forecasts are 28 (=-31.930+4.421) basis points lower than those of borrowers that do not issue such forecasts.

In column 2, we add to equation (2) *PriorLend* and its interaction with

[20] Because we include rating fixed effects in equation (2), we do not add *Junk rated* and *Unrated* to the regression. *Capex_Forecast*×*Unrated* is a control variable and its effect is untabulated, as for other control variables.

Capex_Forecast, where *PriorLend* is an indicator variable for the existence of a lending relationship between the borrower and the lender in the prior five years (e.g., Bharath et al. 2011). The coefficient on the interaction term is positive and significant (37.222, *t*-statistic = 3.65), consistent with our prediction that the pricing benefit of capital expenditure forecasts is smaller when the borrower has a prior relationship with the lender.[21] The estimated coefficient on *Capex_Forecast* suggests that for firms without prior relationship with the lender, loan spreads of borrowers that issue capital expenditure forecasts are 38 basis points lower than those of borrowers that do not issue such forecasts.

Finally, in column 3, we define an indicator variable, *Large Firm*, for firms with large assets (above the sample median) and add this variable and its interaction with *Capex_Forecast* to equation (2). We find that the coefficient on the interaction term is positive and significant (32.035, *t*-statistic = 2.88). This evidence suggests that the pricing benefit of capital expenditure forecasts is smaller for larger firms. The estimated coefficient on *Capex_Forecast* suggests that for small firms, loan spreads of borrowers that issue capital expenditure forecasts are 33 basis points lower than those of borrowers that do not issue such forecasts. Overall, the results in Table 8 are consistent with our prediction that the negative effect of capital expenditure forecasts on loan spread is more pronounced when the agency costs of debt are higher.

4. Conclusion

We propose that firms use capital expenditure forecasts as a commitment to not engage

[21] The coefficient on *PriorLend* is negative and significant, suggesting that prior lending relationship reduces loan spread (e.g., Bharath et al. 2009).

in expropriating lenders through opportunistic investment activities. Consistent with this hypothesis, we find that firms with higher leverage and lower credit quality, proxies for greater borrower-lender agency problems, are more likely to issue capital expenditure forecasts. We also find that issuance of capital expenditure forecasts by firms provides the following benefits: loan spread decreases and investment efficiency increases.

Our study contributes to the voluntary disclosure literature by proposing and showing that firms use certain public disclosure (in our case, capital expenditure forecasts) as a commitment mechanism to reduce contracting costs with certain stakeholders (in our case, creditors). Our study also contributes to the debt contracting literature by documenting a new voluntary bonding mechanism that mitigates the borrower-lender agency conflicts. Finally, it contributes to the recent work that attempts to examine the determinants of non-earnings management forecasts, in particular capital expenditure forecasts.

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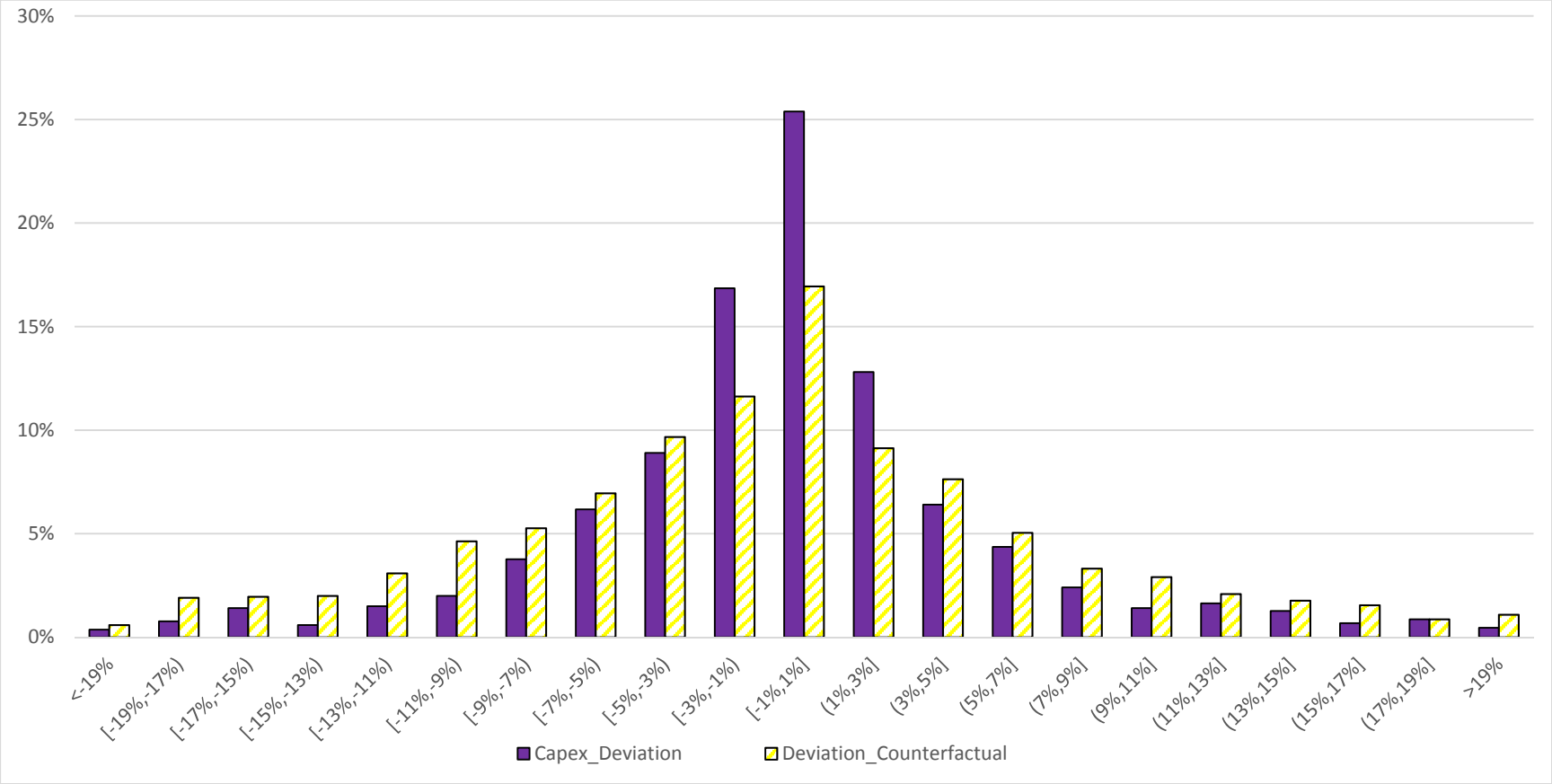
Appendix: Variable Definitions

Variable	Definitions
Age	The difference between the first year the firm appears in CRSP and year *t*.
AQ	The negative standard deviation of the residuals from the augmented Dechow and Dichev (2002) model (McNichols 2002) during the years *t-5* to *t-1*. The residuals are obtained from industry-year regressions of working capital accruals on lagged, current and one-year ahead cash flows, and changes in revenue and PP&E. All variables are scaled by average total assets.
B rated	A dummy variable which equals 1 if a firm has an S&P rating of B+, B or B- at quarter-end *t* and 0 otherwise.
BadNews	A dummy variable which equals 1 if *Return*<0 and 0 otherwise.
BB rated	A dummy variable which equals 1 if a firm has an S&P rating of BB+, BB or BB- at quarter-end *t* and 0 otherwise.
BBB rated	A dummy variable which equals 1 if a firm has an S&P rating of BBB+, BBB or BBB- at quarter-end *t* and 0 otherwise.
Block	A dummy variable which equals 1 if at least one institutional investor owns greater than 5% of a firm's outstanding equity at quarter-end *t* and 0 otherwise.
BookLev	Total debt (current debt + long-term debt) as a percentage of book value of assets at quarter-end *t*. In Table 4 and Table 5, the variable is measured prior to the loan origination date.
BookLev_ST	Debt maturing within three years as a percentage of book value of assets at year-end before the quarter.
BookLev_LT	Debt maturing in more than three years as a percentage of book value of assets at year-end before the quarter.
Capex_Deviation	Actual capital expenditure amount in fiscal year/quarter *t* minus the forecast amount for the same period scaled by net PP&E at the end of the previous year.
Capex_Forecast	A dummy variable which equals 1 if a firm issues at least one capital expenditure forecast during quarter *t* and 0 otherwise. In Table 4, Table 5 and Table 9, *Capex_Forecast* is a dummy variable which equals 1 if the borrower issued at least one capital expenditure forecast within one year prior to the loan origination date and 0 otherwise. In Table 6, *Capex_Forecast* is a dummy variable which equals 1 if a firm issues at least one capital expenditure forecast for a fiscal year or a quarter in that fiscal year.
Cash/Asset	Cash and short-term investment scaled by PP&E at the end of year *t-1*.
CCC rated or worse	A dummy variable which equals 1 if a firm has an S&P rating of CCC+, CCC, CCC-, CC or D at quarter-end *t* and 0 otherwise.
CFO/Sale	Cash flow from operating activities over sales in year *t-1*.
Dispersion	The coefficient of variation of analysts' quarterly earnings forecasts before the earnings announcement.
Dividend	A dummy variable which equals 1 if a firm pays dividends in year *t-1* and 0 otherwise.
EDF	Merton's (1974) expected default frequency calculated following

Variable	Definitions
	Bharath and Shumway (2008) at quarter-end *t*. In Table 5, the variable is measured prior to the loan origination date.
EPS_Deviation	Actual EPS in fiscal year/quarter *t* minus the forecast for the same period scaled by the stock price three days prior to the forecast issuance date.
EPS_Forecast	A dummy variable which equals 1 if a firm issues at least one EPS forecast during quarter *t* and 0 otherwise. In Table 4 and Table 5, *EPS_Forecast* is a dummy variable which equals 1 if the borrower issues at least one EPS forecast within one year prior to the loan origination date and 0 otherwise. In Table 6, *EPS_Forecast* is a dummy variable which equals 1 if a firm issues at least one EPS forecast for a fiscal year or a quarter in that fiscal year.
Ind_MktLev	Average market leverage for firms in the same 3-digit SIC industry.
Institutions	Percentage of shares held by institutional investors at the beginning of year *t*.
InvestEfficiency	A dummy variable which equals 1 if a firm has unexpected investment level below the sample median in year *t* and 0 otherwise. Unexpected investment is measured as the absolute value of the residual from an industry-year regression of a firm's capital expenditure (scaled by lagged net PP&E) in year *t* on log of sales growth in year *t-1*.
Junk rated	A dummy variable which equals 1 if a firm has an S&P rating of BB+ or below at quarter-end *t* and 0 otherwise. In Table 9, the variable is measured prior to the loan origination date.
High Tangibility	A dummy variable that equals 1 if *Tangibility* is above the sample median and 0 otherwise.
Large Firm	A dummy variable that equals 1 if a firm's total assets are above the sample median and 0 otherwise.
LoanSize	Loan facility amount scaled by total assets prior to the loan origination date. In Table 5, *LoanSize* is defined as the loan package amount scaled by total assets prior to the loan origination date.
LogAsset	Natural logarithm of total assets at quarter-end *t*. In Table 4 and Table 5, the variable is measured prior to the loan origination date. In Table 6, the variable is measured at the end of year *t-1*.
Loss	A dummy variable which equals 1 if net income before extraordinary items for year *t-1* is negative and 0 otherwise.
Maturity	Loan maturity in months. In Table 5, *Maturity* equals the amount-weighted maturity across all facilities.
MktLev	Total debt (current debt + long-term debt) as a percentage of market value of assets at quarter-end *t*. In Table 6, the variable is measured at the end of year *t-1*.
MktLev_ST	Debt maturing within three years as a percentage of market value of assets at year-end before the quarter.
MktLev_LT	Debt maturing in more than three years as a percentage of market value of assets at year-end before the quarter.
NumAnalysts	The number of analysts following a firm before the earnings announcement of quarter *t*. In Table 6, the variable is measured at the beginning of year *t*.
NumCov	The number of financial covenants in a loan agreement.

Variable	Definitions
NumSegments	The number of business segments in which a firm operates in the previous year.
OperatingCycle	Log [(account receivables/sales+inventory/cost of goods sold)×360].
PP	A dummy variable which equals 1 if a loan facility contains a performance pricing grid and 0 otherwise.
PriorLend	A dummy variable which equals 1 if the borrower and the lead arranger has a prior lending relationship in the five years prior to the loan origination date.
Q	Market value of assets (market value of equity + total debt + preferred stock – deferred tax and investment tax credit) to book value of assets at quarter-end *t*. In Table 4 and Table 5, the variable is measured prior to the loan origination date. In Table 6, the variable is measured at the beginning of year *t*.
Return	The stock return during quarter *t*.
Revolver	A dummy variable which equals 1 for revolving loans and 0 otherwise.
ROA	Income before extraordinary items scaled by total assets for quarter *t*. In Table 4 and Table 5, *ROA* is defined as accumulated 4-quarter income before extraordinary items scaled by total assets prior to the loan origination date. In Table 6, *ROA* is defined as income before extraordinary items scaled by total assets for year *t-1*.
Security	A dummy variable which equals 1 if the facility is secured and 0 otherwise. In Table 5, *Security* is a dummy variable which equals 1 if at least one facility of the package is secured and 0 otherwise.
Spread	Loan spread over LIBOR.
Std_Capex	The standard deviation of capital expenditure multiplied by 100 scaled by beginning-of-period net property, plant and equipment from quarter *t-12* to quarter *t*. In Table 6, the variable is defined as standard deviation of capital expenditure scaled by beginning-of-period net PP&E from years *t-5* to *t-1*.
Std_CFO	Standard deviation of cash flow from operations scaled by total assets from years *t-5* to *t-1*.
Std_ROA	Standard deviation of income before extraordinary items scaled by total assets from quarter *t-12* to quarter *t*. In Table 6, *Std_ROA* is defined as the standard deviation of income before extraordinary items scaled by total assets from year *t-5* to year *t-1*.
Std_Sales	Standard deviation of sales scaled by average total assets from years *t-5* to year *t-1*.
Tangibility	Net PP&E scaled by total assets at quarter-end *t*. In Table 4 and Table 5, the variable is measured prior to the loan origination date. In Table 6, the variable is measured at the end of year *t-1*.
Unrated	A dummy variable which equals 1 if firm has no credit rating available at quarter-end *t* and 0 otherwise. In Table 9, the variable is measured prior to the loan origination date.
Volatility	The standard deviation of daily stock returns during quarter *t*.
Z_Score	Altman (1968)'s Z-score measured at the end of year *t-1*.

Figure 1
Deviation of Actual Capital Expenditure from the Forecasts



The figure presents a histogram showing the effect of capital expenditure forecasts on the realized capital expenditure amount. We plot the distribution of two variables: *Capex_Deviation* and *Deviation_Counterfactual*. *Capex_Deviation* is the actual capital expenditure in fiscal year/quarter *t* minus the forecast for the same period, scaled by net PP&E at the end of fiscal year *t-1*. *Deviation_Counterfactual* is the actual capital expenditure in fiscal year *t-1* (quarter *t-4*) minus the forecast for fiscal year *t* (quarter *t*), scaled by the net PP&E at the end of year *t-1*. The sample includes 2,189 capital expenditure forecasts.

Table 1
Sample Selection

Panel A: Sample for the analysis of determinants of capital expenditure forecasts

		Observations
Management forecasts issued in 2008 to 2014		259,430
Drop firms not matched to the intersection of Compustat and CRSP	(36,523)	222,907
Drop forecasts issued after the forecasted fiscal period end date	(16,583)	206,324
Assign forecasts into firm-quarters based on announcement date	(159,749)	46,575
Drop firms in finance industries (SIC: 6000-6999)	(4,087)	42,488
Drop firm-quarters without required controls	(7,708)	34,780

Panel B: Sample for the analysis of loan spreads

		Observations
Loan facilities in Dealscan issued between 2009 and 2014 with borrowers matched to Compustat		27,583
Drop facilities without loan spreads information available	(11,331)	16,252
Require at least one management forecast in IBES Guidance within one year prior to the facility issuance date	(9,731)	6,521
Drop packages without required controls	(2,708)	3,813
Drop firms in finance industries (SIC: 6000-6999)	(205)	3,608

Panel C: Sample for the analysis of investment efficiency

		Observations
Management forecasts issued in 2008 to 2014		259,430
Drop firms not matched to the intersection of Compustat and CRSP	(36,523)	222,907
Drop forecasts issued after the forecasted fiscal period end date	(16,583)	206,324
Assign forecasts into firm-years based on forecasted date	(192,323)	14,001
Drop firms in finance industries (SIC: 6000-6999)	(925)	13,076
Drop firm-years without required controls	(2,295)	10,781

This table summarizes the sample construction processes for the three samples used in our multivariate analyses.

Table 2
Agency Conflicts of Debt and the Likelihood of Capital Expenditure Forecasts: Summary Statistics and Univariate Results

Panel A: Summary Statistics

Variable	N	Mean	Std. Dev.	25%	Median	75%
Capex_Forecast	34,780	0.526	0.499	0.000	1.000	1.000
EPS_Forecast	34,780	0.542	0.498	0.000	1.000	1.000
BookLev	34,780	0.219	0.205	0.017	0.193	0.339
MktLev	34,780	0.203	0.209	0.011	0.144	0.326
EDF	21,909	0.042	0.147	0.000	0.000	0.000
Unrated	34,780	0.599	0.490	0.000	1.000	1.000
Junk rated	34,780	0.192	0.394	0.000	0.000	0.000
BBB rated	34,780	0.129	0.335	0.000	0.000	0.000
BB rated	34,780	0.121	0.326	0.000	0.000	0.000
B rated	34,780	0.085	0.280	0.000	0.000	0.000
CCC rated or worse	34,780	0.003	0.052	0.000	0.000	0.000
Q	34,780	1.579	1.190	0.829	1.199	1.872
Tangibility	34,780	0.275	0.246	0.081	0.182	0.411
ROA	34,780	0.007	0.037	0.001	0.011	0.022
LogAsset	34,780	7.069	1.663	5.835	6.953	8.198
Return	34,780	0.034	0.245	-0.102	0.027	0.150
Volatility	34,780	0.028	0.016	0.017	0.025	0.035
NumAnalysts	34,780	9.392	6.868	4.000	8.000	13.000
BadNews	34,780	0.441	0.496	0.000	0.000	1.000
NumSegments	34,780	2.483	1.712	1.000	2.000	4.000
Block	34,780	0.894	0.308	1.000	1.000	1.000
Dispersion	34,780	0.034	0.042	0.010	0.020	0.040
Std_Capex	34,780	0.035	0.033	0.013	0.024	0.044

Panel B: Correlation Matrix

Variable	*Capex_Forecast*	*EPS_Forecast*	*MktLev*	*BookLev*	*EDF*
Capex_Forecast	1.000	-0.172	0.247	0.227	0.087
		(<.0001)	(<.0001)	(<.0001)	(<.0001)
EPS_Forecast	-0.172	1.000	-0.096	-0.084	-0.221
	(<.0001)		(<.0001)	(<.0001)	(<.0001)
MktLev	0.248	-0.096	1.000	0.917	0.584
	(<.0001)	(<.0001)		(<.0001)	(<.0001)
BookLev	0.227	-0.084	0.917	1.000	0.403
	(<.0001)	(<.0001)	(<.0001)		(<.0001)
EDF	0.087	-0.221	0.584	0.403	1.000
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	

Panel C: Capital Expenditure and Earnings Forecasts by Ratings

	N	*Capex_Forecast*	*EPS_Forecast*
AAA, AA rated	295	28.5%	77.3%
A rated	1,913	54.6%	73.4%
BBB rated	4,476	65.4%	72.6%
BB rated	4,193	69.7%	52.7%
B rated	2,973	76.3%	26.4%
CCC rated or worse	96	85.4%	2.1%

This table reports summary statistics for the sample of firm-quarters used in the analysis of the effect of agency conflicts of debt on the likelihood of issuing capital expenditure forecasts (Panel A), the correlations between measures of agency conflicts of debt and the likelihoods of issuing capital expenditure forecasts and earnings forecasts (Panel B), and the frequencies of firm-quarters issuing capital expenditure forecasts and earnings forecasts for different credit rating groups (Panel C). Variable definitions are in the Appendix.

Table 3
Agency Conflicts of Debt and the Likelihood of Capital Expenditure Forecasts

Panel A: Capital Expenditure Forecasts

	Dependent Variable: *Capex_Forecast*			
	(1)	(2)	(3)	(4)
BookLev	0.091**			
	(2.19)			
MktLev		0.128***		
		(2.95)		
EDF			0.124***	
			(3.38)	
BBB rated				0.115***
				(3.54)
BB rated				0.153***
				(4.40)
B rated				0.151***
				(3.86)
CCC rated or worse				0.250***
				(3.30)
Unrated				0.061*
				(1.69)
Q	0.003	0.007	-0.003	0.007
	(0.46)	(1.10)	(-0.36)	(1.13)
Tangibility	0.626***	0.620***	0.561***	0.627***
	(10.58)	(10.51)	(9.12)	(10.78)
ROA	0.772***	0.793***	0.807***	0.749***
	(5.36)	(5.58)	(5.47)	(5.39)
LogAsset	0.019**	0.016**	0.020***	0.017**
	(2.55)	(2.18)	(2.61)	(2.08)
Return	-0.017	-0.014	-0.012	-0.023*
	(-1.27)	(-1.00)	(-0.73)	(-1.67)
Volatility	0.821**	0.521	0.446	0.708*
	(2.12)	(1.27)	(0.95)	(1.86)
NumAnalysts	-0.000	0.000	-0.000	-0.000
	(-0.19)	(0.08)	(-0.08)	(-0.10)
BadNews	-0.017**	-0.017***	-0.012	-0.017**
	(-2.52)	(-2.59)	(-1.42)	(-2.49)
NumSegments	0.015***	0.014***	0.009*	0.015***
	(3.14)	(3.10)	(1.93)	(3.37)
Block	0.099***	0.098***	0.115***	0.084***
	(5.33)	(5.25)	(6.20)	(4.60)
Dispersion	0.252*	0.239*	0.265*	0.176
	(1.80)	(1.70)	(1.84)	(1.26)
Std_Capex	-1.012***	-1.004***	-1.279***	-1.011***
	(-4.55)	(-4.50)	(-4.87)	(-4.56)
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
No. of Observations	34,780	34,780	21,909	34,780
Pseudo *R*-squared	0.225	0.226	0.210	0.231

Panel B: Earnings Forecasts

	Dependent Variable: *EPS_Forecast*			
	(1)	(2)	(3)	(4)
BookLev	-0.142***			
	(-2.78)			
	[p<0.01]			
MktLev		-0.145***		
		(-2.70)		
		[p<0.01]		
EDF			-0.048	
			(-1.09)	
			[p<0.01]	
BBB rated				0.071*
				(1.73)
				[p=0.45]
BB rated				-0.059
				(-1.29)
				[p<0.01]
B rated				-0.177***
				(-3.59)
				[p<0.01]
CCC rated or worse				-0.554***
				(-3.47)
				[p<0.01]
Unrated				-0.059
				(-1.29)
				[p=0.06]
Control Variables	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
No. of Observations	34,780	34,780	21,909	34,780
Pseudo R-squared	0.209	0.209	0.234	0.217

This table reports the regression results for the effect of agency conflicts of debt on the likelihood of issuing capital expenditure forecasts. We present the main results in Panel A and the results of using earnings forecasts as benchmarks in Panel B. We estimate probit models and report the average marginal effects of the independent variables and related z-statistics in parentheses. Standard errors are clustered for each firm. ***, **, and * indicates significance at the 1%, 5%, 10%, respectively, based on two-tailed tests. In Panels B, we also report for each variable the p-value in square brackets for the tests of the differences between the estimated coefficients and the corresponding coefficients in Panel A. All variables are defined in the Appendix.

Table 4
Capital Expenditure Forecasts and Loan Spreads

Panel A: Summary Statistics

Variable	N	Mean	Std. Dev.	25%	Median	75%
Spread	3,608	242.648	141.427	150.000	200.000	300.000
Capex_Forecast	3,608	0.769	0.422	1.000	1.000	1.000
EPS_Forecast	3,608	0.575	0.494	0.000	1.000	1.000
LogAsset	3,608	7.807	1.493	6.676	7.723	8.797
BookLev	3,608	0.308	0.205	0.162	0.285	0.420
Tangibility	3,608	0.332	0.263	0.103	0.252	0.531
ROA	3,608	0.035	0.083	0.015	0.038	0.070
Std_ROA	3,608	0.022	0.030	0.005	0.010	0.023
Q	3,608	1.282	0.773	0.769	1.058	1.560
NumCov	3,608	2.240	3.089	0.000	1.000	3.000
LoanSize	3,608	0.182	0.176	0.057	0.125	0.249
Maturity	3,608	53.501	16.444	48.000	60.000	60.000
Security	3,608	0.514	0.500	0.000	1.000	1.000
Revolver	3,608	0.652	0.476	0.000	1.000	1.000
PP	3,608	0.378	0.485	0.000	0.000	1.000

Panel B: Regression Results

	Dependent Variable: *Spread*	
	(1)	(2)
Capex_Forecast	-17.191***	
	(-3.07)	
EPS_Forecast		-0.757
		(-0.14)
		[*p*=0.03]
LogAsset	-11.778***	-11.349***
	(-3.76)	(-3.61)
BookLev	36.346**	34.850**
	(2.17)	(2.09)
Tangibility	0.278	-7.284
	(0.02)	(-0.49)
ROA	-119.002***	-119.781***
	(-2.87)	(-2.88)
Std_ROA	370.304***	377.510***
	(3.69)	(3.74)
Q	-14.320***	-13.844***
	(-4.29)	(-4.14)
NumCov	-0.046	-0.156
	(-0.05)	(-0.15)
LoanSize	31.968**	31.475**
	(2.18)	(2.15)
Maturity	0.254	0.247

	(1.21)	(1.18)
Security	27.872***	27.917***
	(5.01)	(4.98)
Revolver	-58.023***	-57.904***
	(-11.85)	(-11.82)
PP	-19.337***	-19.905***
	(-5.17)	(-5.33)
Intercept	389.024***	376.909***
	(12.56)	(12.35)
Rating Fixed Effects	Yes	Yes
Lead Arranger Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
No. of Observations	3,608	3,608
Adj. *R*-squared	0.580	0.578

This table reports results for the analysis of the effect of capital expenditure forecasts on loan spreads. Panel A reports summary statistics. Panel B reports the OLS regression results. In column 2, we also report for *EPS_Forecast* the *p*-value in the square bracket for the test of the difference between the estimated coefficient and the corresponding coefficient for *Capex_Forecast* in column 1. The sample includes 3,608 loan facilities for 1,193 firms. The reported numbers in Panel B are estimated coefficients and related *t*-statistics (in parentheses), calculated based on standard errors clustered by firm. ***, **, and * indicates significance at the 1%, 5%, and 10% levels, respectively, based on two-tailed tests. Variable definitions are provided in the Appendix.

Table 5
Capital Expenditure Forecasts and Investment Efficiency

Panel A: Summary Statistics

Variable	N	Mean	Std. Dev.	25%	Median	75%
InvestEfficiency	10,781	0.500	0.500	0.000	1.000	1.000
Capex_Forecas	10,781	0.635	0.481	0.000	1.000	1.000
EPS_Forecast	10,781	0.526	0.499	0.000	1.000	1.000
Institutions	10,781	0.688	0.246	0.548	0.747	0.877
NumAnalysts	10,781	8.852	6.770	3.000	7.000	13.000
AQ	10,781	-0.042	0.026	-0.055	-0.035	-0.023
LogAsset	10,781	7.165	1.685	5.870	7.100	8.381
Q	10,781	1.458	0.906	0.805	1.168	1.815
ROA	10,781	0.030	0.093	0.006	0.044	0.083
Std_ROA	10,781	0.062	0.066	0.016	0.035	0.080
Std_CFO	10,781	0.047	0.033	0.022	0.037	0.061
Std_Sales	10,781	0.128	0.097	0.055	0.100	0.172
Std_Capex	10,781	0.134	0.131	0.042	0.085	0.173
Z_Score	10,781	1.261	0.828	0.679	1.227	1.781
Tangibility	10,781	0.268	0.233	0.084	0.179	0.406
MktLev	10,781	0.198	0.198	0.015	0.143	0.320
Ind_MktLev	10,781	0.203	0.120	0.097	0.172	0.279
CFO/Sale	10,781	0.134	0.116	0.055	0.113	0.197
Cash/Asset	10,781	2.126	3.324	0.135	0.628	2.409
Dividend	10,781	0.460	0.498	0.000	0.000	1.000
Age	10,781	23.146	18.277	11.000	17.000	30.000
OperatingCycle	10,781	4.599	0.648	4.195	4.664	5.068
Loss	10,781	0.241	0.428	0.000	0.000	0.000

Panel B: Regression Results

	Dependent Variable: *InvestEfficiency*	
	(1)	(2)
Capex_Forecast	0.040***	
	(3.03)	
EPS_Forecast		0.008
		(0.60)
		[p=0.09]
Institutions	0.043*	0.052**
	(1.66)	(1.98)
NumAnalysts	0.001	0.001
	(0.87)	(0.70)
AQ	0.639**	0.648**
	(2.43)	(2.46)
LogAsset	0.021***	0.021***
	(3.07)	(3.20)
Q	-0.006	-0.006

	(-0.78)	(-0.71)
ROA	-0.097	-0.103
	(-1.09)	(-1.15)
Std_ROA	-0.089	-0.078
	(-0.85)	(-0.74)
Std_CFO	0.149	0.135
	(0.70)	(0.63)
Std_Sales	0.002	0.006
	(0.03)	(0.09)
Std_Capex	-0.147***	-0.149***
	(-2.91)	(-2.96)
Z_Score	0.011	0.014
	(0.90)	(1.10)
Tangibility	-0.142**	-0.118*
	(-2.30)	(-1.95)
MktLev	-0.103**	-0.097**
	(-2.47)	(-2.32)
Ind_MktLev	-0.044	-0.037
	(-0.46)	(-0.39)
CFO/Sale	-0.033	-0.033
	(-0.42)	(-0.43)
Cash/Asset	0.000	-0.000
	(0.19)	(-0.19)
Dividend	-0.002	-0.001
	(-0.17)	(-0.05)
Age	-0.000	-0.000
	(-0.64)	(-0.67)
OperatingCycle	0.018	0.016
	(1.29)	(1.21)
Loss	-0.020	-0.020
	(-1.54)	(-1.54)
Industry Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
No. of observations	10,781	10,781
Pseudo *R*-square	0.131	0.130

This table reports results for the analysis of the effect of capital expenditure forecasts on investment efficiency. Panel A reports summary statistics. Panel B reports the probit regression results. In column 2, we also report for *EPS_Forecast* the *p*-value in the square bracket for the test of the difference between the estimated coefficient and the corresponding coefficient for *Capex_Forecast* in column 1. The sample includes 10,781 firm-year observations for 2,383 firms. The reported numbers in Panel B are estimated average marginal effects and related *z*-statistics (in parentheses), calculated based on standard errors clustered by firm. ***, **, and * indicates significance at the 1%, 5%, and 10% levels, respectively, based on two-tailed tests. Variable definitions are provided in the Appendix.

Table 6
Agency Conflicts of Debt and Deviation from Capital Expenditure Forecasts

Panel A: Capital Expenditure Forecasts

	Dependent Variable: |*Capex_Deviation*|			
	(1)	(2)	(3)	(4)
BookLev	-0.049**			
	(-2.34)			
MktLev		-0.073***		
		(-2.79)		
EDF			-0.066**	
			(-2.18)	
BBB rated				-0.013*
				(-1.72)
BB rated				0.009
				(0.35)
B rated				0.004
				(0.14)
CCC rated or worse				-0.007
				(-0.23)
Unrated				-0.000
				(-0.01)
Q	-0.006	-0.009	-0.003	-0.006
	(-1.03)	(-1.47)	(-0.45)	(-1.07)
Tangibility	-0.152***	-0.149***	-0.125**	-0.159***
	(-3.05)	(-3.04)	(-2.34)	(-3.00)
ROA	-0.894*	-0.918*	-0.383	-0.855*
	(-1.77)	(-1.80)	(-1.56)	(-1.72)
LogAsset	-0.007	-0.005	0.002	-0.009
	(-0.71)	(-0.53)	(0.20)	(-0.75)
Return	0.007	0.005	0.000	0.005
	(0.65)	(0.49)	(0.01)	(0.49)
Volatility	-0.295	-0.100	0.398	-0.420
	(-0.70)	(-0.24)	(0.97)	(-1.06)
NumAnalysts	0.001	0.001	0.001	0.002
	(1.28)	(1.05)	(0.93)	(1.48)
BadNews	-0.001	-0.001	-0.004	-0.001
	(-0.32)	(-0.16)	(-1.03)	(-0.46)
NumSegments	-0.010	-0.010	-0.010	-0.009
	(-1.55)	(-1.55)	(-1.35)	(-1.56)
Block	-0.028**	-0.027**	-0.021	-0.029***
	(-2.36)	(-2.28)	(-1.47)	(-2.68)
Dispersion	0.088	0.094	0.053	0.094
	(1.49)	(1.55)	(1.10)	(1.54)
Std Capex	1.507***	1.508***	1.386***	1.518***
	(3.17)	(3.17)	(2.71)	(3.20)
Intercept	0.202**	0.216**	0.078	0.206*
	(2.27)	(2.36)	(1.16)	(1.72)
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
No. of Observations	21,199	21,199	14,600	21,199
Adj. *R*-squared	0.044	0.044	0.070	0.043

Panel B: Earnings Forecasts

	Dependent Variable: |*EPS_Deviation*|			
	(1)	(2)	(3)	(4)
BookLev	0.021***			
	(3.34)			
MktLev		0.040***		
		(3.81)		
EDF			0.122***	
			(3.66)	
BBB rated				-0.005***
				(-2.81)
BB rated				-0.010**
				(-2.54)
B rated				0.003
				(0.39)
CCC rated or worse				-0.039*
				(-1.71)
Unrated				-0.013**
				(-2.30)
Q	-0.002***	-0.001	-0.002*	-0.002***
	(-2.84)	(-1.35)	(-1.93)	(-2.67)
Tangibility	-0.009	-0.012**	-0.006	-0.011*
	(-1.63)	(-2.10)	(-1.20)	(-1.73)
ROA	-0.227***	-0.211***	-0.161**	-0.233***
	(-3.76)	(-3.40)	(-2.46)	(-3.89)
LogAsset	-0.004**	-0.005***	-0.003***	-0.005**
	(-2.53)	(-3.27)	(-3.17)	(-2.03)
Return	-0.022***	-0.022***	-0.017***	-0.022***
	(-3.86)	(-3.84)	(-4.07)	(-3.78)
Volatility	0.680***	0.598***	0.177**	0.698***
	(4.63)	(4.17)	(2.15)	(4.69)
NumAnalysts	-0.000	-0.000	-0.000**	-0.000
	(-1.20)	(-0.22)	(-2.09)	(-1.55)
BadNews	-0.006***	-0.006***	-0.004***	-0.006***
	(-3.58)	(-3.66)	(-3.55)	(-3.62)
NumSegments	0.001	0.001	0.000	0.000
	(1.21)	(1.19)	(0.73)	(0.68)
Block	-0.017	-0.018*	-0.007***	-0.016
	(-1.64)	(-1.69)	(-2.75)	(-1.54)
Dispersion	0.108***	0.098***	0.087***	0.114***
	(4.12)	(3.69)	(2.87)	(4.24)
Std Capex	0.020	0.020	0.029	0.015
	(0.49)	(0.50)	(0.69)	(0.38)
Intercept	0.051**	0.057**	0.049***	0.071**
	(2.29)	(2.57)	(4.24)	(2.20)
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
No. of Observations	24,303	24,303	15,673	24,303
Adj. *R*-squared	0.069	0.072	0.103	0.070

This table reports the OLS regression results of estimating the effect of agency conflicts of debt on the deviation of capital expenditure from the forecasts. We present the main results in Panel A and the results

of using earnings forecasts as benchmarks in Panel B. The reported numbers are estimated coefficients and related *t*-statistics (in parentheses), calculated based on standard errors clustered by firm. ***, **, and * indicates significance at the 1%, 5%, and 10% levels, respectively, based on two-tailed tests. Variable definitions are provided in the Appendix.

Table 7
Firm Leverage and Capital Expenditure Forecasts: Effects of Asset Tangibility and Debt Maturity

Panel A: Asset Tangibility

	Dependent Variable: *Capex_Forecast*	
	(1)	(2)
BookLev	0.210***	
	(4.01)	
MktLev		0.265***
		(4.78)
High Tangibility	0.261***	0.252***
	(13.09)	(13.44)
BookLev × *High Tangibility*	-0.185***	
	(-2.70)	
MktLev × *High Tangibility*		-0.178***
		(-2.70)
Controls	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
No. of Observations	34,780	34,780
Pseudo R-squared	0.230	0.230

Panel B: Debt Maturity

	Dependent Variable: *Capex_Forecast*	
	(1)	(2)
BookLev_ST	-0.088	
	(-1.40)	
BookLev_LT	0.170***	
	(3.79)	
MktLev_ST		-0.036
		(-0.59)
MktLev_LT		0.189***
		(4.15)
Controls	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
No. of Observations	34,780	34,780
Pseudo R-square	0.227	0.228

Test:	*BookLev_LT* – *BookLev_ST* = 0	*MktLev_LT* – *MktLev_ST* = 0
Difference	0.258***	0.225***
p-Value	<0.01	<0.01

This table reports the probit regression results for how the effect of firm leverage on the likelihood of capital expenditure forecasts varies with asset tangibility and debt maturity. The reported numbers are estimated marginal effects and related *z*-statistics (in parentheses), calculated based on standard errors clustered by firm. ***, **, and * indicates significance at the 1%, 5%, and 10% levels, respectively, based on two-tailed tests. Variable definitions are provided in the Appendix.

Table 8
Capital Expenditure Forecasts and Loan Spreads: Cross-Sectional Tests

	Dependent Variable: *Spread*		
	(1)	(2)	(3)
Capex_Forecast	4.421	-38.122***	-32.798***
	(0.66)	(-3.93)	(-3.56)
Capex_Forecast × *Junk rated*	-31.930**		
	(-2.21)		
Capex_Forecast × *PriorLend*		37.222***	
		(3.65)	
Capex_Forecast × *Large Firm*			32.035***
			(2.88)
PriorLend		-42.576***	
		(-4.65)	
Large Firm			-37.022***
			(-4.61)
Controls	Yes	Yes	Yes
Rating Fixed Effects	Yes	Yes	Yes
Lead Arranger Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
No. of Observations	3,608	3,608	3,608
Adj. *R*-squared	0.581	0.584	0.574

This table reports the OLS regression results for how the effect of capital expenditure forecasts on loan spreads varies with borrower size, credit ratings, and the prior lending relationship. The reported numbers are estimated coefficients and related *t*-statistics (in parentheses), calculated based on standard errors clustered by firm. ***, **, and * indicates significance at the 1%, 5%, and 10% levels, respectively, based on two-tailed tests. Variable definitions are provided in the Appendix.