Debt Issuance and Asset Revaluation: Firm Heterogeneity, Monetary Easing, and Implications on Investment

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Declaration

I hereby declare that this thesis is my own work, except where due acknowledgment has been made. To the best of my knowledge, it contains no material previously published or written by another person, nor does it include substantial portions of material that have been submitted for the award of any other degree or diploma at the Australian National University (ANU) or any other educational institution. Furthermore, I certify that all sources of information and literature used have been appropriately cited in the thesis.

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Abstract

This thesis investigates the association between debt issuance and asset revaluation, focusing on variations across firm characteristics and monetary regimes, as well as its implications for investment. The thesis is composed of three chapters, each addressing one of the critical aspects above.

The first chapter establishes the relation between debt issuance and asset revaluation, with the latter defined as value appreciation for firm stakeholders beyond changes in debt notional, and explores how this relation varies across different types of firms. Using quarterly data from over 7,000 public US non-financial firms spanning 1975 to 2023, we find that active debt management is strongly correlated with value creation. Less established firms—characterized as younger, higher-market-to-book, smaller, lower-leverage, higher-cash, or less profitable—experience stronger effects compared to their counterparts. The value impacts are predominantly accrued to stock price appreciation and net equity issuance.

The second chapter analyzes the effect of accommodative monetary policy on how changes in debt levels relate to asset revaluation. We find that active debt management is correlated with stock price appreciation primarily during moderate low-rate periods, while net debt issuance signals increased net equity issuance under broader accommodative monetary conditions. In the cross section, most firm types experience reinforced equity financing under monetary easing, while only younger, value, or smaller firms derive greater stock market benefits from moderate periods of low borrowing costs.

The third chapter explores the link between debt issuance and firm investment, demonstrating a strong association between net debt issuance and increased investment activities. Less established firms tend to allocate debt toward net capital expenditure and R&D, whereas more established firms use it for acquisition. The relation between net debt issuance and investment is amplified by low interest rates, emphasizing the role of accommodative monetary policy in fostering business investment.

Together, this thesis provides a deeper understanding of how debt financing relates to firm value creation and offers important insights for corporate finance strategies and policymaking.

Contents

1. Chapter 1: How Does Debt Issuance Relate to Asset Revaluation?

1.1. Introduction

Corporate finance literature has long debated the association between debt issuance and firm valuation, because the decision to issue debt and its interaction with firm value are complex, shaped by numerous factors. Extensive research explores the choice between debt and equity financing (Julio, Kim, and Weisbach, 2007; Huang and Ritter, 2009; DeAngelo, 2022; Korteweg, Schwert, and Strebulaev, 2022), as well as the role of debt in funding investment (DeAngelo, DeAngelo, and Whited, 2011; Bargeron, Denis, and Lehn, 2018; Bolton, Chen, and Wang, 2011) and shaping payout policies (Ma, 2019; Begenau and Salomao, 2019; Farre-Mensa, Michaely, and Schmalz, 2024). As a major source of external financing, debt issuance is strongly associated with firm valuation and stakeholders' claims. However, the direct association between debt issuance and asset revaluation remains underexplored. This study addresses this gap by investigating how corporate debt issuance correlates with changes in market asset valuations that extend beyond changes in debt notional, with a particular focus on how this relation varies across firms with different characteristics.

We define asset revaluation as the variation in asset value accruing to firm stakeholders, excluding the mechanical effects of changes in debt levels. Using a comprehensive dataset of over 7,000 public US non-financial firms spanning 1975 to 2023, we employ rigorous empirical methods to examine the relation between debt issuance and asset revaluation. Recognizing the heterogeneity among firms, we condition our analysis on firm-specific characteristics, including firm age, market-to-book ratio, firm size, leverage ratio, cash holdings, and profitability.

We regard positive asset revaluation as value creation, while negative one as value destruction. Our initial findings indicate that, on average, value creation significantly positively corresponds to changes in debt levels. Moreover, we refer to aggregate debt changes as *debt issuance*, with positive changes termed *net debt issuance* and negative changes as *net debt redemption*. Stronger value effect is observed when increases and decreases in debt levels are considered separately, suggesting that active debt management strongly relates to value creation—a V-shaped relation

between debt issuance and asset revaluation. Further analysis reveals significant variations in these relations across different types of firms. Firms that are younger, higher-market-to-book (growth-oriented), smaller, lower-leverage, higher-cash, or less profitable generate greater value when either issuing or redeeming debt. We associate these characteristics with *less established* firms, who tend to be more financially constrained and generate more volatile cash flows according to the literature.

In addition to assessing the overall association between debt issuance and asset revaluation, we explore sources of asset revaluation, attributing it among firm stakeholders such as shareholders and debt holders. Our results show that two equity-related components—existing and new shareholders' revaluation—primarily drive the observed V-shaped relation. The stock price changes for existing shareholders show consistent cross-sectional patterns compared to overall asset revaluation, whereas net equity issuance by different types of firms follows distinct patterns. To be more specific, the stock price movement relates positively to active debt management, particularly among less established firms, likely reflecting these firms' growth potential and effective utilization of external financing. Net equity issuance, on the other hand, is more closely related to firms' financing strategies. Higher-market-to-book, higher-cash, or less profitable firms, with substantial funding needs and limited access to credit, tend to issue more equity when adjusting debt, while larger or higher-leverage firms issue more equity to simultaneously meet financing needs and manage capital structure. Low-cash firms consistently issue equity while making debt level adjustments to address liquidity constraints.

The association between debt issuance and debt holders' revaluation tends to be small in scale and consistently negative. Less established firms as well as high-leverage firms experience greater debt value depreciation, reflecting their higher credit risks and lower issuer quality. Lifecycle analysis further reveals that firms in the intro and growth stages actively manage debt levels, supporting expansion and generating significant growth, consistent with the patterns for less established firms.

Since the market value of debt, a key ingredient in firms' valuation, is not directly observable, we construct it using long-term debt as a proxy for corporate bonds and current debt for bank loans. The data are drawn from multiple sources, including Compustat, CRSP, the Lehman Brothers

Fixed Income Database, the Trade Reporting and Compliance Engine (TRACE), the Mergent Fixed Income Securities Database (FISD) National Association of Insurance Commissioners (NAIC) Database, DataStream, and DealScan. For bonds, we apply the Nelson and Siegel (1987) method to derive firm- and time-specific discount factors that convert book values into market values. For bank loans, we compute quarterly firm-level weighted average loan prices based on loan pricing at origination.

The remainder of this chapter is organized as follows: Section 1.2 reviews related literature. Section 1.3 defines asset revaluation and outlines the empirical strategy. Section 1.4 and Section 1.5 describe the market value of assets, data, and variable construction. Section 1.6 presents baseline results on the association between debt issuance and asset revaluation, while Section 1.7 analyzes cross-sectional differences. Section 1.8 decomposes asset revaluation and conducts component-specific analysis. Section 1.9 reports robustness checks, and Section 1.10 concludes.

1.2. Prior Work

This study contributes to several strands of the corporate finance literature.

First, in making external financing decisions, firms face choices between debt and equity (Kraus and Litzenberger, 1973; Myers and Majluf, 1984; Myers, 1984)[1]. A substantial body of research has explored this decision through the lenses of market timing and cross-market arbitrage strategies (Alti, 2006; Huang and Ritter, 2009; Lewis and Tan, 2016; Chang, Chen, and Dasgupta, 2019; Ma, 2019). Related studies examine the determinants of debt composition and structure, identifying the factors that shape firms' preferences for different forms of debt financing (Hackbarth, Hennessy, and Leland, 2007; Julio, Kim, and Weisbach, 2007; Rauh and Sufi, 2010; Becker and Ivashina, 2014; Crouzet, 2018; Darmouni, Giesecke, and Rodnyansky, 2022). Our work centers on debt issuance as the primary explanatory variable. By conditioning on changes in net debt, we provide new insights into how firms choose between increasing or reducing debt and the implications of these choices for firm value.

[1] See Myers (2001) for a summary of the fundamental capital structure theories.

Second, beyond capital structure decisions, an equally important question is how firms allocate the capital they raise. The use of funds can influence firm valuation through different channels. On one hand, firms may retain the capital internally, using it for physical asset investment or cash holdings as a liquidity buffer. On the other hand, firms may distribute the funds externally through payouts to stakeholders. If investment generates returns on newly invested capital (RONIC) that exceed the cost of capital, it enhances the firm's fundamental value. Likewise, cash holdings allow firms to hedge future investment needs against income shortfalls (Acharya, Almeida, and Campello, 2007). Payouts, particularly when persistent, can also boost valuation under a discounted cash flow framework. Regarding debt-financed payouts, Farre-Mensa, Michaely, and Schmalz (2024) emphasize that such strategies are often part of broader leverage and cash management practices. Ma (2019) shows that firms may act as cross-market arbitrageurs, issuing debt and repurchasing equity when the expected return on debt is low relative to equity. Conversely, Denis and McKeon (2012) argue that debt issuance is primarily driven by operating needs, rather than by intentions to return capital to shareholders. Further research highlights the role of leverage management in response to liquidity constraints: Korteweg, Schwert, and Strebulaev (2022) examine how firms manage leverage to meet working capital needs, while Hotchkiss, Nini, and Smith (2022) analyze financing strategies for free cash flow shortfalls. A prominent example of debt issuance for liquidity provision purposes is Ford Motor Company's borrowing of nearly 24 billion US dollars as a financial cushion against economic downturns (Vlasic, 2009). In light of these varied motives, our study examines the association between debt issuance and asset revaluation. A robust positive association implies that firms effectively deploy borrowed funds to generate asset growth and enhance firm value. Chapter 3 will explore investment as a specific mechanism underlying this relation.

Third, firms' financing and capital allocation decisions differ systematically across firm characteristics. Korteweg (2010) find that smaller, more profitable firms often target higher optimal debt ratios, though Danis, Rettl, and Whited (2014) report a non-monotonic relation between profitability and leverage. Dasgupta, Noe, and Wang (2011) show that financially constrained firms

often prioritize debt repayment over capital investment, particularly in adverse market conditions. DeAngelo, Gonçalves, and Stulz (2018) document that firms deleverage to preserve financial flexibility, while their subsequent work (DeAngelo, Gonçalves, and Stulz, 2022) suggests that firms increase leverage as cash holdings fall. Dinlersoz, Kalemli-Ozcan, Hyatt, and Penciakova (2018) investigate leverage dynamics across public and private firms, with firm age and size as key differentiators. Furthermore, Ma (2019) finds that corporate arbitrage through debt-for-equity strategies is most prevalent among large, unconstrained firms, whereas Farre-Mensa, Michaely, and Schmalz (2024) show that low-leverage, high-growth firms are more inclined to finance payouts through debt. Choi (2013) argues that growth firms typically maintain low leverage due to borrowing constraints and limited access to capital markets. Building on these findings, our cross-sectional analysis identifies firm characteristics that condition the relation between debt issuance and asset revaluation.

Fourth, our study is rooted in the broader literature on capital structure theory, connecting financing decisions and firm value. Led by the seminal papers such as Modigliani and Miller (1958, 1963); Miller (1977), numerous researchers have been studying the effect of firms' capital structure on their outcome. The division of such theories could concern tax versus non-tax, static versus dynamic, perfect versus imperfect market, etc. Initially, the foundational Modigliani and Miller (1958) theory established that, under ideal conditions, firm value is invariant to capital structure. However, subsequent models incorporating real-world frictions—such as taxes, bankruptcy costs, agency problems, and asymmetric information—suggest that an optimal capital structure may exist, albeit not uniquely. Despite decades of research, there is still no consensus on the mechanisms through which capital structure affects firm value or on the appropriate empirical methodologies for evaluating these effects.

Our study builds on these theoretical foundations by shifting the focus from static capital structure levels to changes in debt levels as indicators of firms' financing decisions. Additionally, we define asset revaluation in a way that abstracts from the mechanical impact of newly issued debt, isolating the valuation effect. In a world with market frictions, the observed relation between debt

issuance and asset revaluation provides a meaningful signal of whether firms are effectively using debt to generate value. This inquiry does not aim to validate any single capital structure theory but rather to assess whether firms succeed in value maximization through debt-financed strategies.

1.3. Asset Revaluation

Time progresses in discrete periods, where period $t-1$ runs from time $t-1$ to time t, period t from t to $t+1$, and so on. All valuations are expressed in real terms. For a generic firm, let A_t denote the market value of assets at time t, computed as the sum of the market value of equity, $A_t^e = N_t^e P_t^e$, and the market value of debt, $A_t^d = N_t^d P_t^d$:

$$A_t \quad = \quad N_t^e P_t^e + N_t^d P_t^d. \tag{1}$$

Here, N_t^e represents the number of shares outstanding, P_t^e the price per share, N_t^d the notional amount of debt outstanding, and P_t^d the average price per unit of notional debt.

The market value of debt can be further decomposed by maturity as follows:

$$N_t^d P_t^d \quad = \quad \sum_{k=1}^{K} N_t^{d,k} P_t^{d,k}, \tag{2}$$

where k indexes the time to maturity of the debt, $N_t^{d,k}$ and $P_t^{d,k}$ are the corresponding maturity-specific notional amount and price, respectively, such that $N_t^d = \sum_{k=1}^{K} N_t^{d,k}$ represents the total debt notional across all maturities, and $P_t^d = \sum_{k=1}^{K} P_t^{d,k} (N_t^{d,k}/N_t^d)$ denotes the notional-weighted price of debt.

The period-t returns to existing shareholders and debt holders are computed as follows:

$$R_{t+1}^e = \frac{P_{t+1}^e + c_{t+1}^e}{P_t^e} \qquad \text{and} \qquad R_{t+1}^d = \frac{P_{t+1}^d + c_{t+1}^d}{P_t^d}, \tag{3}$$

where c_t^e and c_t^d denote the dividend per share and the average coupon payment per unit of debt notional, respectively. The period-t return to existing stakeholders of the firm can be computed as

the weighted average return to existing shareholders and debt holders:

$$R^a_{t+1} = \frac{A^e_t}{A_t} R^e_{t+1} + \frac{A^d_t}{A_t} R^d_{t+1}. \tag{4}$$

At time $(t+1)$, the market value of net equity issuance during period t is expressed as $(N^e_{t+1} - N^e_t)P^e_{t+1}$. Corporate debt is assumed to be issued and redeemed at par.[2] The market value of net debt issuance is measured by adjusting net debt issuance using the average price per notional at $t+1$.

Combining Equations (1) through (4), we obtain:

$$A_{t+1} = R^a_{t+1} A_t + I_{t+1} - C_{t+1}, \tag{5}$$

where $C_{t+1} = N^e_t c^e_{t+1} + N^d_t c^d_{t+1}$ measures the total dividend and coupon payments to existing stakeholders of the firm, and $I_{t+1} = (N^e_{t+1} - N^e_t)P^e_{t+1} + (N^d_{t+1} - N^d_t)P^d_{t+1}$ is the market value of net issuance in equity and debt.

Gross asset growth in period t, defined as the change in market assets, can be attributable to shareholders and debt holders:

$$\frac{A_{t+1}}{A_t} = 1 + \frac{(N^e_{t+1}P^e_{t+1} - N^e_t P^e_t) + (N^d_{t+1}P^d_{t+1} - N^d_t P^d_t)}{A_t}. \tag{6}$$

On one hand, new debt is issued at par in period t, denoted as $I^d_{t+1} = N^d_{t+1} - N^d_t$, which raises market assets from A_t to mechanical debt-induced asset levels, $A_t + I^d_{t+1}$, reflecting the direct impact of net change in debt notional on the firm's assets. On the other hand, the actual end-of-period market value of assets A_{t+1} may deviate from the debt-induced levels due to equity's or debt's price movement, or changes in the number of shares outstanding.

We utilize $\delta_{t+1} = (A_{t+1} - (A_t + I^d_{t+1}))/A_t$ to measure the rate of *asset revaluation* in period t, which captures the non-mechanical growth in market assets, which is not directly induced from

[2]This assumption is appropriate for coupon-bearing debt but holds only approximately for short-term discount bonds, which tend to trade below par.

debt issuance:

$$\delta_{t+1} = \frac{(N^e_{t+1}P^e_{t+1} - N^e_t P^e_t) + (N^d_{t+1}P^d_{t+1} - N^d_t P^d_t) - I^d_{t+1}}{A_t}, \tag{7}$$

and refer to scenarios where $\delta_{t+1} > 0$ or $\delta_{t+1} < 0$ as *value creation* or *value destruction*, respectively.

Our goal is to understand whether I^d_{t+1} correlates with δ_{t+1}, that is, whether debt issuance correlates with asset revaluation beyond the mechanical growth in market assets. To do so, we consider the specification:

$$\delta_{t+1} = \beta \frac{I^d_{t+1}}{A_t} + X_t'\gamma + \varepsilon_{t+1}, \tag{8}$$

where I^d_{t+1}/A_t is referred to as the main *debt issuance* variable of interest. The terms "debt issuance", "rate of debt issuance", and "debt issuance yield" are used interchangeably in our later discussion. X_t is a vector of conditioning variables observable at time t, and ε_{t+1} captures the remaining variation in δ_{t+1} that is unrelated to our model.

Our null hypothesis is that $\beta = 0$, which implies that debt issuance, on average, contains no additional information for asset revaluation once the conditioning variables have been taken into account. A positive estimate for β indicates that debt issuance tends to be associated with value creation, while a negative estimate for β is consistent with debt issuance relating to value destruction. We empirically test the null hypothesis using the data described in the next sections.

1.4. Market Value of Assets

The market value of assets, A_t, is defined as the sum of the market value of equity and the market value of debt as per Equation (1). This model initially considers firms with only common equity and debt. In reality, however, there are more complex firms with additional balance sheet classes, such as preferred stocks and other liability-like items. We identify these additional balance sheet items by decomposing the difference between total assets and the book value of common stock,

which consists of the book value of debt and the remaining components. The remaining components enter A_t at book value and are aligned with common equity.

The market value of common equity is computed by multiplying the stock price with the number of common shares outstanding, aggregated to the firm level by summing over different classes of common shares, if any. For simplicity, we assume corporate debt consists of corporate bonds and bank loans. Long-term debt with a long maturity acts as a proxy for corporate bonds, while the portion of book debt net of corporate bonds (i.e., current debt) with a short maturity serves as a proxy for bank loans, following the approach of Choi (2013) and Choi and Richardson (2016). Let N_t^b and N_t^l denote the book value of bonds and loans, P_t^b and P_t^l their corresponding prices. The market value of debt in (2) equals the notional of debt outstanding times the notional-weighted average price between bonds and loans:

$$N_t^d P_t^d = \left(N_t^b + N_t^l\right)\left(\frac{N_t^b}{N_t^b + N_t^l} P_t^b + \frac{N_t^l}{N_t^b + N_t^l} P_t^l\right). \tag{9}$$

1.4.1. Market value of corporate bonds

We measure the market value of bonds using secondary market pricing data for corporate bonds, collected from the Lehman Brothers Fixed Income Database, FINRA's Trade Reporting and Compliance Engine (TRACE), the Mergent Fixed Income Securities Database (FISD) National Association of Insurance Commissioners (NAIC) Database, and DataStream (Jostova, Nikolova, Philipov, and Stahel, 2013; Acharya, Amihuda, and Bharat, 2013; Nozawa, 2017). The Lehman data comprise month-end bid prices from January 1973 to March 1998. The WRDS Bond Returns facility provides end-of-month TRACE prices from July 2002 to December 2023. NAIC contains transaction data reported by insurance companies from January 1994 to December 2023. DataStream has month-end bond price quotes from January 1990 to December 2023.[3] We use bond issues' ISIN provided by FISD to obtain bond prices from DataStream. If multiple sources provide price data for a given bond and month, we prioritize Lehman and TRACE data, which do not overlap, first

[3] DataStream datatype *mpd*.

over NAIC and then over DataStream. Bonds are identified by nine-digit CUSIP.

For bonds from FISD-based data sources (TRACE, NAIC and DataStream), we require them to be active senior unsecured bonds issued in US dollars with fixed or zero coupons.[4] We exclude bonds with option-like features other than early redemption.[5] Additionally, issues that are part of unit deals or private placements are excluded. For bonds from the Lehman Brothers database, we exclude puttable issues and assume the bonds to pay semi-annual coupons.[6]

We filter out observations with prices below \$25 or above \$150, coupons below \$0 or above \$75, time to maturity shorter than a quarter or longer than 30 years, and bond-quarter pairs with missing values for any of these variables. Included issues must have a 30/360 day count basis, pay zero, semi-annual, or quarterly coupons, and have a principal amount of \$1,000. We retain only end-of-quarter observations and require issues to have valid Moody's credit rating history. To ensure robust calibration, we exclude bonds rated Aaa, Caa or below Caa.

We compute the market value of bonds in two steps. First, using bond price data, we fit a Nelson and Siegel (1987) yield curve each quarter for each Moody's letter rating cohort (Aa, A, Baa, Ba and B). Specifically, within each rating cohort in a given quarter, we compute implied bond prices for a granular grid of model parameters. Optimal parameters are selected by minimizing the root mean square error (RMSE) between the logarithm of the model-implied and observed bond prices. With the selected parameters, we derive bond yield $r(m)_t$ for a given quarter t, where $m = 1, 2, ..., 5$ stands for debt maturity. The fitted yield curves with a maturity of five years ($m = 5$) are shown in Figure 1. As expected, yields tend to be higher for bonds with lower credit ratings. Yields rise around recessions, before reverting to their pre-recession trends.

Second, we use the fitted curves to price firms' outstanding bonds. According to Moody's rating definition document, issuer ratings reflect opinions on the ability of entities to honour senior

[4] Bonds included should not be perpetual, or asset-backed, or under rule 144a.

[5] Potential option-like features include convertibility, exchangeability, putability, Yankee and Canadian bonds. We allow bonds to be callable in our sample because it is a common feature for bonds issued before the 1980s (Nozawa, 2017). Jostova, Nikolova, Philipov, and Stahel (2013) retain callable bonds in their sample, while Acharya, Amihuda, and Bharat (2013) eliminate all bonds with options.

[6] We assume the number of coupons per year because we do not have access to the bond schedule information provided by Lehman. Referring to the other three sources, semi-annual coupon is the most common form of coupon frequency.

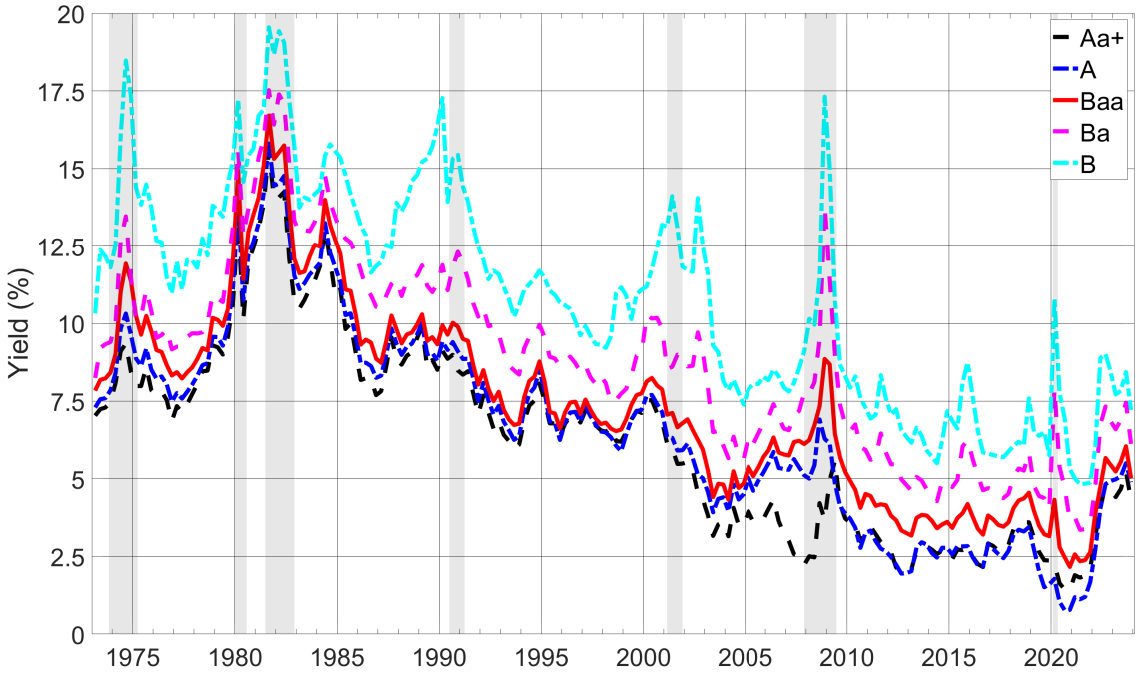

Figure 1: Fitted bond yields

The figure displays the quarterly time series of fitted five-year senior unsecured bond yields, categorized by Moody's letter rating, as described in Nelson and Siegel (1987). The sample period is 1973.I–2023.IV. The shaded areas indicate periods of recessions as identified by the National Bureau of Economic Research (NBER).

unsecured debt and debt like obligations. Thus, issuer ratings incorporate any expected external support for all current and future issuance of senior unsecured financial obligations and contracts. This connection allows us to use the fitted yield curves implied from bond prices for each letter rating cohort to price bonds of firms with the same letter rating. For firms in our sample without a Moody's rating, we estimate a multinomial logistic regression model to predict their ratings based on firm characteristics and macroeconomic conditions.[7] We interpret firms' book value of bonds as the notional value of semi-annual coupon bonds maturing in five years. Rating- and quarter-specific coupon rates are computed as the median ratio of annualized quarterly interest expenses to the book value of bonds. Bond prices are then computed using the standard discount cash flow model, with discount rates $r(m)_t$ inferred from the fitted yields, and rating- and quarter-specific

[7]The results are reported in Appendix 1.B.

coupons c_t^b as the constant coupon payments for outstanding bonds:

$$P_t^b = c_t^b \sum_{i=1}^{m} e^{-i \times r(i)_t} + e^{-m \times r(m)_t}. \tag{10}$$

1.4.2. Market value of bank loans

We measure the market value of loans by forming quarterly firm-level average loan prices. In each quarter when loans are issued, the firm-level loan prices are computed as the amount-weighted average price across loans, reflecting the average loan price that the market applies to the firm's outstanding bank loans (Chen, Glasserman, Nouri, and Pelger, 2017). The prices are then used to price the firm's book value of current debt.

At loan origination, prices are calculated as the present value of the interest payment stream and the face value at maturity, discounted by yield-to-maturity. Unlike bonds, loans are floating-rate instruments based on a reference interest rate plus a fixed spread. Following previous studies (e.g., Gao, Hua, and Khurshed, 2021; Saunders, Spina, Steffen, and Streitz, 2022), we use the DealScan variable "All in Spread Drawn" (AISD) as the loan pricing measure.[8] AISD represents the amount the borrower pays per year over LIBOR for each dollar drawn down, inclusive of fees. While there are other base rates (e.g., CD, Prime, Fixed Rate), we focus on LIBOR as it is the reference rate for the majority of the available loan records, as well as the reference rate utilized by DealScan documentation to define AISD. The 3-Month LIBOR time series, retrieved from the St. Louis Federal Reserve Economic Data (FRED) website, spans from January 1970 to January 2017. We supplement this data with the 3-Month Interbank Rate from DataStream, covering January 1986 to February 2024.[9] AISD plus LIBOR gives the sequence of projected interest payments for each loan, i.e., $c_t^l = \text{AISD}_t + \text{LIBOR}_t$. Time to maturity, m, is measured as the distance between tranche active date and maturity date. The interest rates we use to discount the stream of interest payments and principal are the current facility interest rates from DealScan, computed as the average of the

[8] We acknowledge the concern that AISD is not a time-varying secondary market loan spread. However, it remains one of the most widely available and standardized measures of loan pricing.

[9] During our sample period from 1973.I to 2023.IV, we use FRED series LIOR3MUKM from 1973.I to 2016.IV and DataStream series UKOIR076R from 2017.I to 2023.IV.

minimum and maximum number of basis points, $ri_t = (minbps + maxbps)/2$, added to the current interest rate level, rf_t:[10]

$$P_t^l = c_t^l \sum_{i=1}^{m} \frac{1}{(1+rf_t+ri_t)^i} + \frac{1}{(1+rf_t+ri_t)^m}. \tag{11}$$

The DealScan database provides detailed information on corporate loan origination from June 15, 1981. It is accessible through the Thomson Reuters/Refinitiv LoanConnector (formerly LPC) platform. We merge our firm-level sample with the DealScan loan pricing data using the DealScan-Compustat linking table constructed by Chava and Roberts (2008). To get a sense of the pricing for all loans that count towards firms' debt, we consider loans issued in US dollars, with strictly positive principal amount, strictly positive maturities, and non-negative spread records. According to these criteria, 9,099 firms (GVKEYs) have valid loan origination entries. The median loan origination is \$100 million notional, matures in 4.4 years, and has a spread of 2.00% above LIBOR.[11] For quarters with no new loans, we update pricing using the most recent price of loans issued by the firm, if available. Approximately 40% of observations in our sample are matched with corresponding loan prices. For firm-quarter pairs without pricing data, the market value of loans is set at book value.[12]

1.5. Data and Variable Construction

We collect end-of quarter financial reporting and market data for public US non-financial firms, requiring quarterly accounting periods ending in March, June, September, and December. Our sample comprises US-domiciled and US-headquartered firms from the merged Compustat-CRSP files, excluding financial firms (SIC codes 6000-6999) and government-related entities (SIC codes 9000-). Firm-quarter pairs must have positive book value of assets and market capitalization, non-negative common equity, short-term debt, long-term debt, interest expenses, and book assets

[10] The 3-Month Treasury Bill Secondary Market Rate from FRED is used as the current interest rate.

[11] These figures are comparable to those found in similar studies (e.g., Roberts and Schwert, 2020).

[12] In Section 1.9, we show that our findings are robust to an alternative measure of the market value of bank loans, where missing loan prices are imputed based on firms' credit rating and industry.

greater than common equity (with difference between the two exceeding total debt). All variables in our regressions are required. In a given quarter, we follow van Binsbergen, Graham, and Yang (2010) and exclude firms involved in significant M&A activities, defined as acquisitions amounting to over 15% of total assets. We also remove observations with a leverage ratio greater than one. All firm-level variables, except for firm age and average debt maturity, are winsorized at the 1% level from both ends to mitigate the impact of outliers.[13] Table 1.A.1 in Appendix 1.A summarizes the definitions and source codes for the accounting variables used in our analysis.

The final sample consists of over 7,000 firms identified by permco, with more than 318,000 firm-quarter observations spanning from 1975.II to 2023.IV. These years are chosen based on the following considerations: *(i)* 1973 is the first year for which bond price data are available; *(ii)* we require at least 100 firms at each point in time; *(iii)* we require at least 12 quarters of complete subsequent data for each firm; *(iv)* our analysis is based on intertemporal changes in corporate debt and firm valuation.

1.5.1. Firm characteristics

Asset revaluation is driven by changes in expected future cash flows, which depend on firm characteristics. To study cross-sectional differences in the effectiveness of firms in translating debt issuance into asset valuation, we consider several conditioning variables, including firm age, market-to-book ratio, firm size, leverage ratio, cash rate, profitability, cash flow duration, average debt maturity, intangible assets, and firm lifecycle stages. These variables are widely used to capture potential heterogeneity in firms' expected future cash flows and, consequently, firm valuations associated with debt issuance.

Durante, Ferrando, and Vermeulen (2022) document that young firms tend to be small, highly leveraged, less liquid, and have higher financial vulnerability. They uncover the heterogeneity of firms' investment reactions to monetary policy shocks. Dinlersoz, Kalemli-Ozcan, Hyatt, and Penciakova (2018) provide a comprehensive picture of how firms finance their operations at different

[13] Firm age and average debt maturity are not winsorized because they are measured in years and are within well-defined ranges, where outliers are not a concern.

points in their lifecycle. Candidate measures for firm age include *(i)* the number of years a firm has been on Compustat (Weber, 2018; Strebulaev and Yang, 2013) and *(ii)* the number of years listed, computed by subtracting IPO date from the current date and dividing by 365.25. Since the IPO date is available for more than half of firms in our initial sample (8,436 out of 15,822), and there are firms in Compustat with observations prior to the recorded IPO date,[14] we approximate a firm's age with the longer of the two measures listed above.

Choi (2013) studies the role of asset risk and leverage in explaining differences between the equity risks of value and growth stocks, documenting lower leverage and less sensitive asset betas of growth firms compared to value firms. We, therefore, expect a distinct association between debt issuance and firm valuation for value versus growth firms. The market-to-book ratio is calculated as the ratio between market capitalization and total common equity. Im, Mayer, and Sussman (2020) document significant heterogeneity in investment spike financing by firm size, which we measure as the logarithm of book assets. Since issued securities move firms toward target debt ratios (Elsas, Flannery, and Garfinkel, 2014), the current leverage ratio is correlated with the heterogeneous association between debt issuance and asset valuation. We define the leverage ratio as the notional of debt outstanding divided by the market value of assets, where debt notional is measured as the sum of current debt and long-term debt. DeAngelo, Gonçalves, and Stulz (2022) document that the time-series variation in leverage depends strongly on cash balances. Following the literature (e.g., Acharya and Steffen, 2020; Gao, Whited, and Zhang, 2021), we define the cash rate as cash and short-term investment over total assets. Korteweg (2010) argues that net benefits are higher for more profitable firms, and that more profitable firms have higher optimal leverage ratios, making profitability closely linked to debt issuance and firm valuation. Profitability is measured as net income scaled by total assets.

Cash flow duration, defined as the weighted average of cash flow maturities, assesses the relative importance of future cash flows to current asset value. It is closely related to firms' funda-

[14] As described in the Compustat manual, the first trading date in the major exchange is used as the IPO date if the date of a company's initial public stock offering is not available. This can result in instances where the data date precedes the IPO date.

mentals and provides a comprehensive description of the nature of firm assets. Determined by growth opportunities, investment, and profitability, cash flow duration offers a unified explanation for anomalies associated with these characteristics (Gonçalves, 2021; Weber, 2018; Chen and Li, 2022). A short duration indicates that most asset value stems from short-term cash flows. Cash flow duration is estimated following Dechow, Sloan, and Soliman (2004) and Weber (2018), who construct an "implied equity duration" measure that resembles the traditional Macaulay duration for bonds. We extend this equity duration measure to the asset level. Firms in our sample have an average cash flow duration of 22.90 years, which is comparable to the 19-year average payoff horizon implied for equity in Weber (2018). A detailed description of the estimation process is available in Appendix 1.C.

Average debt maturity is measured by computing weighted averages across current debt and long-term debt, assuming that current debt has a maturity of one year and long-term debt has five years. Firms with high financial distress costs and risky cash flows are more inclined to issue short-term debt (Dangl and Zechner, 2021). Additionally, firms dynamically manage debt maturity to balance liquidity discounts, refinancing risk, and financial distress costs to achieve optimal valuation (Xu, 2018; Chen, Xu, and Yang, 2021). Consequently, we control for average debt maturity in our regression models.

The intangibles-to-asset ratio and R&D-to-operating expense ratio serve as proxies for intangible assets and indicate whether firms are experiencing positive productivity shocks and subsequent financing needs. Missing values for intangible assets and R&D expenses are replaced with zeros, following the accounting literature (e.g., Biddle, Hilary, and Verdi, 2009; Richardson, 2006).[15]

The literature on firms' lifecycle stages includes several relevant studies. DeAngelo, DeAngelo, and Stulz (2010) use the number of years listed as a proxy for firm lifecycle to study the determinants of firms' seasoned equity offering (SEO) decisions. The leverage ratchet effect,

[15] Barth, Kasznik, and McNichols (2001) proxy intangible assets by *(i)* the ratio of combined research and development (R&D) and advertising expenses to total operating expenses, *(ii)* the ratio of depreciation expense to total operating expenses, and *(iii)* the ratio of recognized intangible assets, including goodwill, to total assets. Given that advertising expenses and depreciation expenses are only available annually, we use the intangible-to-asset ratio, and the R&D-to-operating-expense ratio in our analysis.

where firms gradually issue debt and are reluctant to reduce leverage (Admati, Demarzo, Hellwig, and Pfleiderer, 2018; Demarzo and He, 2021), also suggests heterogeneity in capital structure decisions across lifecycle stages. DeAngelo, DeAngelo, and Stultz (2006) categorize firms into lifecycle stages based on the ratio between retained earnings and total equity or assets, indicating reliance on external capital. Dickinson (2011) offers a detailed classification of firms' lifecycle stages based on their cash flow patterns. These stages include intro, growth, mature, decline, and shakeout, each characterized by specific combinations of cash flows from operations, investing, and financing activities as reported in Compustat. Firms in their intro stage are initiating their business operations and heavily investing, primarily relying on external financing. Firms in the growth stage begin to generate profits but continue to invest significantly, still requiring external funds for their investment. Mature firms consistently generate profits, which become the primary source of funding for their investment. In the decline stage, firms are no longer profitable and begin divesting as they exit current business operations. Firms that do not fit neatly into the other stages due to a mix of cash flow patterns are classified in the shakeout stage. By employing Dickinson's lifecycle classification, we can better understand how debt issuance relates differently to asset revaluation across various stages of a firm's lifecycle.

1.5.2. Macroeconomic variables

To account for macroeconomic factors known to predict asset revaluation, we include several time-specific control variables in our analysis. One-year-ahead, two-year and five-year forward rates, as suggested by Cochrane and Piazzesi (2005) and Gurkaynak, Sack, and Wright (2007), are computed from one-year and six-year Treasury yields available on the Federal Reserve Board's website. We also incorporate the effective Federal funds rates and a policy rate based on the Taylor rule, with time series data retrieved and computed from FRED. Equally-weighted S&P returns are obtained from CRSP. The quarter-end macro uncertainty measure over a 3-month forecasting horizon is proposed by Jurado, Ludvigson, and Ng (2015).[16]

[16] As a robustness check, we incorporate additional macroeconomic variables, including the Consumer Price Index as a proxy for inflation (FRED series *CPIAUCSL*), the percent change in real gross domestic product (FRED series

Table 1: Summary statistics

	Mean	Std Dev	5th pctl	25th pctl	Median	75th pctl	95th pctl
Panel A. *Variables measured in millions of 1982-1984 US dollars*							
A_t	3,192	17,010	9	52	257	1,406	12,544
$N_t^d P_t^d$	637	3,978	0	5	38	272	2,704
$N_t^e P_t^e$	2,555	14,557	7	40	196	1,071	9,689
I_{t+1}^d	9	721	-44	-1	-0	2	73
Panel B. *Rates measured in percentages*							
I_{t+1}^d/A_t	0.28	3.60	-4.72	-0.73	-0.02	0.94	6.34
$(A_{t+1}-A_t)/A_t$	2.68	26.58	-24.71	-7.19	0.55	8.97	33.77
δ_{t+1}	1.85	18.24	-24.23	-6.97	0.36	8.33	32.02
Panel C. *Firm characteristics*							
Age	9.67	8.58	1.00	3.49	7.00	13.39	27.24
Market-to-book	2.69	3.27	0.51	1.06	1.72	2.96	7.99
Size	5.27	2.18	1.80	3.63	5.21	6.85	9.00
Leverage (%)	21.35	16.80	0.48	7.37	18.25	31.98	54.03
Cash rate (%)	12.43	17.35	0.23	1.66	5.39	15.45	51.74
Profitability (%)	-0.16	5.06	-9.38	-0.30	0.93	1.95	4.15
Cash flow duration	22.90	5.08	17.74	20.59	21.91	23.54	31.96
Average debt maturity	1.31	0.43	0.10	1.25	1.49	1.58	1.61
Intangible-to-asset (%)	7.84	15.91	0.00	0.00	0.00	6.53	47.43
R&D-to-operating-expense (%)	4.64	12.93	0.00	0.00	0.00	2.22	25.12
Earnings-to-equity (%)	-46.18	331.84	-479.06	-16.87	37.75	73.08	109.96
Earnings-to-assets (%)	-14.45	124.50	-199.28	-6.50	14.55	33.71	60.92
Panel D. *Time series state variables*							
2-year forward rate (%)	5.36	3.53	0.56	2.15	5.06	7.75	12.05
5-year forward rate (%)	5.76	3.31	1.30	3.02	5.49	7.99	11.76
Effective Federal funds rate (%)	4.68	3.98	0.09	1.15	4.76	6.73	11.43
Taylor rule (%)	5.27	3.54	1.39	3.22	4.14	6.39	13.38
S&P return (%)	0.82	4.54	-9.07	-1.38	1.12	3.27	7.48
Macro uncertainty	0.80	0.11	0.68	0.72	0.76	0.83	1.02

This table reports the distributions of firm-level variables and time series state variables. The market value of assets, A_t, the market value of debt, $N_t^d P_t^d$, the market value of equity, $N_t^e P_t^e$, and net debt issuance, I_{t+1}^d, are reported in millions of 1982-1984 US dollars. Debt issuance, I_{t+1}^d/A_t, growth in assets, $(A_{t+1}-A_t)/A_t$, and asset revaluation, δ_{t+1}, are reported in percentages. Firm characteristics include firm age, market-to-book ratio, firm size measured as the logarithm of total assets, leverage ratio, cash rate measured as the cash-to-asset ratio, profitability proxied by net-income-to-asset, cash flow duration, average debt maturity, intangible asset-to-asset ratio, R&D-to-operating-expenses ratio, earnings-to-equity ratio, and earnings-to-assets ratio. Panel D presents the statistics of one-year-ahead two-year and five-year forward rates (Cochrane and Piazzesi, 2005), the effective Federal Funds rates, a policy rate based on the Taylor rule, equally-weighted S&P returns, and a macro uncertainty measure (Jurado, Ludvigson, and Ng, 2015) over our sample period. Variable definitions and sources are available in Table 1.A.1. The sample comprises 318,195 firm-quarter observations for 7,077 public US non-financial firms from 1975.II to 2023.IV.

Table 1 presents the summary statistics for these variables. All nominal quantities are adjusted for inflation using the Consumer Price Index (CPI) from the Bureau of Labor Statistics.

GDPC1), macro uncertainty measures from Jurado, Ludvigson, and Ng (2015) across multiple horizons, macro uncertainty and investor risk sensitivity measures from Bekaert, Engstrom, and Xu (2021) under various horizons, and the excess bond premium from Gilchrist and Zakrajšek (2012), which captures the price of credit risk. The results remain robust to the inclusion of these controls.

Our sample is representative of a broad cross-section of firms in terms of size and leverage. For instance, in Chaderina, Weiss, and Zechner (2022)'s sample, the mean market equity is 2,366, with the 25th and 75th percentiles at 59 and 1,112, respectively. In comparison, the average firm in our sample has a market equity (before aligning balance sheet classes other than debt and equity with equity) of 1,906, with the 25th and 75th percentiles at 27 and 749, respectively. The leverage measures in both studies are comparable: their mean and percentiles are 31.33, 10.71, and 48.55, while ours are 21.35, 7.37, and 31.98.

Our sample encompasses firms from a wide spectrum of industries. As shown in Appendix 1.D Table 1.D.1, we categorize firms into seven non-financial, non-utilities industries using Standard Industrial Classification (SIC) codes and classify firms based on their median leverage ratio over the sample period. According to the table, mining, construction, transportation, communications, electric, gas and sanitary service, and wholesale and retail trade firms in the sample tend to be highly leveraged, while manufacturing and services firms tend to be lower leveraged. The extensive industry coverage and long time series of our sample ensure that our findings are broadly applicable and reflective of general trends in the corporate sector.

1.6. Debt Issuance and Asset Revaluation

We test the null hypothesis by regressing asset revaluation on debt issuance in a pooled OLS panel regression:

$$\delta_{i,t+1} = \beta \frac{I^d_{i,t+1}}{A_{it}} + X'_{it}\gamma + \varepsilon_{i,t+1}. \tag{12}$$

We begin by running regression (12) without the variable of interest, debt issuance, to evaluate the associations between factors in X_{it} and the non-mechanical growth in firms' market value of assets. This involves regressing asset revaluation on a vector of firm characteristics, macro-level time series, and fixed effects, incrementally adding regressors to the model. Next, we sharpen the regression by introducing debt issuance into the model. This step assesses the marginal effect

Table 2: Debt issuance and asset revaluation

	Dependent variable: $\delta_{i,t+1}(\%)$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$I^d_{i,t+1}/A_{it}(\%)$						0.11	-0.49
						(7.6)	(-19.6)
$I^d_{i,t+1}/A_{it}(\%) \times 1^{I^d>0}_{i,t+1}$							1.04
							(32.1)
Age_{it}	0.00	-0.04	-0.02	-0.01	-0.02	-0.02	-0.02
	(0.9)	(-10.6)	(-4.8)	(-2.8)	(-2.0)	(-1.9)	(-2.0)
$\text{Market-to-book}_{it}$	-0.09	-0.10	-0.08	-0.11	-0.49	-0.49	-0.47
	(-6.0)	(-7.1)	(-5.4)	(-7.7)	(-20.4)	(-20.3)	(-19.8)
Size_{it}	-0.43	-0.44	-0.42	-0.47	-5.07	-5.06	-4.90
	(-23.9)	(-22.9)	(-23.3)	(-20.6)	(-41.5)	(-41.4)	(-40.4)
$\text{Leverage}_{it}(\%)$	0.00	0.00	-0.00	0.00	0.10	0.11	0.08
	(0.4)	(0.7)	(-2.3)	(1.7)	(21.5)	(22.9)	(18.3)
$\text{Cash rate}_{it}(\%)$	0.02	0.01	0.02	0.01	-0.02	-0.01	-0.01
	(6.1)	(3.6)	(5.3)	(2.9)	(-2.6)	(-2.2)	(-1.1)
$\text{Profitability}_{it}(\%)$	0.13	0.11	0.11	0.10	0.15	0.15	0.16
	(7.0)	(5.9)	(6.1)	(5.1)	(6.2)	(6.2)	(6.5)
$\text{Cash flow duration}_{it}$	-0.13	-0.19	-0.17	-0.20	-0.22	-0.22	-0.22
	(-7.6)	(-10.8)	(-10.0)	(-11.3)	(-10.3)	(-10.5)	(-10.3)
$\text{Average debt maturity}_{it}$	0.20	0.24	0.25	0.31	0.51	0.44	0.83
	(2.0)	(2.4)	(2.6)	(3.0)	(3.8)	(3.2)	(6.1)
$\text{Intangible-to-asset}_{it}(\%)$	0.00	-0.03	-0.01	-0.02	0.00	0.00	0.00
	(0.4)	(-12.1)	(-3.7)	(-5.8)	(-0.8)	(-0.8)	(-0.6)
$\text{R\&D-to-operating-expense}_{it}(\%)$	0.07	0.07	0.06	0.05	0.04	0.04	0.04
	(13.2)	(13.5)	(12.6)	(8.8)	(3.1)	(3.1)	(3.0)
Time-specific controls		Yes	Yes	Yes	Yes	Yes	Yes
Year FE			Yes	Yes	Yes	Yes	Yes
Industry FE				Yes			
Firm FE					Yes	Yes	Yes
R-squared	0.01	0.01	0.04	0.05	0.09	0.09	0.09

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and asset revaluation, $\delta_{i,t+1}$, as specified in (12). Regressors are incrementally added to the model from column (1) to (6). Column (7) studies scenarios of net debt issuance ($I^d_{i,t+1}/A_{it} > 0$) and net debt redemption ($I^d_{i,t+1}/A_{it} \leq 0$) by interacting an issuer dummy with $I^d_{i,t+1}/A_{it}$, as specified in (13). Both the dependent variables and the estimated coefficients are expressed in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, and fixed effects for year, industry, and firm, sequentially. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

debt issuance provides for explaining the variations in $\delta_{i,t+1}$. All control variables are measured at the start of the period to capture information available at time t. To address potential time series correlation associated with one firm, we cluster standard errors by firm.

The estimated coefficients for debt issuance and firm characteristics are reported in Table 2. As shown in columns (5) and (6), the coefficient estimates for control variables align with expectations. Firms tend to grow more slowly as they age and become larger. The estimates on market-to-book ratio is negative, meaning the higher the ratio, the closer the firm is to its growth stage, and the smaller the firm's asset revaluation. That is, firms, on average, generate greater

value as they transition from growth stages to value stages. In addition, firms' cash flow duration is expected to shorten along this process, with the negative coefficient for cash flow duration consistent with this expectation. Holding other factors constant, high-leverage firms, low-cash firms, more profitable firms, firms with more long-term debt, and firms with higher R&D expenses are estimated to grow more compared to their corresponding counterparts. Intangibles appear to play a limited role in explaining asset revaluation once other characteristics are included in the model.

As more controls are introduced, the model's R-squared value increases, indicating improved predictive power. The increases occur in three steps. First, including time-specific controls in column (2) enhances the model. These controls establish the explanatory power of quarterly economic conditions on asset revaluation. Second, introducing year fixed effects in column (3) further improves the model. These effects account for year-specific constants and eliminate biases from unobservable factors that change over time but are common to all firms. The final increase in R-squared value occurs with the inclusion of firm fixed effects. These effects address firm-specific, time-invariant unconditional asset revaluation that other regressors have not accounted for, thereby enhancing the model's predictive power.

Conditioning on the macroeconomic conditions and firm-specific information, our results in column (6) of Table 2 indicate that, for the average firm in the sample, debt issuance not only indicates mechanical adjustments to asset value, but also ultimately relates to firm asset revaluation beyond such adjustments. Specifically, a one-percent increase in debt levels as a fraction of total market assets is associated with an increase in asset revaluation by 11 basis points (bps). For the average firm in our sample, market assets, growth in market assets, and asset revaluation are \$3,192 million, 2.68%, and 1.85%, respectively. An 11-bps increase in δ is equivalent to the asset revaluation of the average firm increasing by 5.9% (0.11%/1.85%). Fully translated into growth in market assets, this means an increase in the market value of assets by \$3.51 million (\$3,192 mil$\times$0.11%). We confirm that the average growth in assets is comparable to those documented in the literature, and that the marginal effects of debt issuance in explaining asset revaluation are sizable and nontrivial.

To further explore whether the relation between debt issuance and asset revaluation holds for both increases and decreases in debt levels, we estimate a model incorporating an issuer indicator, $1_{i,t+1}^{I^d>0}$, which activates for positive changes in debt levels:

$$\delta_{i,t+1} \quad = \quad \left(\beta_0 + \beta\, 1_{i,t+1}^{I^d>0}\right) \frac{I_{i,t+1}^{d}}{A_{it}} + X_{it}'\gamma + \varepsilon_{i,t+1}. \tag{13}$$

Hereafter, we continue referring to the aggregate changes in debt levels as *debt issuance*, and term positive and negative changes as *net debt issuance* ($I_{i,t+1}^{d}/A_{it} > 0$) and *net debt redemption* ($I_{i,t+1}^{d}/A_{it} \leq 0$), respectively. The results, presented in column (7) of Table 2, show that net debt issuance is positively associated with asset revaluation, whereas net debt redemption exhibits a negative association. Since the coefficient of the interaction term β is incremental to the negative baseline estimate β_0, net debt issuance and redemption contribute to firms' value creation in absolute terms at similar scales, producing a V-shaped relation between debt issuance and asset revaluation. When both scenarios are combined in a single regression, their opposing effects offset each other, resulting in a diminished overall association between debt issuance and asset revaluation, as observed in column (6). To ensure the robustness of these results, we also estimate regression (12) within issuer and redeemer firm subsamples, with corresponding results presented in columns (7) and (8) of Table 1.D.2 in Appendix 1.D.

Based on these findings, we reject the null hypothesis and conclude that firms generate significant value when conducting active debt management. The interpretation of such results may be impacted by the potential endogeneity between managerial decisions and firm value. On one hand, firms may choose optimal capital structure to maximize firm value based on forward-looking expectations. On the other hand, firms may respond to changes in their market values by adjusting debt. As defined in Section 1.3, market values are measured at the end of each quarter, which have already incorporated firms' value-maximizing decisions during the period. Since the estimated asset revaluation may or may not be caused by debt issuance, we hereby state that our results capture equilibrium associations, reflecting both managerial expectations and market responses.

1.7. Cross-Sectional Differences in Debt Issuance and Asset Revaluation's Association

After rejecting the null hypothesis and concluding that both net debt issuance and net debt redemption are associated with positive asset revaluation for the average firm in the sample, we next explore the potential cross-sectional differences in these relations.

To capture variations across firm types, we classify firm-quarter observations according to their beginning-of-quarter characteristics. Firm characteristics are measured as in Section 1.5, based on which firms are ranked and grouped into low-, medium-, or high-level categories using the 33$^{\text{rd}}$ and 66$^{\text{th}}$ panel percentiles as cutoffs. This approach ensures consistent grouping of firm-quarter pairs across the panel.

Panel A of Table 3 summarizes the distribution of net debt issuance across firm types. Younger, smaller, or lower-profit firms exhibit greater net debt increases compared to their counterparts, reflecting their substantial financing needs given constrained financial flexibility and limited internally generated funds, supporting Dickinson (2011)'s observation that mature firms rely less on external financing. Value, higher-leverage, or lower-cash firms, on the other hand, on average issue more debt as a fraction of their market assets, likely reflecting their ability to identify profitable investment opportunities, optimize the use of funds, and manage larger debt burdens (DeAngelo, Gonçalves, and Stulz, 2018; De Santis and Zaghini, 2021). This is qualitatively consistent with the notion that most firms issue debt when their cash balances become scarce, typically in response to investment needs rather than equity payouts (DeAngelo, Gonçalves, and Stulz, 2022; Denis and McKeon, 2012).

To investigate how firm-specific characteristics influence the association between net debt issuance/redemption and asset revaluation, we extend the baseline model by conditioning the β coefficient in (12) on firm characteristic, Z_{it}, an issuer indicator, $1^{I^d>0}_{i,t+1}$, and a redeemer indicator, $1^{I^d\leq 0}_{i,t+1}$:

$$\delta_{i,t+1} = \left[1^{I^d>0}_{i,t+1}\left(\beta_1 + Z'_{it}\beta_2\right) + 1^{I^d\leq 0}_{i,t+1}\left(\beta_3 + Z'_{it}\beta_4\right)\right]\frac{I^d_{i,t+1}}{A_{it}} + X'_{it}\gamma + \varepsilon_{i,t+1}, \tag{14}$$

Table 3: Net debt issuance and asset revaluation across firm types

	Age	*Market-to-book*	*Size*	*Leverage*	*Cash rate*	*Profitability*
Panel A. *Average net debt issuance for issuer firms across firm types* ($I^d_{i,t+1}/A_{it} > 0$, %)						
Low	3.06	3.45	3.36	2.02	2.96	2.95
Medium	2.76	2.61	2.85	2.67	2.73	2.61
High	2.10	1.89	1.90	3.13	2.03	2.34
Panel B. *Full-sample regression* (14) *with issuer and firm type interaction*						
(%)			*Dependent variable:* $\delta_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$	0.57	0.42	0.68	0.65	0.53	0.67
	(18.8)	(12.9)	(19.3)	(13.7)	(17.8)	(19.8)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.03	0.10	-0.26	-0.05	-0.03	-0.18
	(0.8)	(2.4)	(-5.6)	(-1.0)	(-0.7)	(-4.4)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	-0.08	0.37	-0.09	-0.21	0.13	-0.18
	(-1.5)	(6.9)	(-1.5)	(-3.8)	(2.5)	(-3.9)
Panel C. *Issuer-type-subsample regression* (12)						
(%)			*Dependent variable:* $\delta_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$ (Low)	0.61	0.39	0.66	0.68	0.58	0.64
	(17.7)	(11.1)	(17.0)	(12.2)	(17.1)	(16.7)
$I^d_{i,t+1}/A_{it}$ (Medium)	0.62	0.55	0.39	0.65	0.53	0.48
	(16.2)	(15.3)	(11.8)	(17.1)	(14.0)	(14.8)
$I^d_{i,t+1}/A_{it}$ (High)	0.54	0.78	0.66	0.47	0.63	0.49
	(12.5)	(15.7)	(13.8)	(16.1)	(12.8)	(11.9)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and asset revaluation, $\delta_{i,t+1}$, conditioning on firm characteristics such as firm age, market-to-book ratio, firm size, leverage ratio, cash rate, and profitability. Firms are identified at each point in time by group indicators formed based on the 33$^{\text{rd}}$ and 66$^{\text{th}}$ percentiles of the corresponding measures. Panel A presents the average net debt issuance for issuer firms across firm types. Panel B presents the estimated β_1 and β_2 for net debt issuance and its interaction with group indicators, as specified in (14). Baseline groups represent young, value, small, low-leverage, low-cash, or less profitable firms, with estimates for other groups shown as incremental to the baseline. Panel C presents the estimates for net debt issuance as specified in (12), after stratifying the data into subsamples by group indicators. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

where Z_{it} represents a vector of dummy variables indicating whether the firm belongs to low, medium, or high group corresponding to certain firm characteristics at time t. The interaction terms between debt issuance and vector Z_{it} facilitate comparisons across groups and avoid reliance on the scale of the conditioning characteristics, ensuring simplified interpretation and comparability of results across conditioning variables. That is, this specification allows for a consistent interpretation of results across different firm characteristics and isolates the interaction effects without

unit-related distortions.

The results, presented in Panel B of Table 3, focus on scenarios where the issuer indicator is activated (β_1 and β_2). These findings indicate that the positive asset revaluation associated with net debt issuance, as highlighted in column (7) of Table 2 from the overall regression, tends to be greater for younger, higher-book-to-market (growth), smaller, lower-leverage, higher-cash, or lower-profit firms, compared to their respective counterparts. We regard such types of firms as *less established* firms, typically associated with earlier lifecycle stages, greater financial constraints, and more volatile cash flows (Hadlock and Pierce, 2010; Acharya, Almeida, and Campello, 2007; Ma, 2019; Durante, Ferrando, and Vermeulen, 2022). Additionally, we also observe that the cross-sectional pattern is not monotonic across size groups, which will be further assessed in our later discussions.

To evaluate the stand-alone statistical significance of each group's estimated β, regression (12) is applied directly within each group. The results, detailed in Panel C of Table 3, reveal that a one-percent net increase in debt levels as a fraction of market assets is associated with asset revaluation of 61 bps for young firms. Medium-age and old firms do not exhibit significantly different associations, as shown in Panel B. Similar to young firms, small firms issue more debt than large firms and are expected to achieve a 66-bps rate of asset revaluation for a one-percent increase in debt levels. This effect appears greater than that for medium-size firms, but statistically indistinguishable from that for large firms. For less profitable firms, which are also identified as less established firms, net debt issuance tends to be greater and relates to significantly greater value for firm stakeholders. By contrast, more profitable firms exhibit lower revaluation correlated with comparable net debt issuance.

The findings also highlight that high-market-to-book (growth) firms, low-leverage firms, and high-cash firms, while generally issuing less debt, demonstrate a stronger positive relation between net debt issuance and asset revaluation. Specifically, growth firms generate 78 bps of asset revaluation with a one-percent increase in debt levels as a fraction of market assets, compared to 39 bps for low-market-to-book (value) firms. Low-leverage firms show 68 bps of asset revaluation

Table 4: Net debt redemption and asset revaluation across firm types

	Age	*Market-to-book*	*Size*	*Leverage*	*Cash rate*	*Profitability*
Panel A. *Average net debt redemption for redeemer firms across firm types* ($I^d_{i,t+1}/A_{it} \leq 0$, %)						
Low	-1.60	-2.20	-1.65	-0.53	-2.32	-1.73
Medium	-1.62	-1.39	-1.60	-1.57	-1.62	-1.62
High	-1.34	-0.94	-1.27	-2.58	-0.86	-1.22
Panel B. *Full-sample regression* (14) *with redeemer and firm type interaction*						
(%)			*Dependent variable:* $\delta_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$	-0.58	-0.23	-0.66	-1.33	-0.41	-0.59
	(-15.5)	(-8.1)	(-16.0)	(-13.1)	(-13.0)	(-15.7)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.05	-0.19	0.21	0.80	-0.07	0.23
	(1.1)	(-4.0)	(4.1)	(7.3)	(-1.5)	(4.7)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	0.30	-0.98	0.54	0.97	-0.14	0.18
	(5.3)	(-14.8)	(8.1)	(9.2)	(-2.4)	(3.2)
Panel C. *Redeemer-type-subsample regression* (12)						
(%)			*Dependent variable:* $\delta_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$ (Low)	-0.57	-0.30	-0.68	-0.96	-0.47	-0.51
	(-13.0)	(-9.8)	(-14.9)	(-8.2)	(-13.4)	(-12.0)
$I^d_{i,t+1}/A_{it}$ (Medium)	-0.51	-0.40	-0.46	-0.49	-0.52	-0.35
	(-12.2)	(-8.6)	(-12.7)	(-9.9)	(-11.6)	(-8.8)
$I^d_{i,t+1}/A_{it}$ (High)	-0.29	-1.03	-0.06	-0.37	-0.43	-0.49
	(-6.2)	(-14.4)	(-1.2)	(-13.6)	(-7.2)	(-9.3)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt redemption, $I^d_{i,t+1}/A_{it} \leq 0$, and asset revaluation, $\delta_{i,t+1}$, conditioning on firm characteristics such as firm age, market-to-book ratio, firm size, leverage ratio, cash rate, and profitability. Firms are identified at each point in time by group indicators formed based on the 33$^{\text{rd}}$ and 66$^{\text{th}}$ percentiles of the corresponding measures. Panel A presents the average net debt redemption for redeemer firms across firm types. Panel B presents the estimated β_3 and β_4 for net debt redemption and its interaction with group indicators, as specified in (14). Baseline groups represent young, value, small, low-leverage, low-cash, or less profitable firms, with estimates for other groups shown as incremental to the baseline. Panel C presents the estimates for net debt redemption as specified in (12), after stratifying the data into subsamples by group indicators. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

per percent of net debt issuance, while the corresponding effects for medium- and high-leverage firms are 65 bps and 47 bps, respectively. High-cash firms' 63-bps asset revaluation makes them the highest among three cash groups.

Moving on to the scenario of negative changes in debt levels, the average net debt redemption across different types of redeemer firms is reported in Panel A of Table 4. The cross-sectional patterns for net debt redemption are largely symmetric to those for net debt issuance in Panel A of

Table 3. Specifically, younger, smaller, or less profitable firms, tend to reduce debt that accounts for a larger portion of their market assets compared to older and larger firms, respectively. This may reflect the weaker ability of these firms to roll over debt at maturity, coupled with their heavier reliance on external financing in the earlier stages of their lifecycle (Dangl and Zechner, 2021). Conversely, older, larger, or profitable firms likely benefit from greater collateral availability, providing stronger support for sustained debt financing. Value, higher-leverage, or lower-cash firms, on average, engage in more extensive debt reduction, which may indicate a deliberate effort to revert toward their target leverage levels and to enhance financial flexibility after temporary deviations to fund investment (DeAngelo, DeAngelo, and Whited, 2011; DeAngelo, Gonçalves, and Stulz, 2018).

The cross-sectional analysis of firms engaged in net debt redemption is detailed in Panel B of Table 4, which examines the interaction among debt changes, firm characteristic indicators, and the redeemer indicator. The estimated β_3 and β_4 coefficients are reported, where the redeemer indicator is activated. The corresponding stand-alone statistical significance results are presented in Panel C.

Net debt redemption, a negative change in debt levels, is associated with a negative estimated coefficient, suggesting that debt reduction relates to positive asset revaluation. Unlike the limited cross-age differences observed for net debt issuance in Table 3, younger firms generate significantly more value when redeeming debt compared to older firms. Similarly, growth, smaller, lower-leverage, higher-cash, or less profitable firms also experience enhanced value creation when reducing debt, stronger than their counterparts. These results imply that deleveraging by less established firms may signal greater benefit in terms of asset revaluation.

Overall, our findings reveal that both net debt issuance and redemption are associated with firms' value creation, but the effects differ across firm types. Less established firms—such as younger, growth, smaller, lower-leverage, higher-cash firms, or less profitable firms—derive greater asset revaluation when conducting active debt management. These findings underscore the necessity of distinguishing between positive and negative changes in debt levels, as well as assessing

the cross-sectional differences in debt issuance and asset revaluation's association.[17] Notably, our results on active debt management contrast with the predictions of the ratchet effect model by Admati, Demarzo, Hellwig, and Pfleiderer (2018). As noted in DeAngelo (2022), empirical challenges to the ratchet model include widespread leverage reductions and the observed "dash for cash" phenomenon. Additionally, the estimated association between net debt issuance and asset revaluation is not strictly monotonic across size groups, through which we will dig deeper using the decomposition introduced in the next section.

1.8. Sources of Asset Revaluation

Equation (7) provides a framework for attributing asset revaluation to various stakeholders of the firm. In this section, we perform component-specific analyses to identify which stakeholder group experiences the most significant fluctuations when adjusting debt. For a generic firm, we decompose asset revaluation into three components:

$$\begin{aligned} \delta_{t+1} &= \frac{N_t^e(P_{t+1}^e - P_t^e)}{A_t} + \frac{(N_{t+1}^e - N_t^e)P_{t+1}^e}{A_t} + \frac{N_{t+1}^d P_{t+1}^d - N_t^d P_t^d - I_{t+1}^d}{A_t} \\ &= \delta_{t+1}^{ep} + \delta_{t+1}^{ei} + \delta_{t+1}^{d}, \end{aligned} \tag{15}$$

where δ_{t+1}^{ep} represents the stock price movements for existing shareholders, who are proxied by the beginning-of-period total number of shares outstanding, excluding issuance or repurchases during period t; δ_{t+1}^{ei} reflects the net change in the number of shares outstanding during period t, evaluated at time $t+1$ and attributable to new shareholders; δ_{t+1}^{d} captures value changes for debt holders, excluding debt issuance, which is assumed to be at par.

This decomposition provides a detailed understanding of how debt issuance relates to firms' revaluation distribution among different stakeholders. It sheds light on whether the positive asset revaluation identified in prior sections is broadly distributed across value creations for existing

[17] Table 1.D.3 in Appendix 1.D reports the cross-sectional results when net debt issuance and redemption scenarios are pooled together. It is suggested that the positive relation of either net debt issuance or net debt redemption is masked, conveying unclear information.

Table 5: Summary statistics of the sources of asset revaluation

	Mean	Std Dev	5th pctl	25th pctl	Median	75th pctl	95th pctl
Panel A. *Stakeholders' revaluation in percentages*							
δ^{ep} (Existing shareholders)	0.59	16.94	-24.97	-6.83	-0.29	6.59	27.47
δ^{ei} (New shareholders)	1.51	6.63	-4.63	-0.82	0.40	2.00	10.82
δ^{d} (Debt holders)	-0.17	0.93	-1.68	-0.38	-0.05	0.09	1.06
Panel B. *Variable distribution by firm characteristics*							
	Low		*Medium*		*High*		
(%)	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	
Age							
δ^{ep}	0.24	18.88	0.72	17.17	0.81	14.48	
δ^{ei}	2.01	7.38	1.56	6.76	0.97	5.58	
δ^{d}	-0.21	0.93	-0.18	0.98	-0.11	0.87	
Market-to-book							
δ^{ep}	1.69	13.74	0.59	15.40	-0.50	20.79	
δ^{ei}	0.87	6.01	1.36	5.87	2.30	7.76	
δ^{d}	-0.24	1.23	-0.16	0.82	-0.10	0.63	
Size							
δ^{ep}	1.09	22.68	0.43	15.34	0.25	10.57	
δ^{ei}	2.05	7.80	1.49	6.45	1.00	5.38	
δ^{d}	-0.14	0.73	-0.18	1.02	-0.18	1.02	
Leverage							
δ^{ep}	0.35	22.76	0.71	15.21	0.71	10.59	
δ^{ei}	2.14	7.87	1.33	6.34	1.07	5.41	
δ^{d}	-0.03	0.26	-0.16	0.71	-0.31	1.41	
Cash rate							
δ^{ep}	0.04	12.74	0.53	14.56	1.20	22.03	
δ^{ei}	1.37	6.06	1.34	6.32	1.83	7.42	
δ^{d}	-0.24	1.08	-0.19	0.99	-0.08	0.67	
Profitability							
δ^{ep}	-0.62	20.35	0.44	12.22	1.96	17.15	
δ^{ei}	1.72	7.06	1.15	5.28	1.66	7.34	
δ^{d}	-0.16	1.03	-0.22	1.02	-0.13	0.70	

This table reports the distributions of the sources of asset revaluation, including existing shareholders, new shareholders, and debt holders. The bottom panel presents the distributions of stakeholders' revaluation by firm characteristics, including firm age, market-to-book ratio, firm size, leverage ratio, cash rate, and profitability. The sample comprises 318,195 firm-quarter observations for 7,077 public US non-financial firms from 1975.II to 2023.IV.

shareholders and debt holders or is primarily driven by newly issued equity.

Table 5 presents the distributions of the components of asset revaluation, both in aggregate and across various firm types. For the average firm in our sample, the majority of asset revaluation is attributed to new shareholders, accounting for 81.6% of the total revaluation (1.51 out of 1.85). On average, firms experience a decline in debt holders' revaluation, likely due to our assumption of debt issuance and redemption at par, which is offset by stock price appreciation for existing shareholders. Cross-sectional patterns reveal that existing shareholders' revaluation increases with

Table 6: Debt issuance and sources of asset revaluation

Dependent variable: (%)	$\delta^{ep}_{i,t+1}$ (%) Existing shareholders	$\delta^{ei}_{i,t+1}$ (%) New shareholders	$\delta^{d}_{i,t+1}$ (%) Debt holders
$I^d_{i,t+1}/A_{it}$	0.02	0.06	-0.01
	(2.2)	(7.5)	(-6.8)
$I^d_{i,t+1}/A_{it}$	-0.22	-0.27	-0.01
	(-11.9)	(-21.8)	(-6.3)
$I^d_{i,t+1}/A_{it} \times 1^{I^d>0}_{i,t+1}$	0.44	0.56	0.00
	(17.4)	(34.7)	(1.2)
Firm-specific controls	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and the sources of asset revaluation from regression (12), along with the results for scenarios of net debt issuance and net debt redemption, as specified in (13). In each row, the three estimates do not sum to the one observed in Table 2 because winsorization is done for each component of asset revaluation separately. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

firm age, leverage ratio, cash holding, and profitability, but diminishes with market-to-book ratio and firm size. Meanwhile, new shareholders contribute a larger share of asset revaluation in less established firms, although the patterns across cash and profitability groups are not strictly monotonic. Debt value depreciation, on the other hand, is more pronounced in younger, value, larger, higher-leverage, lower-cash, or medium-profitable firms.

Although the distributions of asset revaluation and its components are informative, they do not directly relate to changes in debt levels. To isolate the association between debt issuance and asset revaluation for specific stakeholders, we estimate regression (12) with each of the three components of asset revaluation as the dependent variable separately. The estimated β coefficients are reported in the top panel of Table 6. Consistent with the overall results in Table 2, which highlight significant value creation associated with debt issuance, our findings show that debt issuance is associated with both stock price appreciation for existing shareholders and net equity issuance. However, the effect for debt holders is negative and relatively small in scale.

To further distinguish between net debt issuance and redemption scenarios, we condition the β coefficients on an issuer indicator, $1^{I^d>0}_{i,t+1}$, as specified in (13). The results, shown in the bottom

panel of Table 6, reveal that the two equity components of asset revaluation are both positively associated with net debt issuance and negatively associated with net debt redemption. This indicates that both net debt issuance and redemption contribute positively to shareholders' revaluation. These opposing effects partially offset each other when pooled together in a single regression, resulting in smaller overall estimates observed in the top panel. In other words, active debt management correlates with share price appreciation and net equity issuance, combined together driving the V-shaped effect observed for overall asset revaluation. Debt holders' revaluation, on the other hand, is generally negatively correlated with debt issuance and relatively small in magnitude, with insignificant differences detected when separating net debt issuance and redemption scenarios.

1.8.1. Debt issuance and shareholders' revaluation

Equation (15) allocates period-t shareholders' revaluation to existing shareholders, measured by applying the period-t stock price change to the number of shares outstanding at the start of the period, and to new shareholders, represented by the net change in number of shares outstanding during period t, evaluated at the end-of-period stock price. In this subsection, we further assess the cross-sectional differences in the association between debt issuance and shareholders' revaluation.

Given the observed V-shaped relation between debt issuance and revaluation for both existing and new shareholders, we evaluate the statistical significance of the cross-sectional differences by employing regression (14), substituting the dependent variable with the respective equity components. Additionally, regression (12) is applied to each type of firm to assess stand-alone significance.

Similar to Panel B of Table 3, Table 7 focuses on issuer firms and presents cross-sectional differences in the relation between net debt issuance and shareholders' revaluation. The table reports the estimated coefficients β_1 and β_2 for instances where the issuer indicator is activated, with each panel associated with one group of shareholders.[18]

Panel A of Table 7 demonstrates that net debt issuance is strongly associated with greater

[18]Detailed stand-alone significance results are available in Table 1.D.4 of Appendix 1.D.

Table 7: Net debt issuance and shareholders' revaluation

	Age	*Market-to-book*	*Size*	*Leverage*	*Cash rate*	*Profitability*
Panel A. *Existing shareholders' revaluation for issuer firms*						
(%)			*Dependent variable:* $\delta^{ep}_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$	0.26	0.17	0.41	0.34	0.17	0.31
	(11.2)	(8.9)	(14.6)	(9.4)	(9.2)	(12.3)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	-0.01	-0.02	-0.26	-0.13	0.05	-0.16
	(-0.2)	(-0.6)	(-7.5)	(-3.2)	(1.8)	(-5.4)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	-0.15	0.14	-0.37	-0.22	0.10	-0.13
	(-4.5)	(3.6)	(-10.8)	(-5.7)	(2.6)	(-3.6)
Panel B. *New shareholders' revaluation for issuer firms*						
(%)			*Dependent variable:* $\delta^{ei}_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$	0.28	0.23	0.25	0.26	0.30	0.31
	(18.0)	(12.7)	(14.6)	(11.4)	(16.7)	(18.0)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.01	0.09	-0.01	0.05	-0.05	-0.01
	(0.6)	(4.0)	(-0.5)	(2.0)	(-2.1)	(-0.6)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	0.02	0.14	0.18	0.04	0.04	-0.06
	(0.9)	(5.1)	(5.7)	(1.5)	(1.3)	(-2.2)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and shareholders' revaluation, $\delta^{ep}_{i,t+1}$ and $\delta^{ei}_{i,t+1}$, conditioning on firm characteristics such as firm age, market-to-book ratio, firm size, leverage ratio, cash rate, and profitability. Firms are identified at each point in time by group indicators formed based on the 33$^{\text{rd}}$ and 66$^{\text{th}}$ percentiles of the corresponding measures. Presented coefficients are β_1 and β_2, estimated for net debt issuance and its interaction with group indicators, as specified in (14). Baseline groups represent young, value, small, low-leverage, low-cash, or less profitable firms, with estimates for other groups shown as incremental to the baseline. The dependent variable in Panel A is the asset revaluation attributable to existing shareholders, while that in Panel B is for new shareholders. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

stock price appreciation for younger, growth, smaller, lower-leverage, higher-cash, or lower-profit firms, which are regarded as less established firms. This observation contrasts with the well-documented negative stock returns following external financing events (Spiess and Affleck-Graves, 1999; Huang and Ritter, 2022). To reconcile this discrepancy, we propose the following considerations: *(i)* The stock price appreciation for existing shareholders and net debt issuance reported here are within the same quarter, conditioned on beginning-of-period firm characteristics. In contrast, prior studies typically examine holding period returns (raw or abnormal) at higher frequencies, over extended periods after the event of debt offering; *(ii)* Spiess and Affleck-Graves (1999) note

that smaller, younger, NASDAQ-listed firms, and firms issuing speculative grade debt are more prone to post-issue underperformance. The stock price appreciation for less established firms observed here may signal that these firms are overvalued, with subsequent negative post-issue returns correcting stock prices back to fundamentals.

As for new shareholders' revaluation, Panel B of Table 7 confirms the results in Table 6 that firms often issue debt and equity simultaneously. However, the cross-sectional patterns do not mirror those in Panel A—some of them align with our less established firm classification, while others do not. On one hand, growth, higher-cash, or lower-profit firms might have limited access to credit, and continue to rely on external financing in both equity and debt to meet investment needs and to maintain financial flexibility. On the other hand, firms with large size, higher leverage, or less cash might be seeking liquidity to finance investment or payouts. They are more mature and closer to their optimal leverage levels, thus need to issue equity alongside debt to actively manage their capital structure and default risk (DeAngelo, Gonçalves, and Stulz, 2018; Begenau and Salomao, 2019; Korteweg, Schwert, and Strebulaev, 2022). These two aspects combined give the mixed cross-sectional patterns in Panel B: net debt issuance does not yield significant differences across firm age groups but signals greater equity issuance for growth, larger, medium-leverage, low- or high-cash, or lower-profit firms.

Net equity issuance, although leading a component of asset revaluation, is more of a financing decision made by the firm rather than a value creating process. Accordingly, different uses of the new funds raised via equity might have different implications on firms' valuation by the stock market. The distinct cross-sectional patterns between Panel A and B suggest that not all funds raised are immediately reflected through stock prices.

Additionally, the decomposition of asset revaluation facilitates us to explain the non-monotonic pattern across size group in Panel B of Table 3: the overall asset revaluation associated with net debt issuance bounces back due to greater equity issuance by large firms.

Table 8 presents the association between net debt redemption and shareholders' revaluation, estimated using regression (14). The table reports the estimated coefficients β_3 and β_4 for cases

Table 8: Net debt redemption and shareholders' revaluation

	Age	*Market-to-book*	*Size*	*Leverage*	*Cash rate*	*Profitability*
Panel A. *Existing shareholders' revaluation for redeemer firms*						
(%)			*Dependent variable:* $\delta^{ep}_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$	-0.26	-0.07	-0.38	-0.80	-0.13	-0.33
	(-8.3)	(-3.3)	(-11.0)	(-8.9)	(-5.4)	(-10.7)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.00	-0.07	0.22	0.51	-0.11	0.26
	(-0.1)	(-1.9)	(5.3)	(5.3)	(-3.0)	(6.6)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	0.15	-0.65	0.38	0.68	-0.25	0.16
	(3.3)	(-11.8)	(8.8)	(7.4)	(-5.1)	(3.5)
Panel B. *New shareholders' revaluation for redeemer firms*						
(%)			*Dependent variable:* $\delta^{ei}_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$	-0.33	-0.16	-0.31	-0.56	-0.28	-0.28
	(-17.3)	(-10.4)	(-15.7)	(-13.6)	(-15.3)	(-15.7)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.06	-0.14	0.04	0.26	0.02	-0.01
	(2.5)	(-6.3)	(1.5)	(5.9)	(0.8)	(-0.3)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	0.13	-0.36	0.13	0.33	0.06	0.04
	(4.9)	(-11.5)	(4.4)	(7.7)	(2.3)	(1.7)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt redemption, $I^d_{i,t+1}/A_{it} \leq 0$, and shareholders' revaluation, $\delta^{ep}_{i,t+1}$ and $\delta^{ei}_{i,t+1}$, conditioning on firm characteristics such as firm age, market-to-book ratio, firm size, leverage ratio, cash rate, and profitability. Firms are identified at each point in time by group indicators formed based on the 33rd and 66th percentiles of the corresponding measures. Presented coefficients are β_3 and β_4, estimated for net debt redemption and its interaction with group indicators, as specified in (14). Baseline groups represent young, value, small, low-leverage, low-cash, or less profitable firms, with estimates for other groups shown as incremental to the baseline. The dependent variable in Panel A is the asset revaluation attributable to existing shareholders, while that in Panel B is for new shareholders. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

where the redeemer indicator is active.[19] Again, a negative coefficient associated with net debt redemption reflects positive revaluation. Panel A reveals that net debt redemption signals greater stock price appreciation for less established firms, mirroring the cross-sectional patterns associated with net debt issuance, as observed in Panel A of Table 7.

When firms are reducing debt, it is likely that firms are in constrained financing status. Therefore, less established firms are expected to experience greater liquidity pressure and to issue more equity accordingly. Indeed, the patterns observed in Panel A largely persist in Panel B, with the exception of variations across cash groups. This finding implies that less established firms often

[19]Detailed stand-alone significance results are available in Table 1.D.5 of Appendix 1.D.

issue more equity alongside debt reduction to address urgent financing needs. For low-cash firms, this behavior is expected, as tighter liquidity constraints necessitate reliance on external equity financing during debt redemption.

In summary, the stock market fluctuations relate positively to active debt management, particularly among less established firms. This likely reflects these firms' growth potential and effective utilization of external financing on value creation. More importantly, it is existing shareholders' revaluation that drives the cross-sectional patterns observed for overall asset revaluation. Net equity issuance is more closely related to firms' financing strategies as oppose to value creation process, and shows combined cross-sectional patterns. Higher-market-to-book, higher-cash, or less profitable firms, driven by substantial financing needs and potential financial constraints, tend to issue more equity when adjusting debt levels. Larger or higher-leverage firms are more likely to issue equity concurrently with net debt issuance. Low-cash firms consistently issue equity during debt level adjustments to address liquidity constraints.

1.8.2. Debt issuance and debt holders' revaluation

Equation (15) allocates period-t asset revaluation to debt holders, measured by value changes in the market value of debt, exclusive of net changes in debt notional during period t. As specified in Equation (2), a firm's outstanding debt can consist of various maturities indexed by k. To illustrate, consider the simplest case where $k = 1$, meaning the firm's debt has a maturity of one period. At time t, the firm issues N_t^d in debt, which matures at the end of the same period. At time $t+1$, the firm redeems the existing debt N_t^d and issues a new amount N_{t+1}^d, both at par. Under this framework, debt is issued and redeemed at par at the start and end of each period, respectively, replaced by new debt of the same nature. As a result, debt prices remain constant, resulting in no revaluation for debt holders:

$$\begin{aligned} \delta_{t+1}^d &= \frac{N_{t+1}^d P_{t+1}^d - N_t^d P_t^d - I_{t+1}^d}{A_t} \\ &= \frac{N_{t+1}^d \times 1 - N_t^d \times 1 - (N_{t+1}^d - N_t^d)}{A_t} = 0. \end{aligned} \tag{16}$$

Now consider a more realistic case where $k = 2$, representing a firm that issues one single type of debt with a two-period maturity. Under this setup, debt maturing in two periods is considered long-term, while debt maturing in one period is short-term. At time t, the firm holds both long-term debt N_t^l issued at par and short-term debt N_t^s, which is the long-term debt issued at time $t-1$. The total debt notional and the average debt price are given by:

$$\begin{aligned} N_t^d &= N_t^s + N_t^l, && (17) \\ P_t^d &= \frac{N_t^s}{N_t^d} \times P_t^s + \frac{N_t^l}{N_t^d} \times 1, && (18) \end{aligned}$$

where superscripts s and l denote short-term and long-term debt, respectively.

At time $t+1$, the firm redeems the N_t^s short-term debt at par, and the N_t^l long-term debt, now one period closer to maturity, effectively becomes short-term debt. Simultaneously, the firm issues a new amount N_{t+1}^l of long-term debt at par. This results in:

$$\begin{aligned} N_{t+1}^d &= N_{t+1}^s + N_{t+1}^l, && (19) \\ P_{t+1}^d &= \frac{N_{t+1}^s}{N_{t+1}^d} \times P_{t+1}^s + \frac{N_{t+1}^l}{N_{t+1}^d} \times 1, && (20) \end{aligned}$$

where $N_{t+1}^s = N_t^l$. Debt holders' revaluation during period t is expressed as:

$$\begin{aligned} \delta_{t+1}^d &= \frac{N_{t+1}^d P_{t+1}^d - N_t^d P_t^d - I_{t+1}^d}{A_t} \\ &= \frac{(N_{t+1}^s P_{t+1}^s + N_{t+1}^l \times 1) - (N_t^s P_t^s + N_t^l \times 1) - [(N_{t+1}^s + N_{t+1}^l) - (N_t^s + N_t^l)]}{A_t} \\ &= \frac{N_{t+1}^s (P_{t+1}^s - 1) - N_t^s (P_t^s - 1)}{A_t}. && (21) \end{aligned}$$

Expression (21) shows that debt holders' revaluation depends on short-term debt price changes, which reflect the transition of long-term debt to short-term debt and intertemporal price deviations from par. Notably, this revaluation primarily involves short-term debt holders who hold their debt and experience debt price fluctuations that is potentially correlated with newly issued debt. In

practice, firms' debt structures are not strictly classified as short- or long-term with time to maturity being the only difference. Inspired by this illustration, we generalize (21) to apply to total debt, meaning the newly issued long-term debt accounts for only a negligible portion of total debt.

As for the association between debt issuance and debt holders' revaluation, we already know from Table 6 that the effect is tiny and does not vary with the direction of changes in debt levels. Therefore, we apply the following model without distinguishing scenarios of net debt issuance versus redemption:

$$\delta^d_{i,t+1} = \left(\beta_0 + Z'_{it}\beta\right)\frac{I^d_{i,t+1}}{A_{it}} + X'_{it}\gamma + \varepsilon_{i,t+1}, \tag{22}$$

where we expect the cross-sectional patterns to be driven by firms' credit risks and issuers' quality.

Table 9 presents the association between debt issuance and debt holders' revaluation. Panel A reports the estimated β_0 and β from model (22), while Panel B highlights the stand-alone significance, as specified in (12). We find that debt issuance tends to correlate with more severe debt value depreciation for younger, smaller, higher-cash, or less profitable firms, likely reflecting factors such as more volatile cash flows, riskier operating profiles, weaker financing conditions, or precautionary cash holdings, which are associated with less established firms (Halling, Yu, and Zechner, 2022). Similarly, high-leverage firms experience more pronounced debt value depreciation, consistent with their elevated default risk. These firms often issue debt at higher yields, leading to average debt prices below par. Interestingly, value firms also experience greater depreciation despite their typically more established nature. This phenomenon may be driven by the strong connection between market-to-book ratios and our revaluation metric, as value firms with lower market-to-book ratios are more prone to observe lower prices.

1.9. Robustness and Extensions

In this section, we conduct additional analyses to ensure the robustness of our findings.

Table 9: Debt issuance and debt holders' revaluation

	Age	*Market-to-book*	*Size*	*Leverage*	*Cash rate*	*Profitability*
Panel A. *Full-sample regression with firm type interaction*						
(%)			*Dependent variable:* $\delta^d_{i,t+1}$ *(bps)*			
$I^d_{i,t+1}/A_{it}$	-1.22	-1.47	-1.15	0.50	-0.42	-1.13
	(-10.3)	(-10.6)	(-10.9)	(3.9)	(-3.1)	(-8.3)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.48	1.69	0.02	-0.62	-0.30	0.82
	(3.1)	(10.2)	(0.1)	(-4.2)	(-1.7)	(4.9)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	1.71	1.74	2.45	-1.81	-0.41	0.96
	(8.2)	(9.1)	(10.1)	(-10.3)	(-2.1)	(5.8)
Panel B. *Firm-type-subsample regression*						
(%)			*Dependent variable:* $\delta^d_{i,t+1}$ *(bps)*			
$I^d_{i,t+1}/A_{it}$ (Low)	-1.22	-1.35	-1.24	0.29	-0.37	-0.98
	(-10.0)	(-9.6)	(-11.7)	(2.4)	(-2.7)	(-7.2)
$I^d_{i,t+1}/A_{it}$ (Medium)	-0.64	0.21	-1.08	-0.31	-0.68	-0.21
	(-5.1)	(1.7)	(-7.0)	(-2.7)	(-4.8)	(-1.6)
$I^d_{i,t+1}/A_{it}$ (High)	0.73	0.23	1.44	-1.16	-0.67	-0.33
	(3.9)	(1.6)	(6.6)	(-8.9)	(-4.4)	(-2.6)

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and debt holders' revaluation, $\delta^d_{i,t+1}$, conditioning on firm characteristics such as firm age, market-to-book ratio, firm size, leverage ratio, cash rate, and profitability. Firms are identified at each point in time by group indicators formed based on the 33$^{\text{rd}}$ and 66$^{\text{th}}$ percentiles of the corresponding measures. Panel A presents the estimated coefficients for debt issuance and its interaction with group indicators. Baseline groups represent young, value, small, low-leverage, low-cash, or less profitable firms, with estimates for other groups shown as incremental to the baseline. Panel B presents the estimates for debt issuance as specified in (12), after stratifying the data into subsamples by group indicators. The dependent variables are measured in basis points, while the key regressor is in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

1.9.1. Debt issuance and asset revaluation across firm lifecycles

Cash flow characteristics and sensitivities vary across firm lifecycle stages, ultimately reflecting firms' revaluation dynamics. Therefore, one could use the cash flow patterns outlined by Dickinson (2011) to capture firms' lifecycle and analyze the association between debt issuance and asset revaluation across firms' lifecycle stages.

Panel A of Table 10 presents the distributions of changes in debt levels across lifecycle stages, also separated into net debt issuance and redemption scenarios. Average debt issuance initially declines but then rebounds as firms progress through their lifecycle. Conditioning on positive changes in debt levels, the average net debt issuance forms a U-shaped pattern across stages, suggesting that firms in their early and later stages are more reliant on debt financing. Conversely, the

average net debt redemption follows an inverse U-shaped pattern, albeit flatter, with a peak during the growth stage. This trend may reflect firms' higher uncertainty about rolling over debt during their inception and their strategic deleveraging as they approach maturity or exit stages.

Similar to the cross-sectional analysis in earlier sections, we condition the estimated coefficient β on lifecycle proxies, as well as issuer and redeemer indicators, as specified in (14). This approach allows us to assess how firms in the intro, growth, mature, decline, or shakeout stages experience varying revaluation effects associated with net debt issuance versus redemption. Panels B of Table 10 provides the estimation results on the associations between debt issuance and asset revaluation as well as shareholders' revaluation across these lifecycle stages.[20]

Firms in the intro stage, characterized by small size, high growth potential, and limited cash inflows and profitability, exhibit an average increase in debt levels, with the highest average net debt issuance among all stages. This reflects their reliance on external financing to fuel initial expansion and their inability to maintain stable debt maturity, similar to less established firms defined earlier. Both net debt issuance and redemption are estimated to relate positively to asset revaluation, which can be primarily attributed to both existing and new shareholders. On one hand, active debt management is associated with stock price appreciation for existing shareholders, highlighting the value creation effect when intro firms are adjusting debt. On the other hand, intro firms frequently issue equity as broader sources of external financing, especially when firms are reducing debt.

Growth-stage firms typically exhibit robust revenue growth and expanding market presence. Net debt issuance in this stage remains high but begins to stabilize, while net debt redemption reaches its lowest average level, supporting further expansion and scaling of operations. The positive correlation between net debt issuance and asset revaluation remains, while the share price appreciation decays, offset by greater equity issuance compared to intro-stage firms. For redeemer firms, the revaluation effect declines due to diminished association between net debt redemption and stock price movement, although equity issuance remains comparable to that for intro-stage

[20]Detailed stand-alone significance results are available in Table 1.D.6 of Appendix 1.D.

Table 10: Debt issuance and asset revaluation across firm lifecycle stages

Panel A. *Average debt issuance across firm lifecycle stages*

	Lifecycle stages:				
(%)	Intro	Growth	Mature	Shakeout	Decline
$I^d_{i,t+1}/A_{it}$	2.60	1.73	-0.94	-1.02	-0.15
$I^d_{i,t+1}/A_{it} > 0$	3.78	2.60	1.01	1.59	2.33
$I^d_{i,t+1}/A_{it} \leq 0$	-1.12	-0.80	-1.47	-1.73	-1.55

Panel B. *Full-sample regression with firm lifecycle interaction*

Dependent variable:	$\delta_{i,t+1}$ (%) Asset revaluation		$\delta^{ep}_{i,t+1}$ (%) Existing shareholders		$\delta^{ei}_{i,t+1}$ (%) New shareholders	
(%)	Issuer	Redeemer	Issuer	Redeemer	Issuer	Redeemer
$I^d_{i,t+1}/A_{it}$	0.55	-1.57	0.31	-0.74	0.21	-0.98
	(13.5)	(-9.9)	(9.8)	(-5.9)	(9.5)	(-13.2)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Growth}}_{it}$	0.01	0.39	-0.17	0.63	0.15	-0.12
	(0.2)	(2.1)	(-4.2)	(4.2)	(5.4)	(-1.3)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Mature}}_{it}$	0.06	1.15	-0.09	0.53	0.12	0.79
	(0.7)	(7.2)	(-1.6)	(4.1)	(2.3)	(10.4)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Shakeout}}_{it}$	0.82	1.06	0.09	0.42	0.48	0.77
	(6.3)	(6.5)	(1.1)	(3.2)	(6.9)	(10.0)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Decline}}_{it}$	0.42	0.93	0.10	0.17	0.23	0.83
	(3.6)	(5.3)	(1.1)	(1.2)	(3.9)	(10.1)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel A reports the distributions of debt issuance, $I^d_{i,t+1}/A_{it}$ by firm lifecycle stages, which are defined based on cash flow patterns following Dickinson (2011). Debt issuer and redeemer scenarios are also considered separately. Firms are identified at each point in time by group indicators formed based on the signs of their cash flows from operations, investing, and financing activities. All values are presented in percentages. Panel B reports the association between net debt issuance/redemption and asset revaluation as well as its equity components, respectively, conditioning on firm lifecycle stages. Issuer and redeemer scenarios are studied separately by conditioning on issuer and redeemer indicators, as specified in (14). The issuer columns present the estimated β_1 and β_2 for debt issuance and its interaction with firm stage indicators where the issuer indicator is activated, while the redeemer columns present the β_3 and β_4 estimates where the redeemer indicator is active. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

firms. Therefore, growth firms realize reduced stock price appreciation when conducting debt management compared to intro firms, but continue to rely on diverse external financing sources.

Mature firms, with established market positions and stable cash flows, exhibit the lowest average net debt issuance among all stages. These firms increasingly rely on internal profits to meet financing needs and reduce their dependence on external debt. When issuing debt, mature firms continue generating positive asset revaluation driven by consistent stock price appreciation

and more prominent net equity issuance. Aligning with our earlier findings, net equity issuance alongside net debt issuance relates to firms' financing strategies, likely reflecting efforts to meet financing needs and optimize capital structure simultaneously. In contrast, net debt redemption signals significantly reduced stock price appreciation for existing shareholders and less net equity issuance compared to intro firms, consistent with our earlier findings for more established firms.

Firms in the decline stage face shrinking market shares, and declining revenues. Debt issuance shows a slight uptick during this stage, possibly due to the needs for additional financing to manage liquidity, business closures, or restructuring. Net debt issuance during this stage signals greater asset revaluation than in the intro stage, which is driven by net equity issuance, while existing shareholders' revaluation is not significantly different. These reflect increased equity issuance to address funding needs due to leverage burden of additional debt, as well as the challenges of reversing declining trends to create more value. In contrast, net debt redemption signals significantly lower asset revaluation, primarily driven by reduced net equity issuance. This pattern aligns with declining redeemer firms completing their exit processes, with shrinking operations and reduced needs for external financing.

Shakeout-stage firms exhibit characteristics of transitional phases, often undergoing strategic realignments. Debt issuance may fund restructuring or strategic initiatives, with asset revaluation outcomes highly variable depending on the success of these efforts. In this stage, debt issuance is associated with both value creation for existing shareholders and net equity issuance. For instance, debt issuer firms tend to issue more equity in this stage, generating similar stock price appreciation compared to intro firms. Debt redeemer firms issue less equity and generate less stock price appreciation, following similar patterns to more established firms.

Overall, firms in the intro stages actively manage debt to support expansion and generate significant value, albeit with higher associated risk, consistent with patterns observed for less established firms. From growth stage onwards, debt issuer firms focus on strategic debt optimization and issue more equity, only generating limited stock market movement, while redeemer firms behave like more established firms, issuing less equity and struggling to realize meaningful value.

Table 11: Small debt issuance and asset revaluation

Dependent variable: (%)	$\delta_{i,t+1}$ (%) Asset revaluation	$\delta^{ep}_{i,t+1}$ (%) Existing shareholders	$\delta^{ei}_{i,t+1}$ (%) New shareholders
$I^d_{i,t+1}/A_{it}$	-0.67	-0.71	0.00
	(-5.5)	(-6.0)	(0.0)
$I^d_{i,t+1}/A_{it}$	-1.99	-1.77	-0.23
	(-6.3)	(-5.9)	(-2.1)
$I^d_{i,t+1}/A_{it} \times 1^{I^d>0}_{i,t+1}$	1.70	1.44	0.25
	(4.0)	(3.6)	(1.7)
Firm-specific controls	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and asset revaluation from regression (12), along with the results for scenarios of net debt issuance and net debt redemption, as specified in (13). Debt issuance is limited within its 25th and 75th percentiles. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

This lifecycle-based analysis highlights the interplay between debt issuance and asset revaluation across different stages of firms' evolution. It isolates conditions under which firms derive the most value when managing debt, and provides valuable insights into corporate financial strategy and decision-making across lifecycle stages.

1.9.2. Small changes in debt levels

To provide a more granular investigation on the V-shaped relation between debt issuance and asset revaluation, we conduct an extension by restricting the sample to observations with debt issuance within the interquartile range (25th to 75th percentiles; -0.73% to 0.94%). As shown in Table 11, the association appears more kinked than V-shaped in this subsample. Specifically, small reductions in debt are linked to positive asset revaluation, primarily driven by stock price appreciation for existing shareholders. While these firms forgo the interest tax shield, such actions appear to convey favorable signals to the stock market, consistent with patterns observed in the broader sample. In contrast, small debt increases are not associated with significantly positive revaluation effects, suggesting that the value-enhancing impact is concentrated among firms engaging in more substantial debt issuance.

Table 12: Net debt issuance and asset revaluation—alternative loan pricing

	Dependent variable: $\delta_{i,t+1}$ *(%)*					
(%)	***Age***	***Market-to-book***	***Size***	***Leverage***	***Cash rate***	***Profitability***
Panel A. *Full-sample regression* (14) *with issuer and firm type interaction*						
$I^d_{i,t+1}/A_{it}$	0.58	0.44	0.71	0.67	0.55	0.69
	(19.3)	(13.5)	(20.2)	(14.1)	(18.5)	(20.6)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.04	0.10	-0.28	-0.06	-0.03	-0.19
	(0.9)	(2.3)	(-6.0)	(-1.1)	(-0.7)	(-4.7)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	-0.08	0.36	-0.12	-0.21	0.13	-0.19
	(-1.5)	(6.7)	(-1.9)	(-3.9)	(2.5)	(-4.1)
Panel B. *Issuer-type-subsample regression* (12)						
$I^d_{i,t+1}/A_{it}$ (Low)	0.62	0.41	0.69	0.70	0.60	0.66
	(18.1)	(11.6)	(17.7)	(12.6)	(17.6)	(17.3)
$I^d_{i,t+1}/A_{it}$ (Medium)	0.64	0.56	0.40	0.66	0.54	0.50
	(16.7)	(15.7)	(12.1)	(17.5)	(14.4)	(15.2)
$I^d_{i,t+1}/A_{it}$ (High)	0.55	0.79	0.66	0.48	0.65	0.50
	(12.8)	(15.9)	(13.9)	(16.7)	(13.2)	(12.2)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and asset revaluation, $\delta_{i,t+1}$, conditioning on firm characteristics, if bank loans are valued at alternative pricing measures. Panel A presents the estimated β_1 and β_2 for net debt issuance and its interaction with group indicators, as specified in (14), while Panel B presents the estimates for net debt issuance as specified in (12), after stratifying the data into subsamples by group indicators. Both dependent variables and the key regressor are measured in percentages. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV. See table note of Table 3 for further details on cross-sectional analysis.

1.9.3. Alternative loan pricing measure

To ensure the robustness of our empirical results, we also employ alternative measures to proxy loan prices. These include *(i)* the last available origination price within one year, reflecting the most recent market conditions and pricing for the firm's loans; *(ii)* the average loan price for firms within the same rating cohort and industry, capturing sector-specific and credit risk-related factors influencing loan pricing; and *(iii)* the book value of loans as a fallback proxy when the first two measures are unavailable. While the accounting records of loans may not perfectly align with market values, they provide a consistent and reliable valuation benchmark. The proxies are prioritized in the order listed, from *(i)* to *(iii)*, to ensure that the most relevant and up-to-date pricing information is utilized.

We re-estimate regression (14), substituting the dependent variable with asset revaluation based

Table 13: Debt issuance and new shareholders' revaluation

Dependent variable: (%)	$\delta^{ei}_{i,t+1}$ (%) New shareholders' revaluation	$\delta^{eishr}_{i,t+1}$ (%) Share changes	$\delta^{eiprc}_{i,t+1}$ (%) Price changes
$I^d_{i,t+1}/A_{it}$	0.06	0.07	0.00
	(7.5)	(8.7)	(-0.1)
$I^d_{i,t+1}/A_{it}$	-0.27	-0.27	0.01
	(-21.8)	(-20.9)	(2.5)
$I^d_{i,t+1}/A_{it} \times 1^{I^d>0}_{i,t+1}$	0.56	0.59	-0.01
	(34.7)	(33.1)	(-3.2)
Firm-specific controls	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and two channels of new shareholders' revaluation, $\delta^{ei}_{i,t+1}$, as specified in (12), along with the results for scenarios of net debt issuance and net debt redemption, as in (13). Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses.

on these alternative loan pricing measures. The results, presented in Table 12, align closely with those reported in Table 3, reinforcing the validity of our core findings.[21]

1.9.4. Further investigation on new shareholders' revaluation

Equation (15) decomposes asset revaluation into revaluation attributable to different stakeholders, specifically capturing *(i)* stock price movements for existing shareholders, *(ii)* net equity issuance evaluated at time-$(t+1)$ stock prices, and *(iii)* value changes for debt holders excluding the mechanical effects of changes in debt levels. To strengthen our analysis of the net equity issuance component, we investigate whether new shareholders' revaluation is driven primarily by end-of-period stock price fluctuations. To achieve this, we further decompose new shareholders' revaluation, δ^{ei}_{t+1} into two components:

$$\begin{aligned} \frac{(N^e_{t+1}-N^e_t)P^e_{t+1}}{A_t} &= \frac{(N^e_{t+1}-N^e_t)P^e_t}{A_t} + \frac{(N^e_{t+1}-N^e_t)(P^e_{t+1}-P^e_t)}{A_t} \\ \delta^{ei}_{t+1} &= \delta^{eishr}_{t+1} + \delta^{eiprc}_{t+1}. \end{aligned} \tag{23}$$

[21] The results for net debt redemption scenario are presented in Appendix 1.D Table 1.D.7 for completeness, which aligns with Table 4.

Here, we first evaluate the net change in number of shares outstanding at the beginning-of-period stock price using δ_{t+1}^{eishr}. The remaining component is captured by δ_{t+1}^{eiprc}, measuring the value difference of the newly issued equity as if it were issued at two different prices. These two terms are used as the dependent variable in our estimations of (12) and (13). The results, presented in Table 13, reveal that the relation between debt issuance and new shareholders' revaluation is primarily driven by changes in the number of shares outstanding rather than end-of-period stock price fluctuations. That is, our results remain robust no mater we use the end-of-period stock prices or the beginning-of-period ones. This finding confirms that the observed net equity issuance behavior is primarily related to share count adjustments, rather than immediate stock price movement.

1.9.5. Additional firm characteristics

In this subsection, we investigate the cross-sectional variations in the association between debt issuance and asset revaluation by incorporating additional firm characteristics and alternative life-cycle classifications.

First, we examine firm characteristics that are controlled for in our baseline regression models but are not explicitly analyzed under the cross-sectional setting. The first column of Table 14 presents results for firms categorized by cash flow duration. Firms with shorter cash flow duration exhibit greater association between active debt management and asset revaluation. This finding complements earlier results, aligning with the idea that shorter cash flow duration captures firm characteristics such as higher growth opportunities and liquidity constraints. The second column investigates the impact of debt maturity. Firms with a higher proportion of short-term debt—thus shorter average debt maturity—demonstrate significant value creation correlated with both net debt issuance and redemption. This result supports the notion that less established firms, which tend to be more financially constrained and rely more on short-term debt, are positioned to establish stronger association between active debt management and asset revaluation.[22]

[22]In response to the examiner's suggestion to consider the priority of new debt relative to existing obligations, we treat average debt maturity as a coarse proxy for debt seniority, under the assumption that short-term debt typically holds higher priority and is more readily renegotiated. The results indicate that firms with a higher share of short-term (and thus more senior) debt exhibit a stronger association between debt issuance and asset revaluation, lending support

Table 14: Debt issuance and asset revaluation across firm types—alternatives

	Dependent variable: $\delta_{i,t+1}$ *(%)*			
(%)	***Duration***	***Maturity***	***RE/TE***	***RE/TA***
Panel A. *Issuer firm scenario*				
$I^d_{i,t+1}/A_{it}$	0.80	0.79	0.43	0.61
	(19.9)	(19.4)	(13.7)	(16.4)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	-0.32	-0.32	0.05	-0.15
	(-6.5)	(-6.6)	(1.2)	(-3.2)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	-0.45	-0.39	0.32	-0.06
	(-9.1)	(-7.8)	(7.0)	(-1.2)
Panel B. *Redeemer firm scenario*				
$I^d_{i,t+1}/A_{it}$	-0.74	-0.70	-0.22	-0.44
	(-16.7)	(-15.9)	(-6.5)	(-11.5)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.34	0.34	-0.21	-0.05
	(6.2)	(6.3)	(-4.4)	(-1.0)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	0.50	0.40	-0.53	-0.17
	(9.5)	(7.2)	(-10.2)	(-3.1)
Firm-specific controls	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and asset revaluation, $\delta_{i,t+1}$, as specified in (14), conditioning on firm characteristics such as cash flow duration, average debt maturity, and two earned/contributed capital mixes. Firms are identified at each point in time by group indicators formed based on the 33$^{\text{rd}}$ and 66$^{\text{th}}$ percentiles of the corresponding measures. Baseline groups represent short-duration, short-maturity, and low-earning firms. Estimates for the other groups are incremental to the baseline. Panel A reports on the scenario of net debt issuance, while Panel B on net debt redemption. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

In addition to the five-level lifecycle stages discussed earlier, we consider the lifecycle classification proposed by DeAngelo, DeAngelo, and Stultz (2006), which categorize firms based on the earned/contributed capital mix. Specifically, we examine the retained earnings to total equity ratio (RE/TE) and the retained earnings to total assets ratio (RE/TA). These metrics capture the extent to which a firm is self-financing or reliant on external capital. The results reveal contrasting cross-sectional patterns. Net debt issuance by high-RE/TE firms relates to greater asset revaluation, while the same is true for net debt issuance by low-RE/TA firms. This discrepancy likely stems from the composition of the denominators in these ratios. Firms with more retained earnings as a fraction of total assets often resemble the more profitable firms identified in earlier sections.

to the relevance of debt structure in shaping this relation.

On one hand, they might be better positioned to handle higher leverage and maintain longer debt maturities. On the other hand, they might rely less on debt financing and maintain relatively low leverage ratio. Once total debt notional is excluded from the denominator, established firms with smaller outstanding debt may exhibit smaller RE/TE measure, signaling mixed information about their financial health and reliance on external financing. Moreover, Ball, Gerakos, Linnainmaa, and Nikolaev (2020) argue that larger firms tend to have higher retained earnings as a proportion of total equity, which challenges our earlier findings that less established firms experience more pronounced value creation from debt issuance. These inconsistencies suggest that while RE/TE and RE/TA capture aspects of a firm's lifecycle, their ability to distinguish the association between debt issuance and asset revaluation is not straightforward.[23]

1.10. Conclusion

This study investigates the association between debt issuance and asset revaluation across various firm types, utilizing quarterly data from over 7,000 public US non-financial firms spanning 1975 to 2023.

Our findings reveal that, for the average firm, both net debt issuance and net debt redemption are strongly associated with positive asset revaluation, after controlling for available information. Delving deeper, we uncover substantial cross-sectional variations influenced by firm characteristics, highlighting that firms strategically issue and redeem debt and enhance their asset base simultaneously. Notably, younger, growth, smaller, lower-leverage, higher-cash, or less profitable firms, which we regard as less established firms, generate greater value when conducting active debt management compared to their more established counterparts.

A decomposition of asset revaluation shows that such value accrues primarily to shareholders, both existing and new. Stock price appreciation for existing shareholders drives the cross-sectional patterns observed for overall asset revaluation. Firms tend to issue equity accompanying debt

[23] Motivated by the examiner's suggestion to condition debt changes on firms' prior issuance behavior, we stratify the sample based on whether firms were net debt issuers or net redeemers in the previous quarter. The main findings remain robust across both subsamples, suggesting that the observed relation between contemporaneous net debt issuance and asset revaluation is not driven by short-term issuance history.

adjustment, likely reflecting their strategies in capital structure management. Debt holders' revaluation shows limited correlation with debt issuance and does not vary with the direction of changes in debt levels. The cross-sectional patterns tend to align with firms' credit risks.

This research contributes to the ongoing discourse on the value implications of corporate debt financing, emphasizing the critical role of firm characteristics in shaping the relation between active debt management and asset revaluation. These insights are valuable for investors to assess firm-specific operating status and its implications on the association between debt strategies and stakeholders' value. For corporate managers, the findings underscore the importance of aligning debt management decisions with firm-specific growth objectives and value-creation strategies. Future research could further explore the associations between specific debt structures or maturities and asset revaluation. Investigating how varying market conditions and external shocks influence how debt financing strategies relate to asset revaluation across firm characteristics would also provide richer insights. Additionally, analyzing the long-term relation between debt issuance and firm stability could help refine optimal capital structure decisions.

The next chapter will investigate how the association between debt issuance and asset revaluation evolves over time, with a particular focus on variations across different monetary regimes, offering a dynamic perspective on the interplay between corporate debt strategies and macroeconomic conditions.

Appendix

1.A. Data Sources and Variable Definitions

Table 1.A.1: Variable definitions and data sources

	Variable	Definition/Source
Balance-sheet variables and pricing at t		
N_t^b	Book value of bonds	Compustat *dltt*
N_t^l	Book value of loans	Compustat *dlc*
N_t^d	Notional of debt outstanding	$N_t^b + N_t^l$
P_t^b	Average price per bond notional	Lehman, NAIC, TRACE, DataStream
P_t^l	Average price per loan notional	DealScan
P_t^d	Notional-weighted average debt price	$(N_t^b P_t^b + N_t^l P_t^l)/(N_t^b + N_t^l)$
N_t^e	Number of common shares outstanding	CRSP *shrout*, sum over share classes
P_t^e	Price per common share	CRSP *prc*, weighted average over share classes
A_t	Market value of assets	$N_t^e P_t^e + N_t^d P_t^d$, other balance sheet classes are aligned with $N_t^e P_t^e$
Fund flows in period t		
I_{t+1}^d	Net debt issuance at par	$N_{t+1}^d - N_t^d$
$N_t^e c_{t+1}^e$	Cash dividend payment	Compustat *dv*
$N_t^d c_{t+1}^d$	Coupon payment	Compustat *xint*
Asset revaluation and sources in period t		
δ_{t+1}	Asset revaluation	$(A_{t+1} - A_t - I_{t+1}^d)/A_t$
$\delta_{t+1}^{ep}, \delta_{t+1}^{ei}$	Shareholders' revaluation	$(N_t^e(P_{t+1}^e - P_t^e))/A_t$, $((N_{t+1}^e - N_t^e)P_{t+1}^e)/A_t$
δ_{t+1}^d	Debt holders' revaluation	$(N_{t+1}^d P_{t+1}^d - N_t^d P_t^d - I_{t+1}^d)/A_t$
Firm characteristics at t		
Age_t	Firm age	Compustat $(datadate - ipodate)/365.25$
MB_t^e	Market-to-book ratio	$N_t^e P_t^e / ceq$
Size_t	Firm size	Compustat $\log(at)$
Lev_t	Leverage ratio	N_t^d / A_t
Cash_t	Cash-to-asset ratio	Compustat che/at
Dur_t	Cash flow duration	Dechow, Sloan, and Soliman (2004) and Weber (2018)
Mat_t	Average debt maturity	Compustat $(dlc + 5 \times dltt)/(dlc + dltt)$
Profit_t	Net-income-to-asset ratio	Compustat ni/at
Intan_t	Intangible-to-asset ratio	Compustat $intan/at$
$\text{R\&D}_t$	R&D-to-operating-expense ratio	Compustat $xrd/xopr$
Earnings_t	Earnings (duration estimation input)	Compustat *ib*
BVA_t	Book value of assets (duration estimation input)	Compustat *at*
ROA_t	Return on assets (duration estimation input)	$\text{Earnings}_{t+1}/\text{BVA}_t$
GIA_t	Growth in asset (duration estimation input)	$(\text{BVA}_{t+1} - \text{BVA}_t)/\text{BVA}_t$
RE/TE_t	Retained earnings to total equity ratio	Compustat re/ceq
RE/TA_t	Retained earnings to total assets ratio	Compustat re/at
Lifecycle_t	Intro stage	Compustat $oancf \leq 0$, $ivncf \leq 0$, $fincf > 0$
	Growth stage	Compustat $oancf > 0$, $ivncf \leq 0$, $fincf > 0$
	Mature stage	Compustat $oancf > 0$, $ivncf \leq 0$, $fincf \leq 0$
	Decline stage	Compustat $oancf \leq 0$, $ivncf > 0$
	Shakeout stage	Others
Time series state variables at t		
$f_{2,t}$	One-year-ahead two-year forward rate	Cochrane and Piazzesi (2005),
$f_{5,t}$	One-year-ahead five-year forward rate	https://www.federalreserve.gov/data/nominal-yield-curve.htm
EFFR_t	Effective Federal Funds rate	Federal Reserve Economic Data
TR_t	Policy rate based on the Taylor Rule	Federal Reserve Economic Data
r_t^{SP}	Equally-weighted annual S&P returns	CRSP *ewretd*
Vol_t	Macro uncertainty measure	Jurado, Ludvigson, and Ng (2015)

1.B. Credit Rating Prediction

Table 1.B.1: Credit rating prediction via multinomial logistic regression

Rating categories	Aaa-Aa	A	Ba	B and lower
Book leverage	-0.61 (-31.0)	-0.27 (-17.6)	0.35 (20.3)	1.03 (47.1)
Market value of equity	0.82 (74.0)	0.32 (45.4)	-0.54 (-74.4)	-1.02 (-121.3)
Cash-to-asset	0.54 (2.8)	-0.51 (-3.6)	5.70 (47.4)	7.20 (56.5)
Net-income-to-asset	7.45 (13.2)	5.12 (11.3)	-2.81 (-7.1)	-7.45 (-18.8)
Market-to-book equity	-0.00 (-0.6)	-0.00 (-1.4)	-0.00 (-2.1)	-0.00 (-0.1)
3-month Treasury rate	0.46 (85.8)	0.23 (64.5)	-0.13 (-35.4)	-0.43 (-93.5)
S&P return	0.04 (11.4)	0.02 (7.2)	-0.01 (-3.7)	-0.01 (-4.2)

This table reports the multinomial logistic regression results where we predict credit ratings for unrated firms using the logarithm of book leverage, the logarithm of market value of equity, the net-income-to-asset ratio, the cash-to-asset ratio, the market-to-book equity ratio, 3-month US Treasury bill rate, and trailing 1-year return on the S&P500 index, all measured at the beginning of the period. The benchmark rating cohort is Baa. The estimation includes 107,046 firm-quarter observations over the period 1975.II–2023.IV. The estimation R-squared is 21.1%.

In this appendix, we provide details about how we predict credit ratings for firms in our sample without a Moody's rating.

We predict ratings using a multinomial logistic regression model in firm-quarter panel data. In the credit risk literature, previous studies consistently find that firm-specific and macroeconomic variables are significantly associated with firms' probability of default. Following the literature (e.g., Duffie, Saita, and Wang, 2007; Duan, Sun, and Wang, 2012), we regress indicators of five rating categories (omitting Baa as the benchmark rating cohort) on a series of control variables measured at the beginning of the period. These control variables include the logarithm of book leverage, the logarithm of market value of equity, the net-income-to-asset ratio, the cash-to-asset ratio, the market-to-book equity ratio, 3-month US Treasury bill rate, and the trailing 1-year return on the S&P500 index. The missing ratings are imputed by selecting the rating category with the largest predicted probability. The estimation results are reported in Table 1.B.1.

1.C. Estimating Cash Flow Duration

In this appendix, we provide details about how we estimate firms' cash flow duration at the asset level.

Dechow, Sloan, and Soliman (2004) and Weber (2018) use an "implied equity duration" measure that resembles the traditional Macaulay duration for bonds, with two key differences. Firstly, since stocks do not have a well-defined maturity, the duration formula is split into a finite detailed forecasting period and an infinite terminal value, assumed to be paid out as level perpetuity. Secondly, since cash flows are not known in advance, they are predicted by forecasting return on equity, and growth in book equity based on the clean surplus accounting assumption.[24]

We extend this equity duration measure to the asset level. Similar to the clean surplus accounting assumption, we assume that total book assets increase with earnings, debt and equity issuance, and decrease with dividends, equity repurchases, interest expenses, and debt redemption:

$$\begin{aligned} CF_{i,t+1} &= \text{Earnings}_{i,t+1} - (\text{BVA}_{i,t+1} - \text{BVA}_{it}) \\ &= \text{BVA}_{it} \times \left(\frac{\text{Earnings}_{i,t+1}}{\text{BVA}_{it}} - \frac{\text{BVA}_{i,t+1} - \text{BVA}_{it}}{\text{BVA}_{it}} \right) \end{aligned}$$

where $CF_{i,t+1}$ denotes the net cash flow distributions to stakeholders of the firm, and BVA_{it} represents the firm's book assets. We model return on assets (ROA), defined as $\text{Earnings}_{i,t+1}/\text{BVA}_{it}$, as a first-order autoregressive process with an autocorrelation coefficient reflecting the long-run average rate of mean reversion in ROA and a long-run mean equal to the mean return on wealth in the United States post-1980 at 6.58% per annum. Growth in assets (GIA), defined as $(\text{BVA}_{i,t+1} - \text{BVA}_{it})/\text{BVA}_{it}$, is modeled similarly, with the long-run mean equal to the average growth rate of the economy (long-run GDP growth rate post-1980 at 2.82% per annum).[25]

Using our initial merged Compustat-CRSP sample, we estimate the autocorrelation coeffi-

[24] Clean surplus assumes that the book value of equity only increases with earnings and equity issuance and decreases with dividends and equity repurchases, resulting in the accounting identity $CF_{i,t+1} = \text{Earnings}_{i,t+1} - (\text{BVE}_{i,t+1} - \text{BVE}_{it})$.

[25] The mean return on wealth and GDP growth rate are suggested by Jordà, Knoll, Kuvshinov, Schularick, and Taylor (2019), who construct a broad historical database of equity, bond, bill, and housing returns.

cients: 0.907 for ROA and 0.002 for GIA. With these parameters, we predict future cash flows and book assets over a ten-year forecasting period for each firm. The cash flow duration of firm i at time t is given by

$$\text{Dur}_{it} = \frac{\sum_{s=1}^{T} s \times CF_{i,t+s}(1+r_a)^{-s}}{A_{it}} + (T + \frac{1+r_a}{r_a}) \times \frac{A_{it} - \sum_{s=1}^{T} CF_{i,t+s}(1+r_a)^{-s}}{A_{it}}$$

where r_a is cost of assets assumed to be equal to the expected ROA, and the present value of the first ten years' cash flows in the last term is capped at the observed A_{it}.

1.D. Additional Tables

Table 1.D.1: Distribution of firms across sectors and by median leverage

Leverage percentile range	0-20	20-40	40-60	60-80	80-100	All
Agriculture, forestry and fishing	1	6	8	7	9	31
Mining	63	74	143	157	123	560
Construction	8	15	26	21	18	88
Manufacturing	802	772	774	641	511	3,500
Transportation, communications, electric, gas and sanitary service	36	77	102	241	333	789
Wholesale and retail trade	93	140	145	169	193	740
Services	412	331	218	179	229	1,369
Total	1,415	1,415	1,416	1,415	1,416	7,077

This table reports the distribution of firms across sectors and by median leverage ratio. The data include 7,077 public US non-financial firms, over the period 1975.II–2023.IV.

Table 1.D.2: Debt issuance and asset revaluation—subsample

	Dependent variable: $\delta_{i,t+1}(\%)$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$I^d_{i,t+1}/A_{it}(\%)$						0.11	0.57	-0.47
						(7.6)	(25.1)	(-18.2)
Age_{it}	0.00	-0.04	-0.02	-0.01	-0.02	-0.02	0.00	-0.05
	(0.9)	(-10.6)	(-4.8)	(-2.8)	(-2.0)	(-1.9)	(0.0)	(-3.9)
$\text{Market-to-book}_{it}$	-0.09	-0.10	-0.08	-0.11	-0.49	-0.49	-0.43	-0.53
	(-6.0)	(-7.1)	(-5.4)	(-7.7)	(-20.4)	(-20.3)	(-12.8)	(-17.6)
Size_{it}	-0.43	-0.44	-0.42	-0.47	-5.07	-5.06	-4.57	-5.12
	(-23.9)	(-22.9)	(-23.3)	(-20.6)	(-41.5)	(-41.4)	(-28.8)	(-36.8)
$\text{Leverage}_{it}(\%)$	0.00	0.00	0.00	0.00	0.10	0.11	0.10	0.07
	(0.4)	(0.7)	(-2.3)	(1.7)	(21.5)	(22.9)	(16.1)	(12.7)
$\text{Cash rate}_{it}(\%)$	0.02	0.01	0.02	0.01	-0.02	-0.01	0.05	-0.04
	(6.1)	(3.6)	(5.3)	(2.9)	(-2.6)	(-2.2)	(4.6)	(-5.4)
$\text{Profitability}_{it}(\%)$	0.13	0.11	0.11	0.10	0.15	0.15	0.12	0.17
	(7.0)	(5.9)	(6.1)	(5.1)	(6.2)	(6.2)	(3.0)	(5.7)
$\text{Cash flow duration}_{it}$	-0.13	-0.19	-0.17	-0.20	-0.22	-0.22	-0.24	-0.22
	(-7.6)	(-10.8)	(-10.0)	(-11.3)	(-10.3)	(-10.5)	(-6.8)	(-8.3)
$\text{Average debt maturity}_{it}$	0.20	0.24	0.25	0.31	0.51	0.44	0.59	0.97
	(2.0)	(2.4)	(2.6)	(3.0)	(3.8)	(3.2)	(2.7)	(5.5)
$\text{Intangible-to-asset}_{it}(\%)$	0.00	-0.03	-0.01	-0.02	0.00	0.00	-0.01	0.00
	(0.4)	(-12.1)	(-3.7)	(-5.8)	(-0.8)	(-0.8)	(-1.1)	(-0.1)
$\text{R\&D-to-operating-expense}_{it}(\%)$	0.07	0.07	0.06	0.05	0.04	0.04	0.02	0.05
	(13.2)	(13.5)	(12.6)	(8.8)	(3.1)	(3.1)	(1.1)	(3.5)
Time-specific controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE			Yes	Yes	Yes	Yes	Yes	Yes
Industry FE				Yes				
Firm FE					Yes	Yes	Yes	Yes
R-squared	0.01	0.01	0.04	0.05	0.09	0.09	0.14	0.11
Sample	Full sample	Full sample	Full sample	Full sample	Full sample	Full sample	Issuer subsample	Redeemer subsample

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and asset revaluation, $\delta_{i,t+1}$, as specified in (12). Regressors are incrementally added to the model from column (1) to (6). Columns (7) and (8) study scenarios of net debt issuance ($I^d_{i,t+1}/A_{it} > 0$) and net debt redemption ($I^d_{i,t+1}/A_{it} \leq 0$) separately in corresponding subsamples. Both the dependent variables and the estimated coefficients are expressed in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, and fixed effects for year, industry, and firm, sequentially. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

Table 1.D.3: Debt issuance and asset revaluation across firm types

	Age	***Market-to-book***	***Size***	***Leverage***	***Cash rate***	***Profitability***
Panel A. *Average debt issuance ($I^d_{i,t+1}/A_{it}$) for firms across firm types (%)*						
Low	0.44	0.16	0.25	0.45	0.45	0.28
Medium	0.24	0.40	0.29	0.37	0.29	0.31
High	0.17	0.29	0.30	0.03	0.11	0.26
Panel B. *Full-sample regression with firm type interaction*						
(%)			*Dependent variable:* $\delta_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$	0.09	0.07	0.06	0.25	0.07	0.13
	(4.6)	(3.9)	(3.0)	(6.8)	(4.1)	(6.4)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.00	0.08	0.00	-0.13	0.01	0.00
	(-0.1)	(3.0)	(-0.1)	(-3.3)	(0.3)	(-0.1)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	0.07	0.02	0.21	-0.20	0.15	-0.03
	(2.2)	(0.6)	(5.2)	(-5.2)	(4.4)	(-1.1)
Panel C. *Firm-type-subsample regression*						
(%)			*Dependent variable:* $\delta_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$ (Low)	0.12	0.08	0.08	0.27	0.07	0.11
	(6.0)	(4.2)	(3.6)	(7.0)	(3.6)	(5.2)
$I^d_{i,t+1}/A_{it}$ (Medium)	0.10	0.15	0.04	0.15	0.10	0.10
	(4.8)	(7.0)	(2.2)	(6.5)	(4.1)	(5.2)
$I^d_{i,t+1}/A_{it}$ (High)	0.14	0.09	0.27	0.06	0.24	0.10
	(4.9)	(2.8)	(7.7)	(4.0)	(7.8)	(4.2)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and asset revaluation, $\delta_{i,t+1}$, conditioning on firm characteristics such as firm age, market-to-book ratio, firm size, leverage ratio, cash rate, and profitability. Firms are identified at each point in time by group indicators formed based on the 33$^{\text{rd}}$ and 66$^{\text{th}}$ percentiles of the corresponding measures. Panel A presents the average debt issuance across firm types. Panel B presents the estimated coefficients for debt issuance and its interaction with group indicators. Baseline groups represent young, value, small, low-leverage, low-cash, or less profitable firms, with estimates for other groups shown as incremental to the baseline. Panel C presents the estimates for debt issuance as specified in (12), after stratifying the data into subsamples by group indicators. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

Table 1.D.4: Net debt issuance and shareholders' revaluation—subsample

	Age	***Market-to-book***	***Size***	***Leverage***	***Cash rate***	***Profitability***
Panel A. *Existing shareholders' revaluation for issuer firms*						
(%)			*Dependent variable:* $\delta^{ep}_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$ (Low)	0.28	0.13	0.39	0.35	0.20	0.29
	(10.7)	(6.3)	(12.6)	(8.0)	(9.3)	(9.8)
$I^d_{i,t+1}/A_{it}$ (Medium)	0.26	0.13	0.13	0.22	0.23	0.10
	(9.7)	(5.3)	(5.6)	(8.8)	(9.1)	(5.1)
$I^d_{i,t+1}/A_{it}$ (High)	0.14	0.30	0.07	0.13	0.24	0.13
	(5.6)	(7.7)	(3.2)	(7.8)	(6.1)	(4.4)
Panel B. *New shareholders' revaluation for issuer firms*						
(%)			*Dependent variable:* $\delta^{ei}_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$ (Low)	0.29	0.24	0.24	0.27	0.31	0.29
	(16.2)	(12.5)	(13.1)	(10.3)	(15.7)	(15.6)
$I^d_{i,t+1}/A_{it}$ (Medium)	0.29	0.36	0.23	0.33	0.26	0.32
	(14.6)	(18.5)	(12.9)	(16.2)	(13.4)	(17.1)
$I^d_{i,t+1}/A_{it}$ (High)	0.31	0.37	0.46	0.30	0.33	0.29
	(13.4)	(14.9)	(17.5)	(17.2)	(14.4)	(13.3)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and shareholders' revaluation, $\delta^{ep}_{i,t+1}$ and $\delta^{ei}_{i,t+1}$, conditioning on firm characteristics such as firm age, market-to-book ratio, firm size, leverage ratio, cash rate, and profitability. Firms are identified at each point in time by group indicators formed based on the 33$^{\text{rd}}$ and 66$^{\text{th}}$ percentiles of the corresponding measures. Presented coefficients are estimated for net debt issuance as specified in (12), after stratifying the data into subsamples by group indicators. The dependent variable in Panel A is the asset revaluation attributable to existing shareholders, while that in Panel B is for new shareholders. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

Table 1.D.5: Net debt redemption and shareholders' revaluation—subsample

	Age	***Market-to-book***	***Size***	***Leverage***	***Cash rate***	***Profitability***
Panel A. *Existing shareholders' revaluation for redeemer firms*						
(%)			*Dependent variable:* $\delta^{ep}_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$ (Low)	-0.23	-0.16	-0.38	-0.35	-0.19	-0.30
	(-6.1)	(-6.9)	(-9.9)	(-3.3)	(-7.0)	(-8.3)
$I^d_{i,t+1}/A_{it}$ (Medium)	-0.25	-0.14	-0.16	-0.26	-0.26	-0.10
	(-7.1)	(-3.7)	(-5.6)	(-6.1)	(-7.8)	(-3.5)
$I^d_{i,t+1}/A_{it}$ (High)	-0.16	-0.52	-0.01	-0.13	-0.25	-0.15
	(-4.4)	(-8.5)	(-0.3)	(-6.7)	(-4.8)	(-3.4)
Panel B. *New shareholders' revaluation for redeemer firms*						
(%)			*Dependent variable:* $\delta^{ei}_{i,t+1}$ *(%)*			
$I^d_{i,t+1}/A_{it}$ (Low)	-0.36	-0.15	-0.33	-0.60	-0.30	-0.26
	(-17.0)	(-9.1)	(-15.7)	(-13.2)	(-15.6)	(-13.3)
$I^d_{i,t+1}/A_{it}$ (Medium)	-0.28	-0.29	-0.29	-0.29	-0.28	-0.26
	(-14.0)	(-13.9)	(-15.0)	(-13.9)	(-12.7)	(-13.8)
$I^d_{i,t+1}/A_{it}$ (High)	-0.18	-0.55	-0.12	-0.23	-0.23	-0.34
	(-8.6)	(-17.8)	(-5.5)	(-14.6)	(-9.8)	(-13.9)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt redemption, $I^d_{i,t+1}/A_{it} \leq 0$, and shareholders' revaluation, $\delta^{ep}_{i,t+1}$ and $\delta^{ei}_{i,t+1}$, conditioning on firm characteristics such as firm age, market-to-book ratio, firm size, leverage ratio, cash rate, and profitability. Firms are identified at each point in time by group indicators formed based on the 33$^{\text{rd}}$ and 66$^{\text{th}}$ percentiles of the corresponding measures. Presented coefficients are estimated for net debt redemption as specified in (12), after stratifying the data into subsamples by group indicators. The dependent variable in Panel A is the asset revaluation attributable to existing shareholders, while that in Panel B is for new shareholders. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

Table 1.D.6: Debt issuance and asset revaluation across firm lifecycle stages—subsample

Panel A. *Average debt issuance across firm lifecycle stages*

	Lifecycle stages:				
	Intro	Growth	Mature	Shakeout	Decline
$I^d_{i,t+1}/A_{it}$ (%)	2.60	1.73	-0.94	-1.02	-0.15
$I^d_{i,t+1}/A_{it} > 0$ (%)	3.78	2.60	1.01	1.59	2.33
$I^d_{i,t+1}/A_{it} \leq 0$ (%)	-1.12	-0.80	-1.47	-1.73	-1.55

Panel B. *Firm-stage-subsample regression*

Dependent variable:	$\delta_{i,t+1}$ (%) Asset revaluation		$\delta^{ep}_{i,t+1}$ (%) Existing shareholders		$\delta^{ei}_{i,t+1}$ (%) New shareholders	
(%)	Issuer	Redeemer	Issuer	Redeemer	Issuer	Redeemer
$I^d_{i,t+1}/A_{it}$ (Intro)	0.55	-1.80	0.33	-0.82	0.20	-1.15
	(11.8)	(-7.3)	(8.6)	(-3.7)	(8.8)	(-11.3)
$I^d_{i,t+1}/A_{it}$ (Growth)	0.59	-1.55	0.14	-0.44	0.37	-1.13
	(14.7)	(-8.9)	(5.2)	(-3.3)	(18.5)	(-15.3)
$I^d_{i,t+1}/A_{it}$ (Mature)	0.64	-0.48	0.24	-0.28	0.33	-0.20
	(6.8)	(-12.5)	(4.4)	(-8.8)	(6.0)	(-11.8)
$I^d_{i,t+1}/A_{it}$ (Shakeout)	1.26	-0.27	0.27	-0.17	0.70	-0.14
	(8.1)	(-4.7)	(2.6)	(-3.3)	(8.8)	(-5.8)
$I^d_{i,t+1}/A_{it}$ (Decline)	0.76	-0.51	0.16	-0.44	0.43	-0.17
	(4.6)	(-3.9)	(1.2)	(-3.6)	(5.6)	(-3.5)

Panel A reports the distributions of debt issuance, $I^d_{i,t+1}/A_{it}$ by firm lifecycle stages, which are defined based on cash flow patterns following Dickinson (2011). Debt issuer and redeemer scenarios are considered separately. Firms are identified at each point in time by group indicators formed based on the signs of their cash flows from operations, investing, and financing activities. All values are presented in percentages. Panel B reports the association between net debt issuance/redemption and asset revaluation as well as its components, as specified in (12), after stratifying the data into subsamples by group indicators. Both dependent variables and the key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

Table 1.D.7: Net debt redemption and asset revaluation—alternative loan pricing

	Dependent variable: $\delta_{i,t+1}$ *(%)*					
(%)	***Age***	***Market-to-book***	***Size***	***Leverage***	***Cash rate***	***Profitability***
Panel A. *Full-sample regression* (14) *with redeemer and firm type interaction*						
$I^d_{i,t+1}/A_{it}$	-0.55	-0.19	-0.61	-1.30	-0.37	-0.55
	(-14.6)	(-6.7)	(-14.6)	(-12.8)	(-11.7)	(-14.7)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.06	-0.20	0.18	0.80	-0.08	0.22
	(1.3)	(-4.2)	(3.5)	(7.4)	(-1.6)	(4.5)
$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	0.29	-0.99	0.49	0.98	-0.14	0.18
	(5.3)	(-15.0)	(7.4)	(9.3)	(-2.4)	(3.1)
Panel B. *Redeemer-type-subsample regression* (12)						
$I^d_{i,t+1}/A_{it}$ (Low)	-0.54	-0.27	-0.63	-0.93	-0.44	-0.47
	(-12.4)	(-8.8)	(-13.8)	(-8.0)	(-12.6)	(-11.1)
$I^d_{i,t+1}/A_{it}$ (Medium)	-0.48	-0.37	-0.44	-0.46	-0.49	-0.32
	(-11.4)	(-8.0)	(-12.0)	(-9.5)	(-11.0)	(-8.2)
$I^d_{i,t+1}/A_{it}$ (High)	-0.26	-1.0	-0.05	-0.34	-0.40	-0.46
	(-5.7)	(-14.0)	(-1.0)	(-12.6)	(-6.7)	(-8.8)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt redemption, $I^d_{i,t+1}/A_{it} \leq 0$, and asset revaluation, $\delta_{i,t+1}$, conditioning on firm characteristics, if bank loans are valued at alternative pricing measures. Panel A presents the estimated β_3 and β_4 for net debt redemption and its interaction with group indicators, as specified in (14), while Panel B presents the estimates for net debt redemption as specified in (12), after stratifying the data into subsamples by group indicators. Both dependent variables and the key regressor are measured in percentages. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV. See table note of Table 4 for further details on cross-sectional analysis.

2. Chapter 2: Debt Issuance and Asset Revaluation During Monetary Easing

2.1. Introduction

Over the past two decades, monetary policy interventions have played a pivotal role in mitigating market-wide credit crises, ensuring liquidity, and facilitating access to credit. For instance, the rapid deterioration of bond markets in March 2020, as documented by O'Hara and Zhou (2021), Kargar, Lester, Lindsay, Liu, Weill, and Zúñiga (2021), and Haddad, Moreira, and Muir (2021), prompted the Federal Reserve to introduce several credit facilities aimed at stabilizing financial markets. Notable among these interventions were the Primary Dealer Credit Facility (PDCF), announced on March 17, 2020, provided overnight and term funding at the discount rate, and the Primary and Secondary Market Corporate Credit Facilities (PMCCF and SMCCF), introduced on March 23, 2020, directly purchased investment-grade corporate bonds and ETFs to restore market confidence.[26] These interventions were designed to lower debt funding costs, maintain adequate credit supply for corporate borrowers, and stimulate economic growth.

Shifts in monetary policy regimes significantly influence firms' capital structure decisions and, by extension, their market valuation. One one hand, corporate debt issuance is particularly sensitive to interest rate changes, with prior literature demonstrating that accommodative monetary policy incentivizes firms to raise debt financing (e.g., Hotchkiss, Nini, and Smith, 2022; Acharya and Steffen, 2020; O'Hara and Zhou, 2021; Darmouni and Siani, 2022). On the other hand, how firms utilize the funds raised has varying implications on firm value, which is closely tied to broader macroeconomic conditions (e.g., Begenau and Salomao, 2019; Giambona, Matta, Peydró, and Wang, 2020; Darmouni and Siani, 2022; Acharya and Plantin, 2023). Therefore, how debt issuance relates to firm valuation remains an open question. In the previous chapter, asset revaluation is defined as the growth in firms' market value of assets, excluding the direct effects of changes in debt notional. Building on the findings that active debt management is associated with value

[26] See Figure 1 in O'Hara and Zhou (2021) for a detailed timeline.

creation, which is driven by stock price appreciation, particularly for less established firms, this chapter examines how accommodative monetary policy shapes the relation between debt issuance and asset revaluation.

Our analysis incorporates four measures of accommodative monetary policy, including two "low-for-long" measures, *moderate low-rate* period and *prolonged ultra-low-rate* regimes, and two post-Global Financial Crisis (GFC) indicators, quantitative easing and zero lower bound. Using real-term quarterly data from over 7,000 public US non-financial firms spanning 1975.II to 2023.IV, we show that the association between debt issuance and asset revaluation intensifies during accommodative monetary periods. Net debt issuance correlates with value creation under broader monetary easing conditions, while net debt redemption sustains this effect only when interest rates have remained low for a moderate duration.

Attributing asset revaluation to firm stakeholders, our findings indicate that the association between net debt issuance and asset revaluation is primarily driven by net equity issuance, while significant stock price appreciation occurs exclusively during moderate low-rate periods. Conversely, stock price appreciation is the dominant channel through which net debt redemption relates to asset revaluation under monetary easing, while net equity issuance channel diminishes after the GFC. This suggests that moderate low-rate periods stimulate stock price appreciation under debt adjustments, whereas prolonged ultra-low-rate periods and post-GFC monetary regimes exhibit diminished benefits for existing shareholders, reflecting the challenges of sustaining value creation in extended monetary easing environments.

During accommodative monetary periods, debt issuer firms are more likely to issue equity alongside debt compared to normal times, while redeemer firms, facing constrained access to credit, continue relying on equity as a funding source but to a lesser extent in the post-GFC era. These results highlight limited investment opportunities, heightened risk aversion, and a broader flight-to-quality phenomenon in the aftermath of the GFC and during prolonged ultra-low-rate periods. Additionally, debt value appreciation associated with debt issuance aligns with expectations of lower cost of credit under accommodative policies.

A double-sorting analysis by firm characteristics and monetary regimes confirms that younger, growth, smaller, or lower-leverage firms demonstrate greater stock price appreciation when issuing debt compared to their counterparts, both in normal periods and under monetary easing. It is further revealed that such relation is particularly pronounced for younger, value, or smaller firms during moderate low-rate periods. Regarding new shareholders' revaluation, the strengthened relation between net debt issuance and net equity issuance under broader accommodative monetary conditions spans almost all firm types. However, growth firms and large firms are muted from this effect in prolonged ultra-low-rate periods and the post-GFC era, as they already issue substantial amount of equity during normal times to meet financing needs and manage capital structure.

To ensure robustness, we also incorporate a "Years-in-low" (YIL) variable, which tracks the duration of persistently low Federal Funds rates, as an alternative measure of accommodative monetary conditions. Our findings confirm that extended periods of low interest rates enhance the association between net debt issuance and net equity issuance but weaken its relation with stock price appreciation.

Overall, our analysis provides distributional insights into the valuation effects of monetary policy interventions. The remainder of this chapter is structured as follows: Section 2.2 reviews the related literature. Section 2.3 defines asset revaluation and debt issuance, detailing their measures and distributions. Section 2.4 explores how debt issuance relates to asset revaluation across different monetary policy regimes. Section 2.5 attributes asset revaluation to firm stakeholders and reanalyzes their associations with debt issuance. Section 2.6 presents a double-sorting analysis by firm types and monetary policy regimes. Section 2.7 assesses the robustness of our results, and Section 2.8 concludes.

2.2. Prior Work

As discussed in the previous chapter, the association between debt issuance and asset revaluation reflects both financing and capital allocation decisions. Examining how monetary policy influences this relation connects our study to the broader literature on the transmission of monetary policy to

capital structure and firm valuation.

First, the macroeconomics of debt financing has been extensively studied, with much of the literature emphasizing its cyclical nature and sensitivity to monetary conditions. Bernanke, Gertler, and Gilchrist (1996) highlight that, during the onset of recessions, financially constrained borrowers receive a disproportionately lower share of credit, exacerbating declines in real economic activity and amplifying economic downturns—a phenomenon known as the "flight to quality." Greenwood and Hanson (2013) argue that debt issuance is driven by deviations from firms' target leverage ratios and expected bond risk premia, both of which vary significantly during financial distress. Additionally, financing responses differ across firms depending on size and financial constraints, especially over the business cycle (Begenau and Salomao, 2019; Chang, Chen, and Dasgupta, 2019). The role of monetary intervention in shaping corporate debt market has been particularly visible during recent crises. For example, Hotchkiss, Nini, and Smith (2022) document a surge in bond issuance by investment-grade firms following the Federal Reserve's announcement on March 23, 2020, with proceeds used largely to fund operations as firms "waited out the pandemic." Media reports similarly noted firms rushing to tap US bond markets amid favorable credit conditions (Duguid, 2023). More broadly, a series of studies have analyzed how capital structure and leverage evolve under different macroeconomic regimes (e.g., Korajczyk and Levy, 2003; Korteweg and Strebulaev, 2015; Halling, Yu, and Zechner, 2016; Daskalakis, Balios, and Dalla, 2017; Chen, Hackbarth, and Strebulaev, 2022). Therefore, the time-series variation of firms' debt financing might reflect either the constrained conditions during downturns, or the incentivizing effect of monetary easing. Building on these findings, our work centers on debt issuance as the primary explanatory variable. By conditioning on the direction of debt changes, we examine whether accommodative monetary policies stimulate firms' debt activity and, by extension, contribute to value creation.

Second, how debt proceeds are used—and how those uses affect firm value—depends significantly on macroeconomic conditions. For instance, firms may allocate debt toward investment, liquidity reserves, or payouts. The effectiveness of each use depends on factors such as the cost of

capital and the availability of profitable investment opportunities, which are shaped by the broader economic environment. Acharya and Plantin (2023) find that low interest rates lead firms to increase leverage in order to fund higher payouts, with limited effects on real investment. Similarly, Darmouni and Siani (2022) show that firms issued bonds amid declining yields primarily to accumulate persistent liquid asset buffers rather than increase capital expenditure. In contrast, Giambona, Matta, Peydró, and Wang (2020) provide evidence that quantitative easing (QE) spurred real investment through the corporate bond lending channel, without boosting shareholders' payouts. Begenau and Salomao (2019) find that large, profitable firms increase debt-financed payouts during economic expansions. Taking a broader stakeholder perspective, Davydiuk, Richard, Shaliastovich, and Yaron (2023) examine corporate asset exposure to macroeconomic risks and argue that total payouts rise when firms scale back financing in adverse conditions, leading to inflated valuation estimates and obscured risk exposures. These findings highlight that the asset value implications of debt issuance depend not only on the volume of financing but also on how the funds are allocated within prevailing macroeconomic constraints.

Third, another related strand of literature investigates asset price responses to monetary policy. Bianchi, Lettau, and Ludvigson (2022) present a model in which changes in monetary regimes induce persistent shifts in asset valuations and the equity premium. Lakdawala and Moreland (2021) show that highly leveraged firms, particularly those relying on long-term debt, exhibit greater stock price sensitivity to monetary news in the post-GFC period relative to earlier eras. Meanwhile, Choi (2013) finds that growth firms, which are typically less leveraged, have equity betas that are less sensitive to changes in economic conditions. Swanson (2015) empirically estimates the asset price effects of unconventional monetary policies, including QE.

Despite extensive research on the effects of monetary policy on financing decisions and firm value, there remains no consensus on whether and to what extent monetary easing influences the ability of firms to translate capital structure decisions into value creation. In light of the varied findings mentioned above, our study investigates whether accommodative monetary policy strengthens the association between debt issuance and asset revaluation. Rather than testing any single capital

structure theory, we assess whether monetary easing enhances firms' capacity to generate value through debt financing. A robust positive association would suggest that accommodative policy facilitates value creation by enabling firms to convert financing decisions into tangible valuation gains.

2.3. Debt Issuance, Asset Revaluation and Monetary Policy

As outlined in the previous chapter, to isolate the non-mechanical component of growth in market assets that is not directly driven by debt issuance, we define net debt issuance as $I^d_{t+1} = N^d_{t+1} - N^d_t$ for a generic firm. The rate of *asset revaluation* in period t is then measured as the growth in the market value of assets beyond changes in debt notional:

$$\delta_{t+1} \quad = \quad \frac{A_{t+1} - A_t - I^d_{t+1}}{A_t} = \frac{(N^e_{t+1}P^e_{t+1} - N^e_t P^e_t) + (N^d_{t+1}P^d_{t+1} - N^d_t P^d_t) - I^d_{t+1}}{A_t}, \tag{24}$$

where a positive δ_{t+1} indicates *value creation*, while a negative one reflects *value destruction*.

The previous chapter examines the association between debt issuance and asset revaluation across different firm types. To assess how this relation varies with macroeconomic conditions, particularly changes in monetary policy regimes, we adopt the following specification:

$$\delta_{t+1} \quad = \quad \left(\beta_0 + \beta\, 1_t^{\text{Easy MP}}\right) \frac{I^d_{t+1}}{A_t} + X_t'\gamma + \varepsilon_{t+1}, \tag{25}$$

where I^d_{t+1}/A_t represents the primary *debt issuance* variable of interest, and $1_t^{\text{Easy MP}}$ is a binary indicator equal to one if time t falls within an accommodative monetary policy regime. The regression also includes control variables X_t to account for firm-specific and macroeconomic factors that may influence asset revaluation.

The key parameters of interest are β_0 and β. The null hypothesis $\beta = 0$ tests whether the relation between debt issuance and asset revaluation remains unchanged across monetary regimes. A significant β would suggest that the relation is sensitive to the monetary environment, highlighting the role of accommodative monetary policy in shaping firms' financing decisions and valuation

dynamics.

2.3.1. Measuring asset revaluation and debt issuance

The data for this study are drawn from a comprehensive range of sources, including Compustat, CRSP, the Lehman Brothers Fixed Income Database, the Trade Reporting and Compliance Engine (TRACE), the Mergent Fixed Income Securities Database (FISD) National Association of Insurance Commissioners (NAIC) Database, DataStream, and DealScan. The sample consists of quarterly real-term data for over 7,000 public US non-financial firms, spanning from the second quarter of 1975 to the fourth quarter of 2023.[27]

The market value of assets, A_{it}, is calculated as the sum of the market value of equity and the market value of debt. The market value of equity is obtained by multiplying the stock price by the number of common shares outstanding, aggregated at the firm level across all share classes where applicable. The market value of debt incorporates the values of corporate bonds and bank loans, with the residual difference between total assets and common equity included in A_{it} at book value, aligned with the valuation of common equity.

The notional amount of debt outstanding, N_{it}^{d}, is represented by the combination of book values of corporate bonds and bank loans. Since market values for these instruments are not directly observable, they are estimated using established methodologies. For corporate bonds, we apply the methodology outlined by Nelson and Siegel (1987), constructing firm- and time-specific discount factors to convert book values into market values. For bank loans, we compute firm-level weighted average loan prices each quarter based on loan origination pricing.

Figure 2.3.1 displays the quarterly time series of debt issuance, $I_{i,t+1}^{d}/A_{it}$, and asset revaluation, $\delta_{i,t+1}$, for the average firm in our sample. The top panel shows that debt issuance generally declines, or even turns negative, during recessions and recovers during economic expansion. A notable peak appears in March 2019, when firms issued significantly more debt than in prior periods, consistent with Figures 1 and 2 in Acharya and Plantin (2023), who document a plateau in

[27] Further details on data sources and variable construction are provided in the previous chapter.

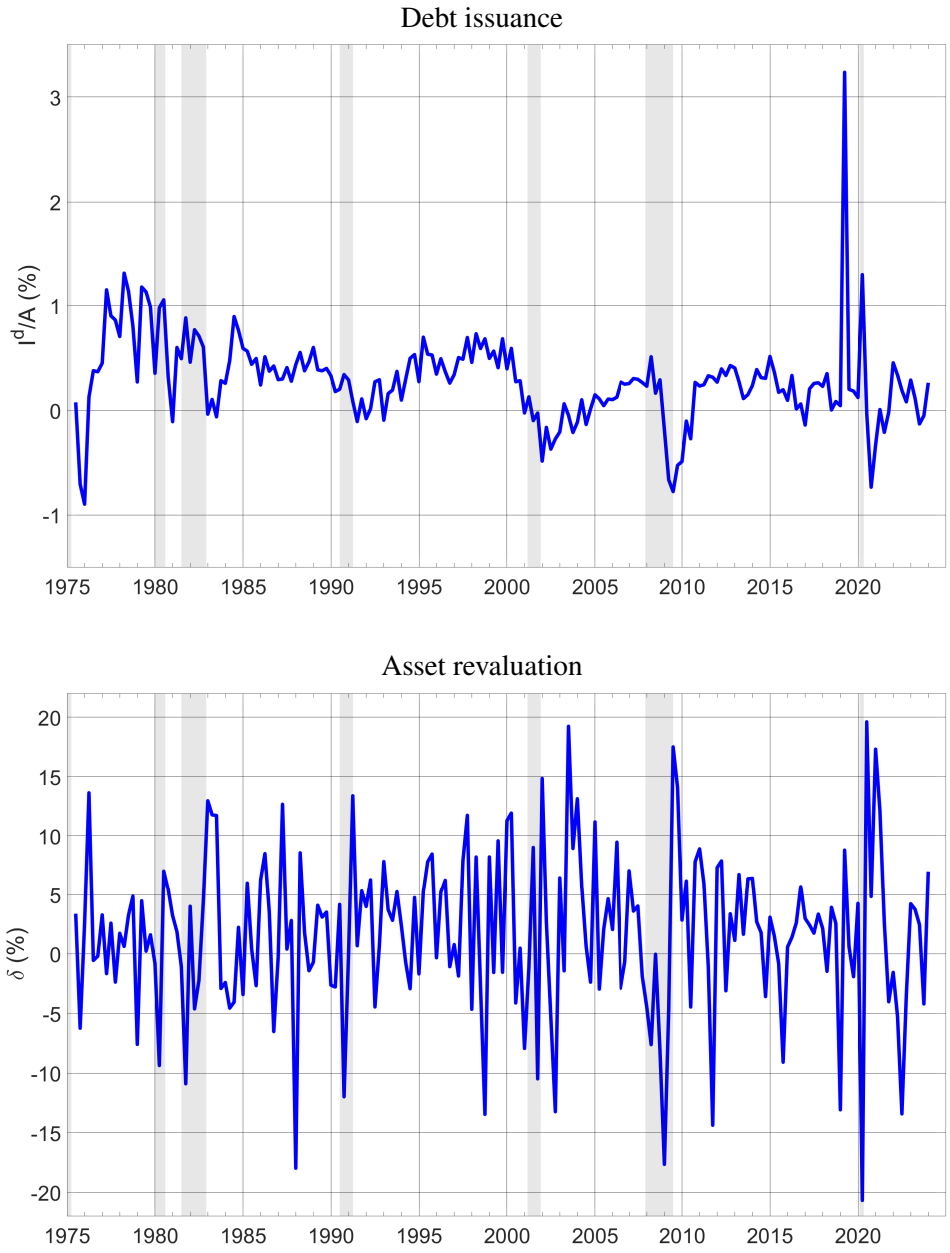

Figure 2.3.1: Debt issuance and asset revaluation

The top figure shows the quarterly time series of debt issuance, $I^d_{i,t+1}/A_{it}$, for the average firm in the sample. The bottom figure depicts the quarterly time series of average asset revaluation, $\delta_{i,t+1}$. The sample period is 1975.II to 2023.IV, with shaded areas representing NBER recessions.

total debt after 2015 followed by a surge in 2019, both in dollar terms and as a fraction of total assets. Importantly, these patterns remain robust to the influence of outliers and hold when examining the median instead of average firm in our sample, as the debt issuance measure is winsorized. Additionally, to ensure robustness, we have tested that the average total debt relative to beginning-

of-period total assets peaked in the first quarter of 2020, consistent with the findings of Hotchkiss, Nini, and Smith (2022). The bottom panel of Figure 2.3.1 illustrates the pro-cyclical nature of asset revaluation, which declines during recessions and rises in the aftermath of economic recoveries. This pattern highlights the sensitivity of asset revaluation to macroeconomic conditions, with recoveries marked by widespread asset growth across firms.

2.3.2. Measuring monetary policy regimes

Our analysis incorporates multiple measures of monetary policy to capture periods of low interest rates and accommodative monetary policy regimes. Specifically, we employ two "low-for-long" measures and two post-GFC indicators to identify sustained periods of low borrowing costs and unconventional monetary easing.

To assess extended periods of low interest rates, which correspond to a reduced cost of debt, we adopt the zero lower bound (ZLB) concept and construct "low-for-long" variables following Berndt and Helwege (2024). After the collapse of Lehman Brothers, in response to the debt market disruption, the Federal Open Market Committee (FOMC) set the Federal Funds (FF) rate target to 0–25 basis points, maintaining this ZLB policy for seven years. Our "2yr-low-for-1yr" indicator identifies periods in which the FF rate has remained at or near its two-year low (or the ZLB) for at least one year. Specifically, each month, we track the lowest FF rate over the preceding 24 months and compare the current rate to the higher of this two-year low or the ZLB. A counter records the number of months during which the FF rate stays below 110% of this threshold. If the rate rises, the counter decreases monthly until it reaches zero or a new low rate is established. A "2yr-low-for-1yr" period is defined when this counter reaches 12 months or more, marking a *moderate low-rate* period. Similarly, the "10yr-low-for-2yr" indicator captures *prolonged ultra-low-rate* regimes, where the FF rate has remained at its ten-year low or the ZLB for at least two years.

Beyond these "low-for-long" measures, we identify four distinct US quantitative easing (QE) periods as accommodative monetary regimes. These periods are from 2008.IV to 2010.I, 2010.IV

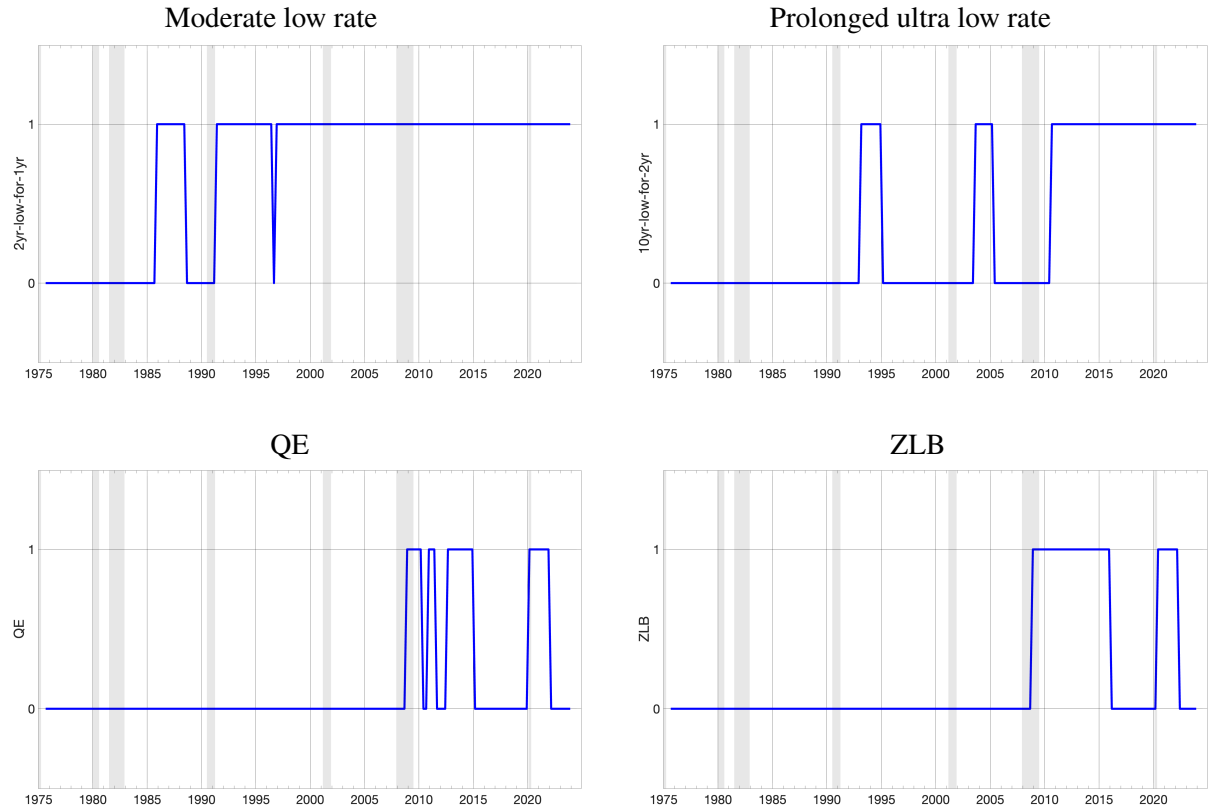

Figure 2.3.2: Monetary policy measures

The figure shows the quarterly time series of four monetary policy indicators, 2yr-low-for-1yr, 10yr-low-for-2yr, QE, and ZLB. The "2yr-low-for-1yr" indicator equals one if the FF rate has remained at or near its two-year low (or ZLB) for at least one year, while "10yr-low-for-2yr" captures regimes where the FF rate has been at or near its ten-year low (or ZLB) for at least two years. These two "low-for-long" measures are constructed following Berndt and Helwege (2024). The QE indicator is active during four US QE episodes, and the ZLB indicator marks periods where the FF rate is below 25 basis points. The sample period is 1975.II to 2023.IV. The shaded areas identify NBER recessions.

to 2011.II, 2012.III to 2014.IV, and 2020.I to 2021.IV. Additionally, we construct a ZLB indicator to mark periods of persistently low interest rates following the GFC, specifically from 2009.I to 2015.IV and from 2020.II to 2022.I. We collectively refer to the QE and ZLB periods as the post-GFC accommodative monetary regimes.

Figure 2.3.2 presents the quarterly time series of these four monetary policy indicators, illustrating their temporal alignment with macroeconomic conditions.

2.3.3. Debt issuance across monetary policy regimes

Using the variables constructed above, we now examine how asset revaluation and debt issuance vary across different monetary policy regimes, highlighting the differences in corporate behavior

Table 2.3.1: Variable distribution by monetary policy regimes

	Tight/Neutral	*Easy MP*		
(%)	Mean	Mean	Mean Difference	t-stat
Panel A. *Asset revaluation,* $\delta_{i,t+1}$				
2yr-low-for-1yr	1.16	2.06	-0.90	-13.42
10yr-low-for-2yr	1.81	1.95	-0.15	-2.18
QE	1.62	3.62	-2.00	-20.80
ZLB	1.72	2.56	-0.84	-10.33
Panel B. *Debt issuance,* $I^d_{i,t+1}/A_{it}$				
2yr-low-for-1yr	0.47	0.23	0.25	14.97
10yr-low-for-2yr	0.30	0.24	0.06	4.91
QE	0.32	0.00	0.32	19.02
ZLB	0.32	0.08	0.24	16.45
Panel C. *Net debt issuance,* $I^d_{i,t+1}/A_{it} > 0$				
2yr-low-for-1yr	3.14	2.47	0.67	29.20
10yr-low-for-2yr	2.87	2.12	0.75	38.45
QE	2.73	1.92	0.81	30.34
ZLB	2.77	1.91	0.86	36.92
Panel D. *Net debt redemption,* $I^d_{i,t+1}/A_{it} \leq 0$				
2yr-low-for-1yr	-1.85	-1.43	-0.42	-29.00
10yr-low-for-2yr	-1.66	-1.21	-0.44	-39.39
QE	-1.55	-1.28	-0.27	-17.49
ZLB	-1.58	-1.20	-0.38	-28.78

This table compares the mean statistics of asset revaluation, $\delta_{i,t+1}$, debt issuance, $I^d_{i,t+1}/A_{it}$, net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and net debt redemption, $I^d_{i,t+1}/A_{it} \leq 0$, across monetary policy regimes. The "2yr-low-for-1yr" indicator equals one when the FF rate has remained at its two-year low or ZLB for at least one year, while "10yr-low-for-2yr" periods occur when the FF rate has been at its ten-year low or the ZLB for at least two years. The QE indicator is activated if the observation falls within one of the four US QE periods. The ZLB indicator suggests the FF rate is below 25 basis points. The 2yr-low-for-1yr, 10yr-low-for-2yr, QE, and ZLB periods are categorized as accommodative monetary regimes (Easy MP). All values are presented in percentages. The sample consists of 318,195 firm-quarter observations for 7,077 public US non-financial firms, spanning from 1975.II to 2023.IV.

under accommodative versus tight or neutral monetary conditions.

Table 2.3.1 summarizes the distribution of asset revaluation and debt issuance across monetary regimes and tests for statistical significance of the differences in means. On average, asset revaluation is significantly higher during accommodative monetary periods, with the largest and most significant increases observed during QE episodes. These findings suggest that easy monetary conditions enhance value creation, likely due to lower cost of capital, higher stock market valuation, or simply increased equity issuance.

Notably, despite the lower borrowing costs associated with accommodative monetary policies, firms tend to issue less debt during these periods. This finding indicates the dual role of monetary

policy: while low interest rates reduce cost of financing, they may coincide with weaker economic conditions that dampen firms' incentives to raise external funds. Indeed, the FF rate is typically lowered in response to economic downturns (Taylor, 1993), reflecting broader macroeconomic challenges rather than actively stimulating additional debt issuance.

Distinguishing between net debt issuance and net debt redemption scenarios, we find that firms tend to scale back both borrowing and repayment activities during easy monetary periods. This suggests that the observed decline in overall debt issuance during accommodative periods, as seen in Panel B, is primarily driven by diminished new borrowing rather than increased debt retirement.

These findings underscore the impact of monetary policy on corporate financial decisions as well as their valuation. While accommodative policies foster value creation, their impact on debt issuance appears more complex, shaped by the interplay between reduced financing costs and prevailing economic conditions. In the next section, we extend this analysis within a regression framework to uncover deeper insights into these dynamics.

2.4. Debt Issuance and Asset Revaluation Across Monetary Policy Regimes

This section examines the association between debt issuance and asset revaluation across different monetary policy regimes. The starting point is to test the null hypothesis using a pooled OLS panel regression:

$$\delta_{i,t+1} \quad = \quad \left(\beta_0 + \beta\, 1_t^{\text{Easy MP}}\right) \frac{I^d_{i,t+1}}{A_{it}} + X'_{it}\gamma + \varepsilon_{i,t+1}, \tag{26}$$

where $\delta_{i,t+1}$ denotes asset revaluation, $I^d_{i,t+1}/A_{it}$ represents the key *debt issuance* variable of interest, and X_{it} is a vector of firm characteristics, macroeconomic variables, and fixed effects. The estimated coefficients β_0 and β capture the baseline association and the interaction effects easy monetary policy indicators on such relation, respectively.

In the prior chapter, we have established a V-shaped relation between debt issuance and asset revaluation and stressed the importance in considering net debt issuance and redemption scenarios

Table 2.4.1: Debt issuance and asset revaluation across monetary policy regimes

	Dependent variable: $\delta_{i,t+1}$ (%)			
(%)	***2yr-low-for-1yr***	***10yr-low-for-2yr***	***QE***	***ZLB***
Panel A. *Cross-regime differences for issuers ($I^d_{i,t+1}/A_{it} > 0$)*				
$I^d_{i,t+1}/A_{it}$	0.36	0.54	0.54	0.54
	(11.9)	(22.2)	(24.1)	(23.7)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Easy MP}}_t$	0.27	0.06	0.18	0.11
	(7.2)	(1.3)	(2.4)	(1.8)
Panel B. *Cross-regime differences for redeemers ($I^d_{i,t+1}/A_{it} \leq 0$)*				
$I^d_{i,t+1}/A_{it}$	-0.36	-0.46	-0.48	-0.49
	(-10.6)	(-16.8)	(-18.7)	(-18.7)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Easy MP}}_t$	-0.16	-0.07	-0.01	0.06
	(-3.9)	(-1.4)	(-0.1)	(0.9)
Firm-specific controls	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance/redemption and asset revaluation, conditioning on monetary regimes, as specified in (27). The monetary policy indicator equals one if the beginning of the period is identified as 2yr-low-for-1yr, 10yr-low-for-2yr, QE, or ZLB. Panel A presents the estimated coefficients, β_1 and β_2, for debt issuance and its interactions with regime and issuer indicators, while Panel B presents β_3 and β_4 corresponding to net debt redemption scenario. The baseline groups are tight or neutral periods, with the estimates for easy monetary policy regimes showing the incremental effect relative to the baseline. Both the dependent variables and estimated coefficients are expressed in percentages. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

separately. Therefore, we disentangle net debt issuance from net debt redemption to evaluate the roles of monetary easing, and estimate the following regression:

$$\delta_{i,t+1} \quad = \quad \left[1^{I^d>0}_{i,t+1}\left(\beta_1+\beta_2\,1^{\text{Easy MP}}_t\right)+1^{I^d\leq 0}_{i,t+1}\left(\beta_3+\beta_4\,1^{\text{Easy MP}}_t\right)\right]\frac{I^d_{i,t+1}}{A_{it}}+X'_{it}\gamma+\varepsilon_{i,t+1}, \quad (27)$$

where $1^{I^d>0}_{i,t+1}$ and $1^{I^d\leq 0}_{i,t+1}$ are indicators for net debt issuance and net debt redemption, respectively.

Panel A of Table 2.4.1 focuses on net debt issuance and presents the estimated coefficients, β_1 and β_2. The results show that net debt issuance relates to greater asset revaluation during accommodative monetary policy periods than during tight or neutral times, though the cross-regime differences are less pronounced under prolonged ultra-low-rate and ZLB regimes.

Panel B reports on net debt redemption, with β_3 and β_4 as the key coefficients. The results reveal that net debt redemption signals significantly greater asset revaluation during moderate low-

rate periods. However, this effect weakens during prolonged ultra-low-rate periods and post-GFC era, where cross-regime differences are statistically insignificant.

Notably, to assess the stand-alone statistical significance of these coefficients under different monetary regimes, we also estimate the regression without the interaction term (as specified in regression (12) in Chapter 1), stratifying the data into subsamples based on issuer/redeemer and monetary regime indicators. The t-statistics in Table 2.B.2 in Appendix 2.B confirm that the corresponding stand-along coefficients remain statistically significant across all subsamples, with larger effect magnitude under easy monetary conditions for net debt issuance scenario and smaller sizes for net debt redemption scenario except for moderate low-rate periods.

Taken together, these results suggest that both net debt issuance and net debt redemption are consistently associated with significant value creation, particularly during accommodative monetary periods. The enhanced asset revaluation effect is primarily driven by net debt issuance. Thus, we reject the null hypothesis and conclude that accommodative monetary policies enhance the association between debt issuance and asset revaluation. These results emphasize the role of monetary conditions in shaping corporate financial behavior and asset value dynamics, highlighting the economic relevance of debt issuance as a signal of asset revaluation and the value-enhancing effect of monetary easing.

As discussed in the prior chapter, the interpretation of such results may raise potential endogeneity concerns. To address such concerns, consider the market value measures in our analysis, which are evaluated at the end of each quarter, reflecting firms' decisions made during the period. Once the values are observed, firms may choose to adjust their decisions accordingly in the following period. Our analysis in this chapter focuses on the impact of accommodative monetary policies on the association between debt issuance and asset revaluation, without establishing any causality between the two.

For completeness, we also estimate the overall association between debt issuance and asset revaluation in a pooled regression (26). The results are reported in Table 2.B.1 in Appendix 2.B, which reveal that debt issuance generally signals stronger asset revaluation during easy mone-

tary periods compared to normal times. However, without separating the direction of debt level changes, what is reflected is a combination of opposing effects—the associations between asset revaluation and net debt issuance versus redemption partially offset each other in the pooled regression. Furthermore, the effect of net debt issuance during QE periods is masked in the aggregate results.

2.5. Sources of Asset Revaluation Across Monetary Policy Regimes

In this section, we decompose asset revaluation to identify which stakeholders primarily drive the impact of monetary policy on the association between debt issuance and asset revaluation. Building on the framework defined in Chapter 1, we extend (24) to allocate asset revaluation among existing shareholders, new shareholders, and debt holders:

$$\begin{aligned}
\delta^{ep}_{t+1} &= \frac{N^e_t(P^e_{t+1} - P^e_t)}{A_t}, \\
\delta^{ei}_{t+1} &= \frac{(N^e_{t+1} - N^e_t)P^e_{t+1}}{A_t}, \\
\delta^{d}_{t+1} &= \frac{N^d_{t+1}P^d_{t+1} - N^d_t P^d_t - I^d_{t+1}}{A_t}.
\end{aligned}$$

This decomposition enables a detailed examination of how the links between active debt adjustments and these components of asset revaluation vary across different monetary policy regimes. Understanding these dynamics is essential for assessing the broader implications of monetary easing on firms' financial strategies and the distribution of value among stakeholders.

2.5.1. Shareholders' revaluation across monetary policy regimes

Figure 2.5.1 illustrates the quarterly time series of shareholders' revaluation for the average firm in our sample. The top figure for δ^{ep} indicates that the pro-cyclical patterns of overall asset revaluation observed in Figure 2.3.1 are largely driven by stock price fluctuations for existing shareholders, emphasizing the critical role of market sentiment and macroeconomic cycles in shaping equity and asset value. The bottom figure for δ^{ei} shows that net equity issuance exhibits a broadly pro-cyclical

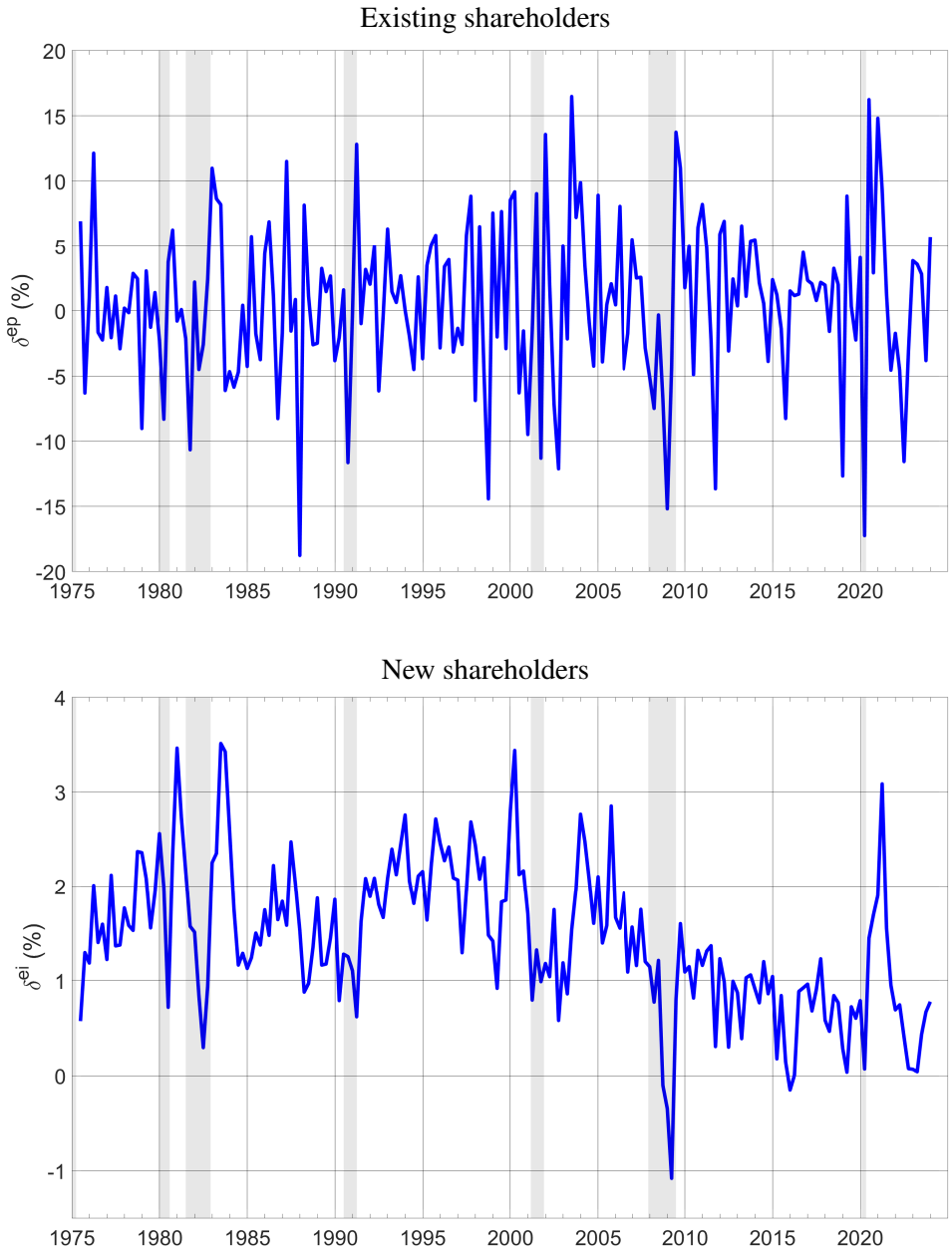

Figure 2.5.1: Shareholders' revaluation

The figures show the quarterly time series of shareholders' revaluation for the average firm in the sample, including existing shareholders $\delta^{ep}_{i,t+1}$, and new shareholders $\delta^{ei}_{i,t+1}$. The sample period is 1975.II to 2023.IV. The shaded areas identify NBER recessions.

trend, albeit with less frequent adjustments on an annual rather than a quarterly basis, aligning with economic expansion when firms actively raise equity capital to fund growth opportunities.

To investigate the relation between debt issuance and shareholders' revaluation across monetary policy regimes, distinguishing between net debt issuance versus redemption scenarios, we

Table 2.5.1: Net debt issuance and shareholders' revaluation across regimes

	2yr-low-for-1yr	*10yr-low-for-2yr*	*QE*	*ZLB*
Panel A. *Existing shareholders,* δ^{ep} *(%)*				
$I^d_{i,t+1}/A_{it}$	0.18	0.24	0.22	0.22
	(8.4)	(14.7)	(14.7)	(14.7)
$I^d_{i,t+1}/A_{it} \times 1_t^{\text{Easy MP}}$	0.05	-0.09	-0.04	-0.06
	(1.9)	(-3.1)	(-0.9)	(-1.6)
Panel B. *New shareholders,* δ^{ei} *(%)*				
$I^d_{i,t+1}/A_{it}$	0.20	0.27	0.28	0.28
	(11.1)	(20.4)	(23.3)	(22.8)
$I^d_{i,t+1}/A_{it} \times 1_t^{\text{Easy MP}}$	0.13	0.10	0.13	0.12
	(6.0)	(4.4)	(3.6)	(3.7)
Firm-specific controls	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and shareholders' revaluation, conditioning on monetary regimes, as specified in (27). The monetary policy indicator equals one if the beginning of the period corresponds to 2yr-low-for-1yr, 10yr-low-for-2yr, QE, or ZLB. The dependent variables in Panel A and B are $\delta^{ep}_{i,t+1}$ and $\delta^{ei}_{i,t+1}$, respectively. Each panel presents the estimated coefficients, β_1 and β_2, for debt issuance and its interactions with regime and issuer indicators. The baseline groups are tight or neutral periods, with the estimates for easy monetary policy regimes showing the incremental effect relative to the baseline. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

employ regression (27), substituting δ^{ep} and δ^{ei} as dependent variables. Table 2.5.1 presents the estimated coefficients β_1 and β_2, highlighting the association between net debt issuance and shareholders' revaluation across different monetary regimes. Each panel focuses on a specific type of shareholders.

As shown in Table 2.4.1, net debt issuance is associated with greater asset revaluation during accommodative monetary periods compared to normal times. However, this effect diminishes in prolonged ultra-low-rate periods and ZLB periods. Here, Table 2.5.1 reveals that the positive relation between net debt issuance and shareholders' revaluation primarily stems from net equity issuance. Notably, during prolonged ultra-low-rate and ZLB periods, net debt issuance tends to correlate with reduced stock price appreciation for existing shareholders, offsetting the enhanced net equity issuance and resulting in negligible overall changes in asset revaluation. Stand-alone significance results in Appendix 2.B Table 2.B.3 confirm that net debt issuance consistently signals stock price appreciation and net equity issuance, regardless of monetary conditions.

Panel A of Table 2.5.1 shows that net debt issuance is correlated with significantly greater stock price appreciation during moderate low-rate periods, albeit only at the 10% significance level. However, this effect reverses under prolonged ultra-low-rate and post-GFC monetary easing. While lower cost of capital generally supports stock prices, our findings suggest that the gains in stock prices signaled by net debt issuance during moderate low-rate periods appear unsustainable over time. The limited long-term impact of prolonged easy monetary policies on value creation likely reflects constrained investment opportunities and a broader economic stagnation, aligning with evidence of reduced investment under persistent monetary easing (Acharya and Plantin, 2023). In such environments, lower discount rates provide only temporary valuation support, failing to translate into enduring growth.

Panel B reveals a positive association between net debt issuance and net equity issuance, which is consistently stronger under easy monetary policy conditions than in other periods. As discussed in Chapter 1, firms often issue debt and equity simultaneously to meet financing needs and adjust capital structure for financial flexibility and optimality. However, these funds raised do not immediately translate into stock price appreciation, as shown in Panel A above. Low interest rates could encourage firms to increase leverage to fund equity payouts (Acharya and Plantin, 2023). Evidence from the ECB's Corporate Sector Purchase Programme suggests that low-cost financing often supports equity payouts rather than real investment (Todorov, 2020; Siani, 2021). If the increased payouts are not sustainable ones, they might not provide positive signal on firms' valuation. Our findings align with this view, indicating limited profitable investment activities that could positively relate to firms' stock prices. Instead, firms appear to prioritize dividends over stock buybacks as their primary equity payout mechanism.

Overall, our findings highlight the inability of persistently low rates to sustain stock price appreciation over prolonged ultra-low-rate periods or after the GFC, despite favorable conditions for debt financing. However, accommodative monetary policies do encourage firms to issue more equity alongside debt, contributing positively to overall asset revaluation. The diminishing value creation under extended monetary easing and persistently greater net equity issuance suggest that

Table 2.5.2: Net debt redemption and shareholders' revaluation across regimes

	2yr-low-for-1yr	*10yr-low-for-2yr*	*QE*	*ZLB*
Panel A. *Existing shareholders, δ^{ep} (%)*				
$I^d_{i,t+1}/A_{it}$	-0.09	-0.20	-0.22	-0.22
	(-3.7)	(-9.7)	(-11.5)	(-11.3)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Easy MP}}_t$	-0.18	-0.07	0.00	-0.01
	(-5.4)	(-1.6)	(0.0)	(-0.2)
Panel B. *New shareholders, δ^{ei} (%)*				
$I^d_{i,t+1}/A_{it}$	-0.25	-0.26	-0.28	-0.28
	(-12.1)	(-19.4)	(-21.2)	(-21.3)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Easy MP}}_t$	-0.02	-0.03	0.07	0.08
	(-1.0)	(-1.1)	(2.3)	(2.7)
Firm-specific controls	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

The table reports the association between net debt redemption, $I^d_{i,t+1}/A_{it} \leq 0$, and shareholders' revaluation, conditioning on monetary regimes, as specified in (27). The monetary policy indicator equals one if the beginning of the period is identified as 2yr-low-for-1yr, 10yr-low-for-2yr, QE, or ZLB. The dependent variables in Panel A and B are $\delta^{ep}_{i,t+1}$ and $\delta^{ei}_{i,t+1}$, respectively. Each panel presents the estimated coefficients, β_3 and β_4, for debt issuance and its interactions with regime and redeemer indicators. The baseline groups are tight or neutral periods, with the estimates for easy monetary policy regimes showing the incremental effect relative to the baseline. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

firms may need to adapt financing and investing strategies to navigate the challenges posed by changing macroeconomic conditions.

Table 2.5.2 presents the results for net debt redemption scenario, with a focus on the estimated coefficients β_3 and β_4 from regression (27). As highlighted in Table 2.4.1, net debt redemption signals significant cross-regime differences in asset revaluation only during moderate low-rate periods. Here, Panel A of Table 2.5.2 shows that net debt redemption relates to substantial stock price appreciation for existing shareholders in these periods, though this effect weakens under other monetary easing measures, mirroring the patterns observed for overall asset revaluation. Panel B reveals that firms shift to equity to meet financing needs when reducing debt, with similar patterns observed in low-for-long periods compared to normal times. However, during post-GFC periods, redeemer firms do not rely on equity issuance as much as they normally do, deviating from historical trends. Stand-alone significance results in Table 2.B.4 of Appendix 2.B confirm that net debt redemption consistently indicates stock price appreciation and net equity issuance for redeemer

firms across all monetary regimes.

Together with results from the net debt issuance scenario, our findings suggest that the stock market relates positively to debt adjustments, especially during moderate low-rate periods. However, such effect of low borrowing cost fades as low-rate regimes persists, reflecting the diminishing marginal benefits of monetary easing over time. Prolonged low interest rates may signal broader economic stagnation, in which there are reduced investment opportunities and heightened post-GFC risk aversion. Regarding net equity issuance, debt issuer firms tend to issue more equity under monetary easing. Firms that reduce debt when borrowing costs are low may face constrained access to credit during economic downturns, prompting reliance on equity to meet financing needs (Bernanke, Gertler, and Gilchrist, 1996). However, in the aftermath of the GFC, the lack of profitable investment opportunities and a broader flight-to-quality phenomenon tempered equity issuance despite favorable financing conditions, consistent with the muted stock price movement seen in Panel A.

2.5.2. Debt holders' revaluation across monetary policy regimes

As established in the previous chapter, debt holders' revaluation can be generalized from short-term debt to total debt by incorporating maturity structures and assuming that newly issued long-term debt constitutes a negligible portion of the total.

Figure 2.5.2 provides a quarterly breakdown of debt holders' revaluation for the average firm in the sample. While less volatile than stock prices, debt holders' revaluation follows a distinctly pro-cyclical pattern: it declines during recessions, driven by falling credit market activities and heightened investor risk aversion, and recovers in the aftermath, particularly during periods of monetary policy intervention aimed at stabilizing credit markets. These trends highlight the dual role of debt markets as both reflections of economic conditions and transmission mechanisms for monetary policy.

From Chapter 1, we already know that the relation between debt issuance and debt holders' revaluation does not depend on the direction of changes in debt levels. Therefore, we estimate

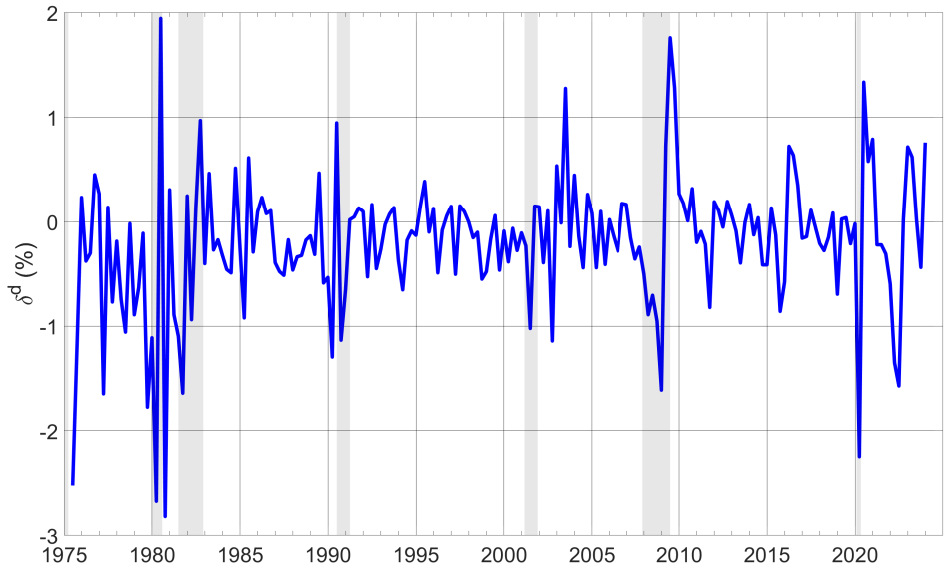

Figure 2.5.2: Debt holders' revaluation

The figures show the quarterly time series of debt holders' revaluation $\delta^d_{i,t+1}$ for the average firm in the sample. The sample period is 1975.II to 2023.IV. The shaded areas identify NBER recessions.

regression (26) and report coefficients β_0 and β in Table 2.5.3. Our results suggest that under tight or neutral monetary conditions, average debt prices tend to remain below par, possibly due to elevated interest rates. In contrast, monetary easing enhances debt holders' revaluation associated with debt level adjustment, particularly during low-for-long and ZLB periods. This effect likely stems from lower cost of credit and the favorable financing conditions enabled by accommodative monetary policy and low-rate environments. For instance, when interest rates have remained low for long, speculative-grade firms, those with higher yields and lower reliance on debt financing, may exploit expanded credit supply conditions to issue debt strategically. This flexibility enables them to manage maturities dynamically and mitigate refinancing risks, which in turn contributes to lower average debt prices (Xu, 2018).

However, a contrasting effect emerges during QE periods. This discrepancy may reflect the targeted nature of QE programs, which influence specific assets and operate through diverse transmission channels that affect asset classes differently (Krishnamurthy and Vissing-Jorgensen, 2011). Firms with QE-eligible bonds or targeted assets utilize lower borrowing costs (Foley-Fisher, Ramcharan, and Yu, 2016; Rodnyansky and Darmouni, 2017), whereas redeemer firms, likely not ben-

Table 2.5.3: Debt issuance and debt holders' revaluation across regimes

	Dependent variable: $\delta^d_{i,t+1}$ (bps)			
	2yr-low-for-1yr	***10yr-low-for-2yr***	***QE***	***ZLB***
$I^d_{i,t+1}/A_{it}$	-2.04	-0.74	-0.56	-0.66
	(-16.3)	(-7.5)	(-6.2)	(-7.0)
$I^d_{i,t+1}/A_{it} \times 1_t^{\text{Easy MP}}$	2.03	0.55	-0.56	0.37
	(13.4)	(3.4)	(-2.0)	(1.5)
Firm-specific controls	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and debt holders' revaluation, $\delta^d_{i,t+1}$, conditioning on monetary regimes, as specified in (26). The monetary policy indicator equals one if the beginning of the period corresponds to 2yr-low-for-1yr, 10yr-low-for-2yr, QE, or ZLB. The presented coefficients are for debt issuance and its interactions with regime indicators. The baseline groups are tight or neutral periods, with the estimates for easy monetary policy regimes showing the incremental effect relative to the baseline. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

efiting from QE policies, face more constrained financial conditions and more pronounced price depreciation. This highlights the uneven distribution of monetary policy benefits, particularly under targeted interventions like QE, and emphasizes the challenges firms face in such environments.

2.6. The Cross-Section of Debt Issuance and Asset Revaluation's Association Across Monetary Policy Regimes

Begenau and Salomao (2019) document that firms of different sizes manage financing and payout activities differently over the business cycle. Similarly, firms with varying sensitivity to inflationary pressures may exhibit distinct responses to interest rate movements (Boons, Duarte, de Roon, and Szymanowska, 2020). For instance, firms more sensitive to interest rate changes may take advantage of lower borrowing costs during monetary easing and increase debt issuance. However, the relation between such issuance and asset revaluation depends on the allocation of raised funds and firm-specific characteristics.

In the previous chapter, we identified firm heterogeneity in the relation between debt issuance and asset revaluation as well as its components. We also provide deeper insight when distinguishing between net debt issuance and net debt redemption scenarios, as well as attributing revaluation

to existing and new shareholders. To further explore whether the cross-regime differences observed in earlier sections also vary with firm characteristics, we refine our model by extending regression (27) as follows:

$$\delta_{i,t+1} = \left[1_{i,t+1}^{I^d>0} \left(\beta_{1,it} + \beta_{2,it}\, 1_t^{\text{Easy MP}} \right) + 1_{i,t+1}^{I^d\leq 0} \left(\beta_{3,it} + \beta_{4,it}\, 1_t^{\text{Easy MP}} \right) \right] \frac{I_{i,t+1}^d}{A_{it}} + X_{it}'\gamma + \varepsilon_{i,t+1}, \quad (28)$$

where coefficients $\beta_{1,it}$, $\beta_{2,it}$, $\beta_{3,it}$, and $\beta_{4,it}$ capture firm- and time-specific variations in how the association between debt issuance and asset revaluation adjusts to firm types and macroeconomic conditions.

As in Chapter 1, we classify firms into categories based on the characteristics that may influence the relation between debt issuance and asset revaluation, including firm age, market-to-book ratio, firm size, and leverage ratio. To avoid redundancy, proxies such as cash rate and profitability are excluded from this analysis.[28] Firm-quarter observations are sorted by beginning-of-quarter values of certain characteristic, with the 33$^{\text{rd}}$ and 66$^{\text{th}}$ panel percentiles serving as thresholds. Observations are then categorized into either low-, medium-, or high-level groups based on these cut-off points, ensuring consistent classification across the panel.

We denote the three firm categories related to a given characteristic as {X, Y, Z} and the two monetary policy regimes as {a, b}, which yields four double-sorting scenarios represented by vector $\mathbf{z}_{it}$:

$$\begin{aligned}
\text{Scenario (A): } \mathbf{z}_{it} &= \left(1_{it}^{Xa} \quad 1_{it}^{Xb} \quad 1_{it}^{Ya} \quad 1_{it}^{Yb} \quad 1_{it}^{Za} \quad 1_{it}^{Zb} \right), \\
\text{Scenario (B): } \mathbf{z}_{it} &= \left(1_{it}^{X} \quad 1_{it}^{Xb} \quad 1_{it}^{Y} \quad 1_{it}^{Yb} \quad 1_{it}^{Z} \quad 1_{it}^{Zb} \right), \\
\text{Scenario (C): } \mathbf{z}_{it} &= \left(1_{t}^{a} \quad 1_{it}^{Ya} \quad 1_{it}^{Za} \quad 1_{t}^{b} \quad 1_{it}^{Yb} \quad 1_{it}^{Zb} \right), \\
\text{Scenario (D): } \mathbf{z}_{it} &= \left(1 \quad 1_{it}^{X} 1_{t}^{b} \quad 1_{it}^{Y} 1_{t}^{a} \quad 1_{it}^{Y} 1_{t}^{b} \quad 1_{it}^{Z} 1_{t}^{a} \quad 1_{it}^{Z} 1_{t}^{b} \right).
\end{aligned}$$

[28] See the previous chapter for detailed descriptions and discussions on these proxies.

We then refine regression (28) as follows:

$$\delta_{i,t+1} = \left[1^{I^d>0}_{i,t+1}\left(\beta_1+\mathbf{z}'_{it}\beta_2\right)+1^{I^d\leq 0}_{i,t+1}\left(\beta_3+\mathbf{z}'_{it}\beta_4\right)\right]\frac{I^d_{i,t+1}}{A_{it}}+X'_{it}\gamma+\varepsilon_{i,t+1}, \tag{29}$$

where $\mathbf{z}_{it}$ is a vector of dummy variables created for each firm i at time t, and β_2 and β_4 are vectors of coefficients capturing cross-sectional and cross-regime differences for issuer and redeemer firms, respectively.

Estimation in each scenario provides one type of coefficients and t-statistics. In Scenario (A), all six combinations of firm types and monetary regimes are treated independently, providing unique coefficients for each firm type-regime pair without an interaction baseline to be compared with. In Scenario (B), baseline coefficients represent firm types, with regime-specific effects estimated incrementally. That is, the interaction coefficients (e.g., 1^{Xb}_{it}) represent the regime-specific deviations relative to the baseline firm type coefficients (e.g., 1^{X}_{it}). In Scenario (C), baseline coefficients represent monetary regimes, with firm type-specific estimated as deviations. Thus, the interaction coefficients (e.g., 1^{Yb}_{it}) are relative to the baseline monetary regime coefficients (e.g., 1^{b}_{t}). In Scenario (D), interaction coefficients are estimated relative to a baseline combination (X, a). To interpret interaction terms in Scenarios (B) and (C), regime-specific or firm type-specific coefficients are summed with the baseline. Scenario (D) serves as a robustness check by focusing exclusively on the interaction terms. This framework enables a detailed comparison of debt issuance and asset revaluation's association across firm types and monetary regimes. By identifying which firms are more sensitive to debt issuance and how these relations evolve under different macroeconomic conditions, the analysis offers valuable insights into firm behavior during monetary easing.

From our findings earlier, debt issuance's relations with different stakeholders are distinct both across sections and over regimes. Therefore, we conduct the double-sorting analysis exclusively for shareholders' revaluation. In addition, given that the results for net debt redemption scenario are either mirroring the other direction of debt changes or less consistent, we pay special focus on

net debt issuance scenario.

Table 2.6.1 illustrates the differences in the association between net debt issuance and existing shareholders' revaluation across firm types and monetary regimes. The presented estimates are stand-alone coefficients from Scenario (A), with three sets of t-statistics from Scenarios (A)–(C) displayed below their corresponding coefficients. The t-statistics (A) indicate whether the firm type-regime-specific coefficients are statistically significant. The t-statistics (B) highlight significant cross-regime differences, while the t-statistics (C) reveal significant cross-sectional differences.[29]

Previously, we have shown that firms with younger age, higher market-to-book ratio, smaller size, or lower leverage ratio derive greater stock price appreciation when issuing debt, and that the stock market movement is enhanced during moderate low-rate periods. Building upon these results, we analyze Table 2.6.1 by in turn focusing on t-statistics (B) and (C) separately.

As for the cross-regime differences, the enhanced association between net debt issuance and stock price appreciation applies primarily to young firms, value firms, and small firms. That is, t-statistics (B) are only statistically significant for cases (Young, 2yr-low-for-1yr), (Low-MB, 2yr-low-for-1yr), and (Small, 2yr-low-for-1yr), driving the significant cross-regime pattern observed in Panel A of Table 2.5.1. For young or small firms, they effectively establish stronger links between net debt issuance and stock price appreciation and are benefiting from low-interest-rate policies during a moderate period. These effects reflect their stronger growth potential, more volatile income streams, and constrained access to external financing, which heighten their sensitivity to lower borrowing costs. For value firms, even though they demonstrate significantly greater stock price appreciation associated with net debt issuance during moderate low-rate periods (0.20 com-

[29]For instance, consider the "Age-2yr-low-for-1yr" pair in the top left 3×2 panel of Table 2.6.1. In scenario (C), the t-statistic for the case (Medium, Other) is 0.9, indicating that the association between net debt issuance and existing shareholders' revaluation is not significantly different between medium-age firms and young firms during periods not classified as "2yr-low-for-1yr." In the same scenario, the t-statistic for the case (Old, Other) is -1.8, implying that net debt issuance signals less stock price appreciation for old firms compared to young firms in the "Other" periods at the 10% level. Meanwhile, in Scenario (B), the t-statistic for the case (Young, 2yr-low-for-1yr) is 3.2, showing that young firms' net debt issuance is more significantly correlated with value creation during "2yr-low-for-1yr" periods compared to normal times. However, insignificant cross-regime differences are observed for both cases (Medium, 2yr-low-for-1yr) and (Old, 2yr-low-for-1yr) with t-statistics of 1.2 and 0.9, respectively.

Table 2.6.1: Net debt issuance and existing shareholders' revaluation

		Dependent variable: $\delta^{ep}_{i,t+1}$ *(%)*							
		Other	*2yr-low-for-1yr*	*Other*	*10yr-low-for-2yr*	*Other*	*QE*	*Other*	*ZLB*
Age	*Young*	0.17	0.31	0.27	0.21	0.26	0.23	0.26	0.21
	(A)	(6.1)	(9.3)	(10.7)	(3.6)	(11.0)	(2.1)	(11.0)	(2.3)
	(B)	(6.1)	(3.2)	(10.7)	(-1.0)	(11.0)	(-0.3)	(11.0)	(-0.5)
	(C)	(6.1)	(9.3)	(10.7)	(3.6)	(11.0)	(2.1)	(11.0)	(2.3)
	Medium	0.21	0.26	0.27	0.20	0.25	0.19	0.26	0.11
	(A)	(6.6)	(9.1)	(10.3)	(4.2)	(10.7)	(2.1)	(11.0)	(1.5)
	(B)	(6.6)	(1.2)	(10.3)	(-1.2)	(10.7)	(-0.6)	(11.0)	(-1.8)
	(C)	(0.9)	(-1.2)	(0.0)	(-0.1)	(-0.2)	(-0.3)	(0.0)	(-0.8)
	Old	0.05	0.11	0.13	0.09	0.10	0.14	0.09	0.16
	(A)	(0.8)	(4.5)	(4.3)	(2.6)	(4.1)	(2.4)	(3.6)	(3.2)
	(B)	(0.8)	(0.9)	(4.3)	(-1.0)	(4.1)	(0.5)	(3.6)	(1.2)
	(C)	(-1.8)	(-4.8)	(-3.3)	(-1.8)	(-4.5)	(-0.8)	(-4.7)	(-0.5)
MB	*Low*	0.11	0.20	0.16	0.17	0.16	0.22	0.16	0.19
	(A)	(5.0)	(7.6)	(8.0)	(3.9)	(8.4)	(2.9)	(8.3)	(2.9)
	(B)	(5.0)	(2.7)	(8.0)	(0.0)	(8.4)	(0.7)	(8.3)	(0.4)
	(C)	(5.0)	(7.6)	(8.0)	(3.9)	(8.4)	(2.9)	(8.3)	(2.9)
	Medium	0.09	0.16	0.14	0.15	0.14	0.18	0.15	0.13
	(A)	(2.2)	(6.3)	(5.5)	(3.6)	(6.2)	(2.5)	(6.3)	(2.2)
	(B)	(2.2)	(1.6)	(5.5)	(0.2)	(6.2)	(0.5)	(6.3)	(-0.2)
	(C)	(-0.4)	(-1.0)	(-0.6)	(-0.2)	(-0.6)	(-0.3)	(-0.4)	(-0.6)
	High	0.49	0.28	0.42	0.12	0.33	0.18	0.34	0.17
	(A)	(6.0)	(7.4)	(9.5)	(2.3)	(9.0)	(2.1)	(8.9)	(2.4)
	(B)	(6.0)	(-2.4)	(9.5)	(-4.6)	(9.0)	(-1.6)	(8.9)	(-2.1)
	(C)	(4.5)	(1.7)	(5.3)	(-0.7)	(4.1)	(-0.3)	(4.2)	(-0.2)
Size	*Small*	0.32	0.45	0.40	0.46	0.40	0.62	0.40	0.60
	(A)	(7.8)	(12.7)	(13.0)	(7.4)	(14.2)	(3.9)	(13.9)	(4.6)
	(B)	(7.8)	(2.5)	(13.0)	(1.0)	(14.2)	(1.4)	(13.9)	(1.6)
	(C)	(7.8)	(12.7)	(13.0)	(7.4)	(14.2)	(3.9)	(13.9)	(4.6)
	Medium	0.11	0.17	0.17	0.11	0.15	0.12	0.17	0.04
	(A)	(3.9)	(6.3)	(7.1)	(2.7)	(7.2)	(1.5)	(7.6)	(0.6)
	(B)	(3.9)	(1.5)	(7.1)	(-1.2)	(7.2)	(-0.5)	(7.6)	(-2.0)
	(C)	(-4.3)	(-6.4)	(-6.0)	(-4.7)	(-7.1)	(-2.9)	(-6.5)	(-4.0)
	Large	0.05	0.03	0.09	-0.04	0.04	0.01	0.02	0.08
	(A)	(1.8)	(1.2)	(3.3)	(-1.4)	(1.6)	(0.2)	(0.9)	(1.9)
	(B)	(1.8)	(-0.7)	(3.3)	(-3.3)	(1.6)	(-0.6)	(0.9)	(1.2)
	(C)	(-5.3)	(-9.8)	(-7.8)	(-7.3)	(-10.1)	(-3.7)	(-10.3)	(-3.8)
Leverage	*Low*	0.27	0.36	0.39	0.25	0.35	0.27	0.36	0.25
	(A)	(4.2)	(8.6)	(8.9)	(4.0)	(9.3)	(2.4)	(9.2)	(2.5)
	(B)	(4.2)	(1.2)	(8.9)	(-1.8)	(9.3)	(-0.7)	(9.2)	(-1.0)
	(C)	(4.2)	(8.6)	(8.9)	(4.0)	(9.3)	(2.4)	(9.2)	(2.5)
	Medium	0.20	0.21	0.26	0.09	0.22	0.12	0.23	0.10
	(A)	(5.7)	(7.8)	(9.7)	(2.4)	(9.5)	(1.8)	(9.4)	(2.0)
	(B)	(5.7)	(0.3)	(9.7)	(-3.5)	(9.5)	(-1.3)	(9.4)	(-2.1)
	(C)	(-1.0)	(-3.0)	(-2.6)	(-2.1)	(-3.0)	(-1.1)	(-2.9)	(-1.3)
	High	0.09	0.12	0.11	0.13	0.11	0.18	0.11	0.15
	(A)	(4.2)	(5.9)	(6.3)	(3.8)	(6.5)	(3.0)	(6.6)	(3.0)
	(B)	(4.2)	(1.0)	(6.3)	(0.4)	(6.5)	(1.1)	(6.6)	(0.7)
	(C)	(-2.6)	(-5.1)	(-5.9)	(-1.8)	(-5.8)	(-0.7)	(-5.9)	(-0.9)

The table reports the association between net debt issuance and existing shareholders' revaluation, as specified in (29). Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV. See previous table notes for details on standard regression settings.

pared to 0.11), the estimated coefficient for growth firms is still numerically larger in such periods (0.28), despite smaller than that in normal times (0.49). This may reflect different sensitivity of growth versus value firms to low interest rates—value firms might be enhanced by lower cost of capital, while growth firms could be limited by reduced growth opportunities.

As for the cross-sectional differences, t-statistics (C) largely suggest significant results for less established firms. However, young, growth, or low-leverage firms fail to show such effect under post-GFC regimes. These results confirm that less established firms tend to derive greater stock price appreciation when they are issuing debt, compared to their more established counterparts. However, such differences are less pronounced after the GFC.

When it comes to new shareholders' revaluation, we have documented that the relation between net debt issuance and net equity issuance is a combined effect reflecting firms' financing strategies—some firms issue debt and equity simultaneously due to substantial financing needs and limited access to credit, while others do so to fund investment opportunities and actively manage capital structure. Also, we show in previous sections that net debt issuance signals greater net equity issuance under broader accommodative monetary conditions. Here, Table 2.6.2 further examines the relation between net debt issuance and new shareholders' revaluation across firm types and monetary regimes.

As for the cross-regime differences, despite the generally enhancing effect of monetary easing on the link between net debt issuance and net equity issuance, there are a few types of firms exhibiting muted responses to accommodative policies, including young or small firms during post-GFC regimes, old firms during low-for-long periods, as well as growth or large firms in times other than moderate-low-rate periods. The effects for young or small firms are consistent with the notion of reduced investment opportunities in those periods, while the effect for old firms might reflect the limited sensitivity of their net equity issuance to low interest rates. Notably, growth or large firms respond primarily to moderate low-rate periods, aligning with their active equity issuance during most normal times.

As for the cross-sectional differences, t-statistics (C) confirm that the association between net

Table 2.6.2: Net debt issuance and new shareholders' revaluation

		Dependent variable: $\delta^{ei}_{i,t+1}$ *(%)*							
		Other	*2yr-low-for-1yr*	*Other*	*10yr-low-for-2yr*	*Other*	*QE*	*Other*	*ZLB*
Age	*Young*	0.18	0.36	0.26	0.42	0.28	0.37	0.28	0.38
	(A)	(8.2)	(16.8)	(15.4)	(10.2)	(17.3)	(5.1)	(17.0)	(6.1)
	(B)	(8.2)	(6.1)	(15.4)	(3.7)	(17.3)	(1.3)	(17.0)	(1.7)
	(C)	(8.2)	(16.8)	(15.4)	(10.2)	(17.3)	(5.1)	(17.0)	(6.1)
	Medium	0.23	0.32	0.27	0.39	0.28	0.52	0.28	0.48
	(A)	(7.5)	(15.0)	(13.6)	(10.6)	(15.3)	(6.9)	(15.0)	(7.2)
	(B)	(7.5)	(2.3)	(13.6)	(3.0)	(15.3)	(3.1)	(15.0)	(2.9)
	(C)	(1.7)	(-1.4)	(0.6)	(-0.7)	(0.1)	(1.4)	(0.2)	(1.0)
	Old	0.23	0.31	0.29	0.32	0.29	0.38	0.29	0.37
	(A)	(3.6)	(13.4)	(9.2)	(11.4)	(12.0)	(8.2)	(11.2)	(9.3)
	(B)	(3.6)	(1.2)	(9.2)	(0.9)	(12.0)	(1.7)	(11.2)	(1.8)
	(C)	(0.8)	(-1.6)	(0.9)	(-2.0)	(0.5)	(0.1)	(0.4)	(-0.3)
MB	*Low*	0.19	0.26	0.22	0.29	0.22	0.36	0.22	0.34
	(A)	(7.8)	(10.9)	(11.3)	(8.2)	(12.1)	(6.1)	(12.0)	(6.0)
	(B)	(7.8)	(2.1)	(11.3)	(1.9)	(12.1)	(2.4)	(12.0)	(2.1)
	(C)	(7.8)	(10.9)	(11.3)	(8.2)	(12.1)	(6.1)	(12.0)	(6.0)
	Medium	0.24	0.35	0.30	0.41	0.31	0.49	0.31	0.47
	(A)	(8.1)	(18.0)	(15.6)	(12.2)	(18.0)	(7.9)	(17.6)	(9.2)
	(B)	(8.1)	(3.4)	(15.6)	(2.9)	(18.0)	(2.9)	(17.6)	(3.1)
	(C)	(1.3)	(3.4)	(3.1)	(2.6)	(3.8)	(1.6)	(3.8)	(1.8)
	High	0.19	0.41	0.36	0.40	0.37	0.39	0.37	0.39
	(A)	(4.0)	(16.7)	(12.8)	(11.3)	(15.6)	(6.6)	(15.0)	(7.6)
	(B)	(4.0)	(4.3)	(12.8)	(0.9)	(15.6)	(0.3)	(15.0)	(0.4)
	(C)	(0.0)	(4.5)	(4.1)	(2.3)	(5.0)	(0.3)	(4.9)	(0.7)
Size	*Small*	0.20	0.28	0.23	0.34	0.26	0.26	0.25	0.33
	(A)	(6.7)	(13.7)	(12.5)	(9.3)	(14.4)	(4.1)	(14.1)	(5.4)
	(B)	(6.7)	(2.4)	(12.5)	(2.7)	(14.4)	(0.1)	(14.1)	(1.3)
	(C)	(6.7)	(13.7)	(12.5)	(9.3)	(14.4)	(4.1)	(14.1)	(5.4)
	Medium	0.16	0.28	0.22	0.30	0.23	0.40	0.23	0.35
	(A)	(5.9)	(12.5)	(11.7)	(8.9)	(13.0)	(6.5)	(12.9)	(6.2)
	(B)	(5.9)	(3.4)	(11.7)	(2.3)	(13.0)	(2.8)	(12.9)	(2.2)
	(C)	(-0.9)	(-0.1)	(-0.5)	(-0.7)	(-1.1)	(1.5)	(-1.0)	(0.3)
	Large	0.28	0.48	0.43	0.44	0.43	0.48	0.43	0.46
	(A)	(6.4)	(16.8)	(12.5)	(12.8)	(14.8)	(8.5)	(14.0)	(9.8)
	(B)	(6.4)	(4.2)	(12.5)	(0.3)	(14.8)	(0.9)	(14.0)	(0.5)
	(C)	(1.6)	(5.7)	(4.9)	(2.0)	(5.0)	(2.5)	(5.0)	(1.6)
Leverage	*Low*	0.11	0.30	0.22	0.35	0.25	0.38	0.24	0.38
	(A)	(2.6)	(11.9)	(8.2)	(8.8)	(10.3)	(5.4)	(9.9)	(6.3)
	(B)	(2.6)	(3.9)	(8.2)	(3.0)	(10.3)	(1.9)	(9.9)	(2.2)
	(C)	(2.6)	(11.9)	(8.2)	(8.8)	(10.3)	(5.4)	(9.9)	(6.3)
	Medium	0.21	0.35	0.29	0.37	0.30	0.45	0.30	0.40
	(A)	(6.9)	(16.4)	(13.7)	(11.4)	(16.0)	(7.7)	(15.6)	(8.5)
	(B)	(6.9)	(3.8)	(13.7)	(2.1)	(16.0)	(2.5)	(15.6)	(2.1)
	(C)	(2.0)	(1.7)	(2.5)	(0.3)	(2.0)	(0.7)	(2.2)	(0.3)
	High	0.23	0.33	0.28	0.36	0.29	0.40	0.29	0.40
	(A)	(10.2)	(15.9)	(16.5)	(11.3)	(17.8)	(6.9)	(17.7)	(7.4)
	(B)	(10.2)	(3.6)	(16.5)	(2.4)	(17.8)	(1.9)	(17.7)	(2.1)
	(C)	(2.4)	(1.1)	(2.1)	(0.1)	(1.6)	(0.2)	(1.7)	(0.2)

The table reports the association between net debt issuance and new shareholders' revaluation, as specified in (29). Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV. See previous table notes for details on standard regression settings.

debt issuance and net equity issuance is less likely to vary across age groups. Growth firms issue significantly more equity along with debt than value firms during moderate low-rate periods but not so in other times. However, such patterns are not maintained in prolonged ultra-low-rate regimes or after the GFC. Large firms tend to issue significantly more equity associated with debt than small firms throughout, reflecting their needs to manage capital structure and fund projects simultaneously. Higher-leverage firms issue more equity than their counterparts during normal times. Although accommodative monetary policies enhance the association between net debt issuance and net equity issuance across leverage groups, the cross-sectional patterns are not retained under monetary easing, suggesting that the enhancing effect applies more to lower-leverage firms.

Comparing Tables 2.6.1 and 2.6.2 from our double-sorting analysis, we find that not all funds raised are immediately reflected in stock price appreciation, and that not all types of firm can uniformly benefit from lower borrowing costs. Although accommodative monetary policies consistently influence net equity issuance, less established firms tend to be more effective in debt-related value creation under low interest rate environment. The observed heterogeneity underscores the importance of jointly considering firm characteristics and monetary regimes to fully capture the relation between monetary policy, corporate financing decisions, and shareholders' revaluation.

2.7. Robustness and Extensions

To further explore whether the impact of accommodative monetary policy on the association between debt issuance and asset revaluation strengthens over extended periods of low interest rates, we introduce a more granular measure: Years-in-low (YIL). This metric captures the cumulative number of years in which the FF rate has remained at low levels or at the ZLB, whichever is higher. We employ various thresholds for defining low levels, including two-year, five-year, and ten-year benchmarks. Regression (27) is then re-estimated, incorporating the YIL measure as the easy monetary policy variable.

Table 2.7.1 presents the results. The first column reveals a positive and significant coefficient for $I^d_{i,t+1}/A_{it}$, confirming that net debt issuance signals stock price appreciation for existing

Table 2.7.1: Debt issuance and stakeholders' revaluation under low interest rate

	$\delta^{ep}_{i,t+1}$ (%) Existing shareholders		$\delta^{ei}_{i,t+1}$ (%) New shareholders		$\delta^{d}_{i,t+1}$ (bps) Debt holders	
(%)	Issuer	Redeemer	Issuer	Redeemer	Issuer	Redeemer
Panel A. *2-year low interest rate*						
$I^d_{i,t+1}/A_{it}$	0.26	-0.16	0.23	-0.27	-1.66	-0.68
	(13.3)	(-6.4)	(14.4)	(-15.2)	(-9.6)	(-3.6)
$I^d_{i,t+1}/A_{it} \times \text{YIL}_t$	-0.02	-0.02	0.02	0.00	0.33	-0.09
	(-3.0)	(-3.0)	(5.4)	(-0.2)	(7.6)	(-1.8)
Panel B. *5-year low interest rate*						
$I^d_{i,t+1}/A_{it}$	0.25	-0.20	0.26	-0.25	-1.32	-0.93
	(13.8)	(-8.7)	(18.0)	(-17.0)	(-8.3)	(-5.2)
$I^d_{i,t+1}/A_{it} \times \text{YIL}_t$	-0.02	-0.01	0.03	-0.01	0.41	-0.01
	(-3.1)	(-1.2)	(4.2)	(-1.7)	(6.6)	(-0.1)
Panel C. *10-year low interest rate*						
$I^d_{i,t+1}/A_{it}$	0.24	-0.21	0.26	-0.26	-1.19	-0.92
	(14.4)	(-9.5)	(19.3)	(-18.3)	(-8.2)	(-5.5)
$I^d_{i,t+1}/A_{it} \times \text{YIL}_t$	-0.02	-0.01	0.03	-0.01	0.38	-0.01
	(-3.1)	(-1.0)	(4.6)	(-1.4)	(6.4)	(-0.2)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and stakeholders' revaluation, conditioning on the number of years the FF rate has been at its low levels. The issuer columns present the estimated coefficients for debt issuance and its interaction with "Years-in-low (YIL)" and the issuer indicator, while the redeemer columns for the net debt redemption scenario, as specified in (27). Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II–2023.IV.

shareholders. However, this effect diminishes as the number of years in a low-interest-rate environment increases. This finding aligns with our earlier cross-regime analysis, which suggests that the positive association between net debt issuance and stock price movement is not sustained over prolonged periods.

For firms engaged in net debt redemption, stock price appreciation is also observed, with this effect becoming more pronounced as the low-rate period extends. However, when measuring low rates over longer horizons, the effect of net debt redemption weakens. This aligns with our previous results, which indicate that the positive association between net debt redemption and stock price appreciation is primarily observed during moderate low-rate periods.

Net equity issuance by debt issuer firms also increases with the duration of the low-rate environment, suggesting that firms continue to favor debt financing under accommodative conditions

while simultaneously issuing equity to maintain balanced capital structures. Conversely, the relation between net debt redemption and net equity issuance remains largely unaffected by YIL. This suggests that redeemer firms consistently issue equity to replace debt, irrespective of the duration of low-interest-rate conditions, further reinforcing our earlier cross-regime findings.

Finally, in line with our previous results, debt holders' revaluation does not correlate distinctly with net debt issuance versus net debt redemption. Debt issuance relates to debt price depreciation, which subsequently rebounds over extended low-rate periods, which may be attributed to the lower discount rates induced by accommodative monetary policies.

2.8. Conclusion

This study examines the interplay between firm financial policies and varying monetary regimes, with a particular focus on the effects of accommodative monetary conditions. By defining asset revaluation as the growth in firms' market value of assets, excluding the direct effects of debt issuance, this analysis captures broader firm value dynamics. The primary objective is to evaluate whether accommodative monetary policies strengthen the association between debt issuance and asset revaluation.

Using a comprehensive dataset of public US non-financial firms from 1975.II to 2023.IV, we find that active debt management relates to stock price appreciation, particularly when interest rates have remained low for moderate periods. While such periods support short-term value creation associated with debt adjustments, prolonged ultra-low-rate environments and the post-GFC era diminish these benefits for existing shareholders, signaling the challenges of sustaining value gains in such regimes.

Issuer firms' tendency to issue equity and redeemer firms' shift toward equity financing during economic downturns highlights a strategic preference for financial flexibility over aggressive expansion, particularly in constrained credit markets. The observed decline in equity issuance during QE and ZLB regimes likely reflects heightened risk aversion and constrained investment opportunities, characterizing a post-GFC environment where firms prioritize stability over growth.

Moreover, debt issuance tends to be associated with debt holders' revaluation below par in tight or neutral monetary periods but above par under accommodative conditions. Notably, the enhanced marginal effect of debt issuance on asset revaluation is primarily attributable to shareholders, highlighting the critical role equity plays in driving asset revaluation during monetary easing.

A detailed double-sorting analysis by firm type and monetary regimes further reveals that moderate low-rate periods enhance the relation between net debt issuance and stock price appreciation, particularly for younger or smaller firms. These firms, characterized by high financing needs, volatile capital structures, and greater reliance on external funding, benefit more from the increased access to low-cost capital in a low-interest-rate environment. Additionally, net debt issuance tends to coincide with greater net equity issuance across most firm types under accommodative monetary conditions, reinforcing the interplay between debt financing and equity market behavior.

Overall, the baseline effect of net debt issuance on stakeholders' revaluation remains robust, highlighting the intricate relation between monetary policy, corporate financing decisions, and stakeholders' revaluation. While accommodative monetary policies can foster firm activities and enhance value creation, their benefits are uneven across firm types and are not sustained over extended periods. This underscores the importance of understanding monetary policy's role in shaping corporate behavior.

These findings carry important implications for policymakers and corporate managers, emphasizing the need for strategies tailored to maximize the advantages of monetary easing while mitigating its long-term limitations. Future research could delve deeper into the interaction between payout policies, investment decisions, and monetary regimes, offering greater clarity on how firms adjust their financial strategies in response to evolving economic conditions. This is particularly relevant in evaluating the effectiveness of policy-driven financial easing and firms' ability to navigate extended periods of financial and economic uncertainty.

Thus far, our analysis has primarily inferred investment implications based on observed stock price fluctuations and net equity issuance patterns. In the next chapter, we will focus explicitly on the association between debt issuance and investment.

Appendix

2.A. Data Sources and Variable Definitions

Table 2.A.1: Variable definitions

	Variable	Definition/Source
Low-for-long monetary policy measures at t		
2yr-low-for-1yr$_t$	Moderate low-rate period	The Federal Funds (FF) rate has remained at or near its two-year low or the zero lower bound (ZLB) for at least one year
10yr-low-for-2yr$_t$	Prolonged ultra-low-rate period	The FF rate has remained at or near its ten-year low or the ZLB for at least two years
YIL$_t$	Years-in-low	The cumulative number of years that the FF rate has remained at low levels
Post-GFC monetary policy indicators at t		
QE$_t$	Quantitative easing	Four US quantitative easing (QE) periods
ZLB$_t$	Zero lower bound	The FF target has been maintained at a target of 0-25 basis points following the GFC

2.B. Additional Tables

Table 2.B.1: Debt issuance and asset revaluation across monetary policy regimes—combined

	Dependent variable: $\delta_{i,t+1}$ *(%)*			
(%)	***2yr-low-for-1yr***	***10yr-low-for-2yr***	***QE***	***ZLB***
Panel A. *Full-sample regression with regime interaction*				
$I^d_{i,t+1}/A_{it}$	0.04	0.09	0.10	0.10
	(2.4)	(5.6)	(7.0)	(6.6)
$I^d_{i,t+1}/A_{it} \times 1_t^{\text{Easy MP}}$	0.09	0.08	0.07	0.10
	(3.9)	(2.9)	(1.5)	(2.5)
Panel B. *Regime-subsample regression*				
$I^d_{i,t+1}/A_{it}$ (Tight/Neutral)	0.06	0.09	0.10	0.10
	(3.2)	(5.7)	(7.3)	(6.8)
$I^d_{i,t+1}/A_{it}$ (Easy MP)	0.13	0.16	0.20	0.22
	(7.6)	(6.2)	(4.7)	(5.9)
Firm-specific controls	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and asset revaluation, $\delta_{i,t+1}$, conditioning on monetary regimes, as specified in (26). The monetary policy indicator equals one if the beginning of the period is identified as 2yr-low-for-1yr, 10yr-low-for-2yr, QE, or ZLB. Panel A presents the estimated coefficients, β_0 and β, for debt issuance and its interaction with regime indicators, respectively. The baseline groups are tight or neutral periods, with the estimates for easy monetary policy regimes showing the incremental effect relative to the baseline. Panel B presents the estimates for debt issuance after stratifying the data into subsamples by regime indicators. Both the dependent variables and estimated coefficients are expressed in percentages. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

Table 2.B.2: Debt issuance and asset revaluation across monetary policy regimes—subsample

	Dependent variable: $\delta_{i,t+1}$ *(%)*			
(%)	***5yr-low-for-1yr***	***10yr-low-for-2yr***	***QE***	***ZLB***
Panel A. *Stand-alone significance for issuers* ($I^d_{i,t+1}/A_{it} > 0$)				
$I^d_{i,t+1}/A_{it}$ (Tight/Neutral)	0.33	0.55	0.57	0.57
	(9.9)	(20.7)	(23.9)	(23.1)
$I^d_{i,t+1}/A_{it}$ (Easy MP)	0.65	0.61	0.69	0.69
	(23.6)	(14.4)	(9.0)	(11.1)
Panel B. *Stand-alone significance for redeemers* ($I^d_{i,t+1}/A_{it} \leq 0$)				
$I^d_{i,t+1}/A_{it}$ (Tight/Neutral)	-0.37	-0.49	-0.50	-0.51
	(-9.2)	(-16.5)	(-18.2)	(-18.3)
$I^d_{i,t+1}/A_{it}$ (Easy MP)	-0.51	-0.40	-0.23	-0.28
	(-16.1)	(-7.8)	(-3.1)	(-4.1)
Firm-specific controls	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance/redemption and asset revaluation, conditioning on monetary regimes. The monetary policy indicator equals one if the beginning of the period is identified as 2yr-low-for-1yr, 10yr-low-for-2yr, QE, or ZLB. Panel A presents the estimates for debt issuance after stratifying the data into subsamples by issuer and regime indicators, while Panel B for the net debt redemption scenario. Both the dependent variables and estimated coefficients are expressed in percentages. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

Table 2.B.3: Net debt issuance and shareholders' revaluation—subsample

	2yr-low-for-1yr	***10yr-low-for-2yr***	***QE***	***ZLB***
Panel A. *Existing shareholders,* δ^{ep} *(%)*				
$I^d_{i,t+1}/A_{it}$ (Tight/Neutral)	0.18	0.23	0.23	0.23
	(7.7)	(13.1)	(14.3)	(14.2)
$I^d_{i,t+1}/A_{it}$ (Easy MP)	0.23	0.14	0.15	0.17
	(11.8)	(4.8)	(3.0)	(4.1)
Panel B. *New shareholders,* δ^{ei} *(%)*				
$I^d_{i,t+1}/A_{it}$ (Tight/Neutral)	0.18	0.27	0.29	0.28
	(9.1)	(19.7)	(23.0)	(22.2)
$I^d_{i,t+1}/A_{it}$ (Easy MP)	0.34	0.37	0.41	0.41
	(23.9)	(16.4)	(10.4)	(12.2)
Firm-specific controls	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and shareholders' revaluation, conditioning on monetary regimes. The monetary policy indicator equals one if the beginning of the period is identified as 2yr-low-for-1yr, 10yr-low-for-2yr, QE, or ZLB. The dependent variables in Panel A and B are $\delta^{ep}_{i,t+1}$ and $\delta^{ei}_{i,t+1}$, respectively. Each panel presents the estimated coefficient for net debt issuance after stratifying the data into subsamples by issuer and regime indicators. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

Table 2.B.4: Net debt redemption and shareholders' revaluation—subsample

	2yr-low-for-1yr	***10yr-low-for-2yr***	***QE***	***ZLB***
Panel A. *Existing shareholders,* δ^{ep} *(%)*				
$I^d_{i,t+1}/A_{it}$ (Tight/Neutral)	-0.08	-0.21	-0.23	-0.23
	(-2.8)	(-9.2)	(-11.0)	(-10.9)
$I^d_{i,t+1}/A_{it}$ (Easy MP)	-0.28	-0.24	-0.15	-0.21
	(-11.0)	(-5.6)	(-2.2)	(-3.5)
Panel B. *New shareholders,* δ^{ei} *(%)*				
$I^d_{i,t+1}/A_{it}$ (Tight/Neutral)	-0.26	-0.29	-0.29	-0.29
	(-11.2)	(-20.4)	(-21.6)	(-21.8)
$I^d_{i,t+1}/A_{it}$ (Easy MP)	-0.27	-0.23	-0.15	-0.15
	(-18.9)	(-9.3)	(-5.0)	(-5.2)
Firm-specific controls	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

The table reports the association between net debt redemption, $I^d_{i,t+1}/A_{it} \leq 0$, and shareholders' revaluation, conditioning on monetary regimes. The monetary policy indicator equals one if the beginning of the period is identified as 2yr-low-for-1yr, 10yr-low-for-2yr, QE, or ZLB. The dependent variables in Panel A and B are $\delta^{ep}_{i,t+1}$ and $\delta^{ei}_{i,t+1}$, respectively. Each panel presents the estimated coefficient for net debt redemption after stratifying the data into subsamples by redeemer and regime indicators. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

3. Chapter 3: Debt-Financed Investment

3.1. Introduction

Debt issuance serves multiple corporate purposes, relating to both investment and payout decisions that are ultimately associated with asset revaluation outcomes. The previous chapters establish that the association between debt issuance and asset revaluation varies across firm types and is amplified during accommodative monetary periods, with distinct effects observed between net debt issuance and redemption scenarios. This chapter focuses on the relation between debt issuance and investment, a potential channel through which debt issuance signals asset revaluation.

To capture different dimensions of investment activity, we employ three measures, including net capital expenditure, total investment, and investing cash flow. Net capital expenditure represents the net amount the firm spends on fixed assets, total investment consists of net capital expenditure, research and development (R&D) expenditure, and acquisition expenditure, while investing cash flow incorporates net cash outflows in broader investing activities. Using real-term quarterly data for over 7,000 public US non-financial firms from 1975.II to 2023.IV, we find a robust relation between net debt issuance and increased investment.

In the cross section, net debt issuance is strongly associated with net capital expenditure, particularly among younger, growth, or small firms. Similarly, debt-financed R&D spending is concentrated among growth, smaller, lower-leverage, or higher-cash firms. In line with our classification of less established entities, these firms pursue aggressive expansion strategies and generate stock price appreciation accordingly. Conversely, debt-financed acquisition exhibits a different pattern, being more prevalent among older, larger, or more profitable firms, who tend to be equipped with solid growth potential and moderate leverage constraints. These distinct patterns for various types of investment align with our findings from Chapter 1. Net equity issuance was shown to co-occur with positive changes in debt levels. The association between net debt issuance and investment mirrors such pattern, suggesting that firms tend to issue both debt and equity to finance investment. In terms of stock market reactions, while net capital expenditure and R&D spending are consistent

with stock price appreciations, acquisition does not exhibit similar effects.

We further examine how the relation between debt issuance and investment varies across monetary policy regimes. During periods of moderate low interest rates, firms significantly increase net capital expenditures and R&D spending as a proportion of beginning-of-period market assets when issuing debt, whereas other measures of easy monetary policy exhibit merely limited effects. Meanwhile, debt issuer firms engage in more acquisition activities under broader accommodative monetary conditions. These investment patterns align with those observed for the association between net debt issuance and shareholders' revaluation across regimes. Specifically, enhanced stock price appreciation during moderate low-rate periods is closely tied to debt-financed net capital expenditure and R&D spending, while increased net equity issuance in broader monetary easing environments reflects firms' simultaneous engagement in investment and capital structure adjustments.

Focusing on firms with access to credit markets, our regression framework estimates the association between debt issuance and investment, highlighting firm heterogeneity and the effectiveness of accommodative monetary policies in supporting the relation. The remainder of this chapter is structured as follows: Section 3.2 reviews the related literature. Section 3.3 defines key investment variables, measurement approaches, and their distributions. Section 3.4 investigates how debt issuance relates to investment, while Section 3.5 examines potential firm-level heterogeneity involved in this relation. Section 3.6 presents time-varying evidence across monetary policy regimes. Section 3.7 conducts robustness checks and explores extensions, and Section 3.8 concludes.

3.2. Prior Work

This chapter focuses on the association between debt issuance and investment, and relates to two main strands of literature: the dynamics of debt-financed investment and its macroeconomic implications.

A growing body of research examines how firms finance their investment activities. Studies such as DeAngelo, DeAngelo, and Whited (2011) and Denis and McKeon (2012) suggest that

firms often deviate from their leverage targets primarily to fund investment rather than to finance large equity payouts. Bargeron, Denis, and Lehn (2018) further demonstrate that firms tend to favor debt over equity when responding to sudden investment opportunities. Julio, Kim, and Weisbach (2007) highlight distinctions in how various types of investment are financed, showing that long-term, nonconvertible bonds are more frequently used for fixed asset investment, while convertible and short-term bonds are more likely to fund R&D. Similarly, Grundy and Verwijmeren (2020) explore how investment characteristics shape firms' choice between debt and equity financing. As a channel of asset revaluation, investment is intrinsically linked to financing decisions. Rather than tracing specific funding sources for each investment, this study adopts an aggregate approach, building on the methodology introduced in earlier chapters to establish the overall association between debt issuance and investment. Linking these findings to prior results can help assess the effectiveness of firms' financing and investment behavior.

Firm heterogeneity plays a critical role in shaping how investment is financed. Bolton, Chen, and Wang (2011) emphasize the importance of liquidity management for financially constrained firms, highlighting the dynamic interplay between investment and financing decisions. Im, Mayer, and Sussman (2020) document that large firms are more likely to rely on debt when investment spikes occur, while smaller and highly leveraged firms tend to issue less equity. Korteweg, Schwert, and Strebulaev (2022) further argue that firms adjust their leverage in response to changes in operating performance and investment policies. Building on these insights, our cross-sectional analysis extends this literature by exploring how the relation among debt financing, investment, and firm value varies across different firm types and investment categories.

The second relevant strand of literature investigates the interaction between monetary policy and firm investment behavior. Gilchrist and Zakrajsek (2007) argue that rising interest rates reduce investment and hinder long-term capital accumulation. Durante, Ferrando, and Vermeulen (2022) document heterogeneous investment sensitivities to monetary policy shocks, with younger and more leveraged firms exhibiting greater responsiveness to both interest rate and credit channel shocks. Ottonello and Winberry (2020) find that firms with lower default risk tend to respond

more strongly to monetary easing than high-default-risk firms. However, the effectiveness of accommodative monetary policies in stimulating investment remains debated. Acharya and Plantin (2023) find that low interest rates often lead to increased leverage for shareholder payouts, with limited impact on investment. In contrast, Giambona, Matta, Peydró, and Wang (2020) provide evidence that quantitative easing stimulates investment via the corporate bond lending channel, without significantly increasing shareholder distributions. At the aggregate level, trends in corporate debt and investment also reflect macro-financial conditions. For instance, Crouzet (2018) documents declines in borrowing and investment following contractions in bank credit supply. Crouzet (2021) shows that firms relying more on bank loans than bonds exhibit greater sensitivity to monetary policy shocks. This shift from loan-based to bond-based financing in corporate debt composition has, in turn, weakened the pass-through of monetary policy to firm-level investment.

In this chapter, we examine the association between debt issuance and investment and investigate how this relation varies across monetary policy regimes. By doing so, we provide empirical evidence on whether monetary easing facilitates both debt financing and investment, and whether these effects translate into firm value creation.

3.3. Measuring Investment

We define our key investment variable, $\text{Inv}_{i,t+1}$, as net investment in period t divided by beginning-of-period market assets. As mentioned in the prior section, there are distinctions in the financing of different investment types. To capture such distinction, we propose three alternative measures.

First, we consider net capital expenditure, defined as capital expenditure minus the sale of property. Following the accounting literature (e.g., Biddle, Hilary, and Verdi, 2009; Richardson, 2006), we replace missing data with zeros, assuming no investment or asset sales have occurred during the period. Quarterly capital expenditure (Compustat item *capxq*) is computed as year-to-date capital expenditure (Compustat item *capxy*) for the first quarter of the financial year and as the difference between successive quarterly values for subsequent quarters. The same approach is applied to quarterly sale of property data.

Second, we adopt the total investment definition from the accounting literature, which includes net capital expenditure, R&D expenditure (Compustat item *xrd*), and acquisition expenditure (Compustat item *aqc*). Missing values for R&D and acquisition are set to zero to maintain consistency. This measure captures a broader range of investment activities compared to net capital expenditure alone.

Third, we take a comprehensive approach by using net cash outflows from investing activities. This measure encompasses net capital expenditure, acquisition, and both short-term and long-term financial investment. Quarterly investing cash flows (Compustat item *-ivncfq*) are manually computed from year-to-date values (Compustat item *-ivncfy*) to ensure consistency across measures.

Table 3.3.1 presents the distribution of net investment and the investment variable, $\text{Inv}_{i,t+1}$. Panel A shows that average net investment becomes larger when total investment measure is used, compared to net capital expenditure. Average investing cash flow, however, is smaller than average total investment. These patterns reflect the inclusion of R&D and acquisition expenditures in total investment measure, as well as the broader scope of financial investment captured in investing cash flow measure.

Panel B shows that scaling net investment by market assets preserves the patterns observed in Panel A, emphasizing the stable relation between various types of investment and their asset bases. For simplicity, we refer to these investment variables as their corresponding investment types throughout this chapter unless otherwise specified. The investment variable is called *investment* hereafter.

Panel C examines the distribution of investment across firm characteristics and investment types. For instance, the average net capital expenditure first increases and then declines with the market-to-book ratio, firm size, leverage ratio, and profitability, while it consistently decreases with firm age and cash holdings. These variations suggest that firms with different attributes and at different stages of development engage in distinct investment activities.

Table 3.3.1: Summary statistics of investment

	Mean	Std Dev	5th pctl	25th pctl	Median	75th pctl	95th pctl
Panel A. *Net investment in millions of 1982-1984 US dollars*							
Net capital expenditure	24	127	0	0	1	7	94
Total investment	37	218	0	0	2	12	144
Investing cash flow	35	260	-5	0	2	14	157
Panel B. *Investment variable* (Inv) *in percentages*							
Net capital expenditure	0.89	1.35	0.00	0.08	0.46	1.15	3.51
Total investment	1.52	2.03	0.00	0.23	0.92	2.00	5.53
Investing cash flow	1.16	2.91	-2.07	0.22	0.77	1.81	5.79
Panel C. *Investment variable* (Inv) *in percentages by firm characteristics*							
	Low		*Medium*		*High*		
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	
Age							
Net capital expenditure	0.90	1.49	0.90	1.38	0.87	1.16	
Total investment	1.52	2.22	1.55	2.07	1.50	1.77	
Investing cash flow	1.30	3.32	1.17	2.97	1.05	2.52	
Market-to-book							
Net capital expenditure	0.93	1.51	1.03	1.41	0.71	1.08	
Total investment	1.48	2.27	1.67	2.08	1.43	1.68	
Investing cash flow	1.20	3.49	1.35	2.88	0.97	2.43	
Size							
Net capital expenditure	0.89	1.50	0.93	1.39	0.85	1.14	
Total investment	1.80	2.36	1.52	2.01	1.26	1.61	
Investing cash flow	0.96	3.44	1.33	2.94	1.20	2.21	
Leverage							
Net capital expenditure	0.75	1.17	0.98	1.37	0.94	1.48	
Total investment	1.73	2.05	1.57	2.01	1.28	2.00	
Investing cash flow	0.98	3.01	1.27	2.72	1.25	2.99	
Cash rate							
Net capital expenditure	1.00	1.42	0.90	1.35	0.78	1.27	
Total investment	1.34	1.89	1.36	1.90	1.87	2.23	
Investing cash flow	1.37	2.54	1.22	2.56	0.93	3.44	
Profitability							
Net capital expenditure	0.85	1.41	0.96	1.36	0.86	1.28	
Total investment	1.79	2.29	1.42	1.92	1.36	1.81	
Investing cash flow	0.77	3.42	1.41	2.62	1.35	2.48	

This table reports the distributions of net investment and investment variable, $\text{Inv}_{i,t+1}$. Three measures of net investment are reported in millions of 1982-1984 US dollars in Panel A. The corresponding investment variables are reported in percentages in Panel B. Panel C presents the distributions of investment variables by firm characteristics, including firm age, market-to-book ratio, firm size, leverage ratio, cash rate, and profitability. The sample comprises 318,195 firm-quarter observations for 7,077 public US non-financial firms from 1975.II to 2023.IV.

3.4. Debt Issuance and Investment

Following Chapter 1, we begin by testing how debt issuance relates investment using a pooled OLS panel regression:

$$\text{Inv}_{i,t+1} = \beta \frac{I^d_{i,t+1}}{A_{it}} + X'_{it}\gamma + \varepsilon_{i,t+1}, \tag{30}$$

where $I^d_{i,t+1}/A_{it}$ represents the debt issuance variable of interest, and X_{it} is a vector of control variables defined in earlier chapters. To capture the potential V-shaped relation between debt issuance and investment, we extend this baseline model by conditioning the β estimates on an issuer indicator, $1^{I^d>0}_{i,t+1}$, which equals 1 if the change in debt levels in period t is positive:

$$\text{Inv}_{i,t+1} = \left(\beta_0 + \beta\, 1^{I^d>0}_{i,t+1}\right) \frac{I^d_{i,t+1}}{A_{it}} + X'_{it}\gamma + \varepsilon_{i,t+1}. \tag{31}$$

Table 3.4.1 presents the results for the associations between debt issuance and different types of investment. The top panel reports the estimated β from regression (30), indicating that firms are conducting a range of investment activities when issuing debt. The coefficients follow an increasing pattern as the investment measure expands to include broader categories, reflecting firms' debt financing needs to facilitate various types of investment simultaneously.

Unlike the V-shaped relation between debt issuance and asset revaluation observed in Chapter 1, the bottom panel of Table 3.4.1, which separates positive and negative changes in debt levels using regression (31), reveals a kinked pattern for debt issuance and investment. Net debt issuance strongly relates to significant increases in investment, underscoring the role of newly issued debt in funding growth initiatives. By contrast, net debt redemption is associated with modest declines in net capital expenditure, minimal increases in total investment, and significantly lower investing cash flow.

Several mechanisms explain these findings. First, net capital expenditure declines at a relatively slow pace under debt redemption, likely because maintenance investment remains essential for ongoing operations, regardless of financing sources and conditions. Second, when R&D and acquisition expenditures are incorporated, net debt redemption is linked to a slight increase in investment, offsetting the reduction in net capital expenditure. This suggests that redeemer firms actively manage their capital structure by reallocating resources to research projects or strategic acquisitions. Third, financial investment declines significantly among redeemer firms as debt financing contracts, highlighting the role of divestment from non-operating investment as a tool for

Table 3.4.1: Debt issuance and investment

	Dependent variable: $\text{Inv}_{i,t+1}$ *(%)*		
	Net capital expenditure	Total investment	Investing cash flow
$I^d_{i,t+1}/A_{it}$	0.06	0.13	0.26
	(37.6)	(51.3)	(56.3)
$I^d_{i,t+1}/A_{it}$	0.01	-0.01	0.19
	(6.1)	(-4.3)	(26.8)
$I^d_{i,t+1}/A_{it} \times 1^{I^d>0}_{i,t+1}$	0.06	0.20	0.10
	(20.8)	(44.4)	(12.1)
Firm-specific controls	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

The table reports the association between debt issuance, $I^d_{i,t+1}/A_{it}$, and investment, $\text{Inv}_{i,t+1}$, as specified in (30), along with the results for scenarios of net debt issuance and net debt redemption, as in (31). Both dependent variables and the key regressor are measured in percentages. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

debt repayment and capital structure adjustments. As discussed in previous chapters, the interpretation of our results may raise potential endogeneity concerns. We hereby stress that our analysis in this chapter focuses on the association between debt issuance and investment, which happen contemporaneously in one specific periods, without establishing any causality between the two.

Overall, our findings indicate that net debt issuance is strongly associated with investment across various categories, whereas net debt redemption is associated with constrained and mixed investment activity. These asymmetric relations stress the importance of differentiating between investment types when assessing the relation between corporate debt and firm valuation dynamics. These results further motivate our focus on net debt issuance scenario in subsequent cross-sectional analyses.

3.5. Firm Heterogeneity in Debt-Financed Investment

To investigate cross-sectional differences in the association between debt issuance and investment, while also capturing the kinked relation observed in the prior section, we modify model (30) by conditioning the β coefficient on a vector of firm characteristic indicators, Z_{it}, an issuer indicator,

$1^{I^d>0}_{i,t+1}$, and a redeemer indicator, $1^{I^d\leq 0}_{i,t+1}$, while controlling for time-t available information, X_{it}:

$$\text{Inv}_{i,t+1} = \left[1^{I^d>0}_{i,t+1}\left(\beta_1 + Z'_{it}\beta_2\right) + 1^{I^d\leq 0}_{i,t+1}\left(\beta_3 + Z'_{it}\beta_4\right)\right]\frac{I^d_{i,t+1}}{A_{it}} + X'_{it}\gamma + \varepsilon_{i,t+1}. \tag{32}$$

Here, β_1 and β_2 indicate the cross-sectional differences for issuer firms, obtained when the issuer indicator is activated, while β_3 and β_4 capture these differences for redeemer firms. We estimate regression (32) on the full sample with each investment measure in turn as the dependent variable to assess the cross-sectional patterns in the relation between debt issuance and investment. Firm characteristics and group constructions follow Chapter 1.

The prior section shows that net capital expenditure and total investment exhibit limited associations with net debt redemption, while investing cash flow declines significantly when firms are reducing debt. This motivates us to continue distinguishing between positive and negative changes in debt levels but pay special attention on net debt issuance scenario in our cross-sectional analysis. Table 3.5.1 presents the full-sample results, with Table 3.A.1 in Appendix 3.A confirming the coefficients' stand-alone significance by estimating regression (30) within firm-type subsamples.

In the first column, we observe that younger, growth, or smaller firms invest more in net capital expenditure when issuing debt, but the relation does not vary significantly with the other three characteristics. This is likely due to the essential nature of net capital expenditure as maintenance capital: firms in their early stages require financing for business growth, whereas mature firms need to maintain their day-to-day operations. Therefore, firms are incentivized to invest in net capital expenditure, regardless of financial status such as leverage ratios, cash holdings, and profitability. Younger, growth, or smaller firms are more aggressive in such investment, compared to their counterparts. This aligns with Begenau and Salomao (2019), who argue that small firms, operating below their efficient scale, have high investment needs.

When R&D and acquisition expenditures are included in the investment measure, the second column suggests that medium-age firms display a declining investment pattern, which rebounds for older firms. Combined with the less net capital expenditure for older firms, the pattern is consistent

Table 3.5.1: Net debt issuance and investment across firm types

		Dependent variable: $\text{Inv}_{i,t+1}$				
		Net capital expenditure (%)	Total investment (%)	Investing cash flow (%)	R&D expenditure (bps)	Acquisition expenditure (bps)
Age	$I^d_{i,t+1}/A_{it}$	0.07	0.19	0.32	0.36	6.24
		(24.6)	(36.9)	(34.0)	(5.0)	(26.9)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	-0.01	-0.02	-0.04	0.03	-0.11
		(-3.6)	(-3.1)	(-3.3)	(0.3)	(-0.3)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{Old}}_{it}$	-0.02	0.01	-0.04	0.13	2.41
		(-3.7)	(0.8)	(-3.0)	(0.6)	(6.0)
Market-to-book	$I^d_{i,t+1}/A_{it}$	0.06	0.15	0.26	0.00	4.93
		(19.3)	(27.9)	(27.2)	(0.0)	(22.3)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.01	0.07	0.06	0.20	3.65
		(2.4)	(9.5)	(5.2)	(1.6)	(11.2)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	0.01	0.06	0.04	1.20	3.31
		(3.3)	(7.7)	(3.2)	(7.2)	(9.0)
Size	$I^d_{i,t+1}/A_{it}$	0.08	0.18	0.26	0.68	4.86
		(24.2)	(32.3)	(27.2)	(6.5)	(21.1)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	-0.02	0.00	0.07	-0.41	2.40
		(-5.6)	(0.6)	(5.1)	(-3.2)	(6.9)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{Large}}_{it}$	-0.04	0.01	0.08	-0.41	4.87
		(-7.2)	(1.2)	(5.5)	(-1.7)	(11.3)
Leverage	$I^d_{i,t+1}/A_{it}$	0.07	0.20	0.29	1.49	7.22
		(19.9)	(32.0)	(31.2)	(9.9)	(24.7)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.00	0.00	0.01	-1.32	0.15
		(0.0)	(0.0)	(0.9)	(-8.9)	(0.4)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	0.00	-0.02	0.00	-1.62	-1.10
		(-0.8)	(-2.9)	(-0.2)	(-10.4)	(-3.0)
Cash rate	$I^d_{i,t+1}/A_{it}$	0.06	0.19	0.30	0.01	7.25
		(21.1)	(33.7)	(32.7)	(0.3)	(27.9)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.00	0.00	0.02	0.19	-0.07
		(0.6)	(0.7)	(1.5)	(1.8)	(-0.2)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	0.00	-0.01	-0.03	1.24	-1.50
		(0.4)	(-1.7)	(-1.9)	(8.3)	(-4.1)
Profitability	$I^d_{i,t+1}/A_{it}$	0.07	0.16	0.25	0.46	4.95
		(21.7)	(30.6)	(28.3)	(4.1)	(23.8)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{Medium}}_{it}$	0.00	0.05	0.09	-0.15	3.64
		(-0.4)	(7.3)	(8.1)	(-1.5)	(11.1)
	$I^d_{i,t+1}/A_{it} \times 1^{\text{High}}_{it}$	-0.01	0.02	0.07	0.03	2.40
		(-1.5)	(3.3)	(5.3)	(0.3)	(7.2)

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and investment, $\text{Inv}_{i,t+1}$, conditioning on firm characteristics. Each column reports on one investment measure as the dependent variable. The presented estimated coefficients, β_1 and β_2, are for debt issuance and its interaction with issuer and firm characteristic indicators, as specified in (32). Baseline groups represent young, value, small, low-leverage, low-cash, or less profitable firms, with estimates for other groups shown as incremental to the baseline. The key regressor are measured in percentages. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

with mature firms' focus on mergers and acquisitions in later stages (Korteweg, Schwert, and Strebulaev, 2022). Higher-market-to-book firms exhibit greater total investment correlated with net debt issuance, with larger coefficients than those for net capital expenditure across market-to-book groups. Additionally, compared to the diminishing association between net debt issuance and net capital expenditure across size group, the insignificant difference for total investment reflect increases in R&D or acquisition for larger firms. Also, lower-leverage firms and higher-profit firms show a boost in total investment within their categories.

When it comes to investing cash flow, cross-sectional patterns differ from those observed for net capital expenditure and total investment—younger, medium-market-to-book, large, or medium-profit firms tend to have the highest financial investment spending across firm groups. It is suggested that the funds raised are allocated differently by different types of firms among different types of investment. Also, investment types, such as net capital expenditure, R&D expenditure, acquisition expenditure, along with other components of investing cash flow, have different natures that are preferred by firms at distinct stages. These findings reveal motivate us to directly look at the components of investment, net capital expenditure, R&D, and acquisition, separately.

In the fourth column of Table 3.5.1, we observe that debt-financed R&D spending does not vary significantly with firm age or profitability. However, growth, smaller, lower-leverage, or higher-cash firms allocate more funds toward R&D activities when they are issuing debt, reinforcing the idea that less established firms are more likely to conduct growth-oriented investment. This also aligns with findings from Chapter 1, where these firms experienced greater stock price appreciation associated with debt issuance.

The determinants of debt-financed acquisition in the last column differ from those of R&D. Firms are more eager to seek expansion via acquisition when they are more mature (older, larger, or lower-cash), less constrained by high leverage, more profitable, or with decent growth potential (medium market-to-book). However, the effect of profitability is non-linear, stimulating acquisition but diminishing at very high profitability levels. Notably, these patterns resemble those observed for the association between net debt issuance and net equity issuance in Chapter 1, inferring that

firms seem to finance acquisition through a combination of debt and equity. Their less reliance on debt financing as acquisition increases is likely to mitigate default risk.

In summary, our findings highlight clear cross-sectional distinctions in debt-financed investment. Younger, growth, smaller, lower-leverage, or higher-cash firms predominantly allocate newly issued debt to net capital expenditure or R&D spending, likely reflecting their higher growth potential as stronger financing needs in early stages. This is consistent with the observation in Chapter 1 that these firms experience greater stock price appreciation associated with debt adjustments, suggesting a potential link between these types of investment and stock market valuation. In contrast, more established firms rely on debt primarily for acquisition. Combined with the findings from Chapter 1, they often complement debt financing with equity issuance to optimize capital structure simultaneously. However, such acquisition activities generate limited advantageous stock market signals. Overall, firm characteristics play a crucial role in shaping how debt issuance relates to both investment behavior and stock market performance.

3.6. Debt-Financed Investment Across Monetary Policy Regimes

This section examines the association between debt issuance and investment under different monetary policy regimes, along with the potential cross-sectional differences in this relation.

3.6.1. Investment across monetary regimes

Lower interest rates may lead to capital structure adjustments without necessarily stimulating corporate investment. For instance, Darmouni and Siani (2022) argue that firms often prioritize liquidity preservation over increased payouts, even in the aftermath of government intervention. The effectiveness of monetary policy transmission thus depends, in part, on how firms adjust their investment activities when conducting debt restructuring. To illustrate such dynamics, we start by analyzing the distribution of investment over time, paying particular attention to the impact of different monetary policy regimes.

Figure 3.6.1 presents the quarterly time series of the three investment measures for the average

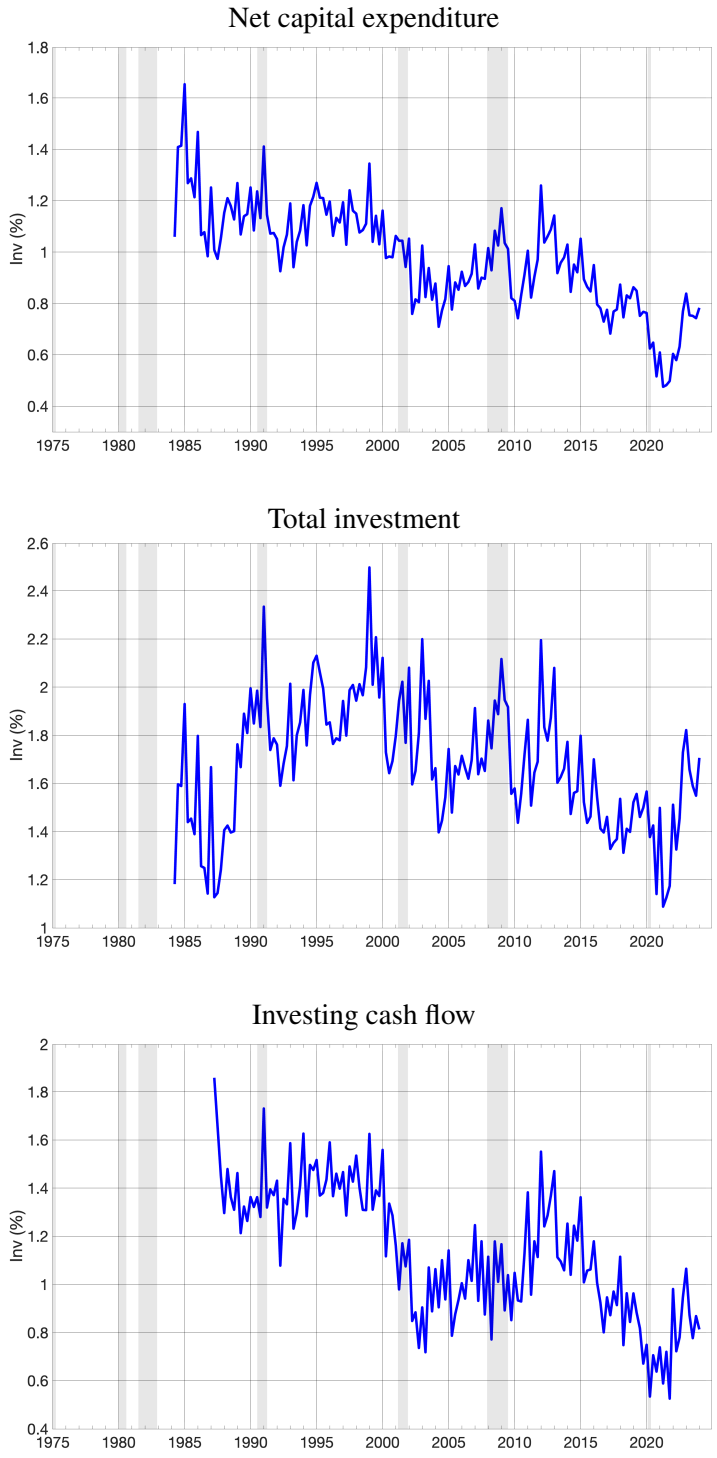

Figure 3.6.1: Three measures of investment

The figures display the quarterly time series of investment, $\text{Inv}_{i,t+1}$, for the average firm in our sample. Investment is measured using net capital expenditure, total investment, or investing cash flow scaled by beginning-of-period market assets, respectively. The sample period is 1975.II to 2023.IV, with shorter time series in some cases due to data availability. Shaded areas represent NBER recessions.

firm in our sample. A noticeable downward trend in net investment as a fraction of beginning-of-period market assets emerges in the second half of the sample period. This observation is consistent with Crouzet (2021), who documents a long-term decline in investment since the 1990s, and with Acharya and Plantin (2023), who find that while absolute investment levels have modestly increased, investment relative to firm assets has exhibited a persistent downward trend.

Following Chapter 2, we categorize monetary policy measures into two broad groups, namely low-for-long measures and post-GFC measures. "2yr-low-for-1yr" measure identifies the times when the Federal Funds (FF) rate has remained at its two-year low or at the Zero Lower Bound (ZLB) for at least one year, which we think of as moderate low-rate periods. "10yr-low-for-2yr" periods occur when the FF rate has been at its ten-year low or at the ZLB for at least two years, regarded as prolonged ultra-low-rate periods. Additionally, we focus on the four US quantitative easing (QE) episodes and the ZLB periods when the FF rate is below 25 basis points after the GFC.

Table 3.6.1 summarizes the distribution of investment across different monetary policy regimes. Panel A suggests that the average net capital expenditure, as a fraction of beginning-of-period market assets, is generally lower during easy monetary policy periods than during tight or neutral periods, with the exception of moderate low-rate periods. This indicates that low interest rates may temporarily stimulate physical capital investment during moderate periods of time, but do not generate a sustained effect, particularly in the post-GFC era.

Unlike net capital expenditure, total investment tends to be higher under broader accommodative monetary regimes, while investing cash flow sees the opposite. This suggests that lower borrowing cost may encourage firms to allocate debt toward research and development or acquisition activities rather than financial investment, highlighting how the impact of monetary policies varies by investment type.

3.6.2. Debt issuance and investment across monetary regimes

The distributions of investment over time suggest that the relation between debt issuance and investment is contingent on the broader monetary environment, with differential effects across in-

Table 3.6.1: Distribution of investment by monetary policy regimes

	Tight/Neutral	*Easy MP*		
	Mean $\text{Inv}_{i,t+1}$ (%)	Mean $\text{Inv}_{i,t+1}$ (%)	Mean Difference	t-stat
Panel A. *Net capital expenditure*				
2yr-low-for-1yr	0.64	0.97	-0.33	-59.22
10yr-low-for-2yr	0.90	0.88	0.01	2.55
QE	0.90	0.82	0.08	11.82
ZLB	0.90	0.87	0.03	4.90
Panel B. *Total investment*				
2yr-low-for-1yr	0.91	1.71	-0.80	-102.42
10yr-low-for-2yr	1.48	1.62	-0.15	-19.12
QE	1.52	1.56	-0.04	-3.54
ZLB	1.51	1.61	-0.10	-10.90
Panel C. *Investing cash flow*				
2yr-low-for-1yr	1.38	1.14	0.24	10.75
10yr-low-for-2yr	1.23	1.06	0.17	14.50
QE	1.19	0.98	0.21	14.68
ZLB	1.19	1.05	0.14	10.63

This table compares the mean statistics of the investment, $\text{Inv}_{i,t+1}$, across different monetary policy regimes. Investment measures included net capital expenditure, total investment, and investing cash flow. The "2yr-low-for-1yr" indicator equals one when the FF rate has remained at its two-year low or the ZLB for at least one year, while "10yr-low-for-2yr" periods occur when the FF rate has been at its ten-year low or the ZLB for at least two years. The QE indicator is activated if the observation falls within one of the four US QE periods. The ZLB indicator suggests the FF rate is below 25 basis points. The 2yr-low-for-1yr, 10yr-low-for-2yr, QE, and ZLB are categorized as accommodative monetary periods (Easy MP). All values are presented in percentages. The sample comprises 318,195 firm-quarter observations for 7,077 public US non-financial firms from 1975.II to 2023.IV.

vestment categories. As in Chapter 2, we assess the cross-regime differences in this relation by conditioning the β estimate in (30) on easy monetary policy indicators. The kinked pattern observed in the prior section reinforce the importance to separately analyze net debt issuance and redemption scenarios.

To examine these variations in greater depth, we employ the following regression model:

$$\text{Inv}_{i,t+1} = \left[1_{i,t+1}^{I^d>0}\left(\beta_1+\beta_2\,1_t^{\text{Easy MP}}\right)+1_{i,t+1}^{I^d\leq 0}\left(\beta_3+\beta_4\,1_t^{\text{Easy MP}}\right)\right]\frac{I^d_{i,t+1}}{A_{it}}+X'_{it}\gamma+\varepsilon_{i,t+1}, \quad (33)$$

where the easy monetary policy indicator, $1_t^{\text{Easy MP}}$, equals one if the beginning of the period is identified as accommodative monetary policy period under one of our four monetary measures.

Table 3.6.2 presents the estimated association between debt issuance and investment across different monetary regimes. As in the prior section, we focus on net debt issuance scenario and report the estimated coefficients β_1 and β_2, with t-statistics for β_2 addressing significant differences

Table 3.6.2: Net debt issuance and investment across monetary regimes

	Dependent variable: $\text{Inv}_{i,t+1}$				
	Net capital expenditure (%)	Total investment (%)	Investing cash flow (%)	R&D expenditure (bps)	Acquisition expenditure (bps)
$I^d_{i,t+1}/A_{it}$	0.05	0.12	0.28	0.08	3.33
	(16.6)	(22.5)	(18.2)	(1.0)	(17.1)
$I^d_{i,t+1}/A_{it} \times 1_t^{\text{2yr-low-for-1yr}}$	0.02	0.10	0.02	0.46	4.93
	(5.0)	(15.5)	(1.4)	(4.9)	(18.4)
$I^d_{i,t+1}/A_{it}$	0.07	0.18	0.30	0.44	6.10
	(28.5)	(43.3)	(40.9)	(5.3)	(33.2)
$I^d_{i,t+1}/A_{it} \times 1_t^{\text{10yr-low-for-2yr}}$	-0.01	0.03	0.00	-0.13	2.89
	(-2.4)	(3.9)	(-0.5)	(-1.2)	(8.3)
$I^d_{i,t+1}/A_{it}$	0.07	0.19	0.30	0.41	6.59
	(30.4)	(47.8)	(46.8)	(5.4)	(37.6)
$I^d_{i,t+1}/A_{it} \times 1_t^{\text{QE}}$	-0.01	0.03	-0.02	-0.06	2.76
	(-1.5)	(2.4)	(-1.3)	(-0.4)	(5.0)
$I^d_{i,t+1}/A_{it}$	0.07	0.18	0.29	0.43	6.40
	(29.9)	(46.7)	(45.5)	(5.5)	(36.6)
$I^d_{i,t+1}/A_{it} \times 1_t^{\text{ZLB}}$	0.00	0.05	0.03	-0.23	3.90
	(-0.4)	(5.0)	(1.9)	(-1.6)	(7.2)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and investment, $\text{Inv}_{i,t+1}$, conditioning on monetary regimes. The monetary policy indicator equals one if the beginning of the period is identified as 2yr-low-for-1yr, 10yr-low-for-2yr, QE, or ZLB. The presented coefficients, β_1 and β_2, are for net debt issuance scenario, as specified in (33). The key regressor are measured in percentages. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV.

across regimes. The corresponding stand-along significance tests (Table 3.A.2 in Appendix 3.A) confirm that net debt issuance consistently signals increases in various investment activities.

The first column of Table 3.6.2 reveals that net debt issuance is linked to significantly higher net capital expenditure during moderate low-rate periods relative to normal times. However, this effect reverses under other monetary easing regimes, particularly showing a significant reduction during prolonged ultra-low-rate periods. This suggests that firms' net capital expenditure responds to lower borrowing costs within a limited window but declines when low rates persist for too long, potentially reflecting worsening economic conditions that necessitate policy stimulus. In the post-GFC era, despite continued cheap credit, debt issuer firms maintain net capital expenditure at normal levels, possibly due to a lack of viable investment opportunities during economic downturn

and the need for maintenance capital rather than expansion.

When R&D and acquisition expenditures are included in the investment measure, net debt issuance is strongly associated with higher total investment during broader accommodative monetary policy periods compared to tight or neutral periods, aligning with the distributions in Table 3.6.1. This indicates that either R&D or acquisition is particularly sensitive to borrowing costs, not only during a moderate period of time, but when the time persists or after the GFC.

Isolating components of total investment, the last two columns of Table 3.6.2 suggest that debt-financed R&D expenditure responds primarily to moderate low-rate periods, while acquisition signaled by net debt issuance increases under broader monetary easing. These findings partially align with the notion that accommodative monetary policy encourages business investment, but only within certain constraints, consistent with Gilchrist and Zakrajsek (2007), who document a negative correlation between interest rates and investment spending. Putting together, these patterns mirror those for shareholders' revaluation across regimes in Chapter 2, where we observe enhanced stock price appreciation during moderate low-rate periods, and greater equity issuance in broader monetary easing regimes. Here, it is suggested that growth-oriented investment activities, such as net capital expenditure and R&D, appear linked to short-term stock price appreciation, while acquisition is associated with additional equity financing and limited responses from the stock market.

When investment is measured using investing cash flow, accommodative monetary policy does not significantly enhance its association with debt issuance, except during ZLB periods, where the effect is marginally significant at the 10% level. While net debt issuance relates to higher total investment during accommodative monetary policy periods, the absence of a significant correlation with investing cash flow suggests a substantial reduction in financial investment. Debt issuer firms may prefer to allocate funds toward operational investment or simply hold cash as a precaution during financial downturns, reluctant to conduct non-operating activities. This interpretation is qualitatively aligned with findings by Giambona, Matta, Peydró, and Wang (2020), De Santis and Zaghini (2021) and Darmouni and Papoutsi (2023).

Overall, our results indicate that accommodative monetary policies enhance the association between firms' debt issuance and their spending on net capital expenditure, R&D, and acquisition, but not for financial investment. Low interest rates significantly encourage debt-financed net capital expenditure and R&D over a moderate period, likely contributing to stock price appreciation and often accompanied by additional equity issuance. However, when low interest rates persist for extended periods or in the post-GFC era, net debt issuance primarily indicates increased acquisition, with shareholders' revaluation characterized by limited stock price increases alongside greater net equity issuance. These findings suggest that the stimulative effects of low interest rates diminish over time. This demonstrates firms' ability for identifying investment opportunities and translating funds raised into stock price appreciation, particularly in challenging economic environments, broadly consistent with Bernanke, Gertler, and Gilchrist (1996), who argue that firms face reduced access to credit due to a flight to quality during the onset of recessions.

3.6.3. Debt issuance and investment across firm types and regimes

Building on the estimation framework in Chapter 2, we further explore how debt issuance and investment's association varies across firm types and monetary regimes. Employing a double-sorting technique, we systematically examine the interaction between firm characteristics and different monetary policy conditions, with a particular focus on components of total investment that reflect firms' operational activities and exhibit significant sensitivity to accommodative monetary periods, as highlighted in the prior section.

Regression (33) is extended so that the coefficients β_2 and β_4 are conditioned not only on various monetary regimes but also on firm characteristics:

$$\text{Inv}_{i,t+1} = \left[1^{I^d>0}_{i,t+1}\left(\beta_1+\mathbf{z}'_{it}\beta_2\right)+1^{I^d\leq 0}_{i,t+1}\left(\beta_3+\mathbf{z}'_{it}\beta_4\right)\right]\frac{I^d_{i,t+1}}{A_{it}}+X'_{it}\gamma+\varepsilon_{i,t+1}, \tag{34}$$

where $\mathbf{z}_{it}$ represents a vector of dummy variables created for each firm i at time t. Denoting the three firm categories related to a given characteristic as {X, Y, Z} and the two monetary policy

regimes as {a, b}, four double-sorting scenarios of vector $\mathbf{z}_{it}$ are given by:

$$\begin{aligned}
\text{Scenario (A): } \mathbf{z}_{it} &= \left(1_{it}^{Xa} \quad 1_{it}^{Xb} \quad 1_{it}^{Ya} \quad 1_{it}^{Yb} \quad 1_{it}^{Za} \quad 1_{it}^{Zb}\right), \\
\text{Scenario (B): } \mathbf{z}_{it} &= \left(1_{it}^{X} \quad 1_{it}^{Xb} \quad 1_{it}^{Y} \quad 1_{it}^{Yb} \quad 1_{it}^{Z} \quad 1_{it}^{Zb}\right), \\
\text{Scenario (C): } \mathbf{z}_{it} &= \left(1_{t}^{a} \quad 1_{it}^{Ya} \quad 1_{it}^{Za} \quad 1_{t}^{b} \quad 1_{it}^{Yb} \quad 1_{it}^{Zb}\right), \\
\text{Scenario (D): } \mathbf{z}_{it} &= \left(1 \quad 1_{it}^{X}1_{t}^{b} \quad 1_{it}^{Y}1_{t}^{a} \quad 1_{it}^{Y}1_{t}^{b} \quad 1_{it}^{Z}1_{t}^{a} \quad 1_{it}^{Z}1_{t}^{b}\right).
\end{aligned}$$

The t-statistics associated with Scenarios (A)–(C) in turn indicate the stand-alone significance, cross-regime significance, and cross-sectional significance of the estimated coefficients.

Table 3.6.3 presents the results of the double-sorting analysis applied to net capital expenditure. Focusing on t-statistics (B), the enhancing effect of monetary easing during moderate low-rate periods is primarily driven by younger, lower-market-to-book, larger, or higher-leverage firms, despite that the overall cross-sectional patterns remain consistent with the findings documented in Section 3.5 that young, growth, and small firms exhibit a stronger association between net debt issuance and net capital expenditure. Younger firms significantly increase their net capital expenditure during moderate low-rate periods, counteracting the opposite cross-sectional pattern observed in normal times. Value firms and highly leveraged firms also respond to low interest rates by increasing investment, resulting in overall insignificant cross-sectional differences under accommodative monetary conditions. Larger firms, while also increasing investment, retain similar relative patterns across monetary regimes.

Table 3.6.4 presents the double-sorting results for debt-financed R&D expenditure. As discussed in Section 3.5, growth, small, and low-leverage firms engage more actively in R&D activities. Further analysis here reveals that these firms are also the ones whose R&D expenditure is particularly responsive to moderate low-rate periods. Additionally, firms at all ages, value, or high-leverage firms also shift their strategies to take advantage of lower borrowing costs, increasing their R&D spending during these periods.

Table 3.6.3: Net debt issuance and net capital expenditure across firm stages and regimes

		Dependent variable: Net capital expenditure (%)							
		Other	*2yr-low-for-1yr*	*Other*	*10yr-low-for-2yr*	*Other*	*QE*	*Other*	*ZLB*
Age	*Young*	0.06	0.09	0.07	0.09	0.07	0.09	0.07	0.10
	(A)	(13.9)	(22.1)	(22.7)	(12.0)	(24.2)	(6.3)	(23.7)	(7.9)
	(B)	(13.9)	(6.0)	(22.7)	(1.8)	(24.2)	(0.8)	(23.7)	(1.9)
	(C)	(13.9)	(22.1)	(22.7)	(12.0)	(24.2)	(6.3)	(23.7)	(7.9)
	Medium	0.04	0.07	0.06	0.06	0.06	0.06	0.06	0.07
	(A)	(8.8)	(19.3)	(17.8)	(11.0)	(19.7)	(6.1)	(19.2)	(6.8)
	(B)	(8.8)	(5.4)	(17.8)	(0.4)	(19.7)	(0.3)	(19.2)	(0.8)
	(C)	(-2.9)	(-3.8)	(-3.0)	(-2.7)	(-3.5)	(-1.3)	(-3.3)	(-2.1)
	Old	0.09	0.05	0.07	0.04	0.06	0.04	0.06	0.05
	(A)	(6.0)	(13.7)	(12.6)	(9.7)	(14.1)	(6.7)	(13.5)	(7.9)
	(B)	(6.0)	(-2.3)	(12.6)	(-4.1)	(14.1)	(-2.1)	(13.5)	(-1.5)
	(C)	(2.1)	(-6.4)	(-0.6)	(-5.2)	(-2.9)	(-2.7)	(-2.6)	(-3.5)
MB	*Low*	0.04	0.07	0.06	0.07	0.06	0.07	0.06	0.08
	(A)	(10.9)	(17.8)	(17.2)	(11.1)	(18.7)	(7.0)	(18.3)	(7.9)
	(B)	(10.9)	(5.7)	(17.3)	(1.6)	(18.7)	(1.7)	(18.3)	(2.1)
	(C)	(10.9)	(17.8)	(17.3)	(11.2)	(18.7)	(7.0)	(18.3)	(7.9)
	Medium	0.06	0.07	0.07	0.05	0.07	0.04	0.07	0.05
	(A)	(10.2)	(19.3)	(19.9)	(10.3)	(21.2)	(4.9)	(20.9)	(6.4)
	(B)	(10.2)	(1.2)	(19.9)	(-3.7)	(21.2)	(-4.0)	(20.9)	(-2.8)
	(C)	(3.0)	(0.1)	(3.8)	(-2.0)	(3.2)	(-3.0)	(3.3)	(-2.7)
	High	0.10	0.07	0.08	0.05	0.08	0.04	0.08	0.04
	(A)	(10.2)	(18.1)	(18.3)	(10.7)	(19.7)	(5.9)	(19.2)	(6.9)
	(B)	(10.2)	(-2.8)	(18.3)	(-5.6)	(19.7)	(-4.8)	(19.2)	(-4.3)
	(C)	(5.5)	(-0.2)	(5.0)	(-2.3)	(4.0)	(-2.7)	(4.1)	(-2.9)
Size	*Small*	0.08	0.08	0.09	0.07	0.08	0.04	0.08	0.06
	(A)	(14.5)	(21.1)	(23.1)	(11.0)	(24.1)	(4.4)	(23.9)	(5.5)
	(B)	(14.5)	(0.2)	(23.0)	(-3.0)	(24.1)	(-3.7)	(23.9)	(-2.5)
	(C)	(14.5)	(21.1)	(23.0)	(11.0)	(24.1)	(4.4)	(23.9)	(5.5)
	Medium	0.03	0.07	0.06	0.06	0.06	0.07	0.06	0.06
	(A)	(7.8)	(18.6)	(16.6)	(11.5)	(18.4)	(7.6)	(18.2)	(7.6)
	(B)	(7.8)	(7.3)	(16.6)	(1.1)	(18.4)	(1.2)	(18.2)	(0.8)
	(C)	(-7.3)	(-2.4)	(-6.2)	(-0.5)	(-6.1)	(1.7)	(-6.0)	(0.5)
	Large	0.03	0.05	0.04	0.05	0.04	0.06	0.04	0.07
	(A)	(4.8)	(11.7)	(9.2)	(9.0)	(10.8)	(7.3)	(9.7)	(8.6)
	(B)	(4.8)	(4.3)	(9.2)	(1.0)	(10.8)	(2.0)	(9.7)	(3.6)
	(C)	(-7.3)	(-5.4)	(-7.1)	(-1.9)	(-7.7)	(1.2)	(-8.3)	(1.0)
Leverage	*Low*	0.07	0.07	0.07	0.05	0.07	0.04	0.07	0.05
	(A)	(9.0)	(18.4)	(17.7)	(10.6)	(19.3)	(5.1)	(18.9)	(6.8)
	(B)	(9.0)	(-0.1)	(17.7)	(-2.5)	(19.3)	(-3.1)	(18.9)	(-2.7)
	(C)	(9.0)	(18.4)	(17.6)	(10.5)	(19.3)	(5.1)	(18.9)	(6.8)
	Medium	0.05	0.07	0.07	0.06	0.07	0.06	0.07	0.06
	(A)	(10.2)	(20.6)	(19.8)	(11.8)	(21.5)	(7.2)	(21.0)	(8.4)
	(B)	(10.2)	(4.6)	(19.8)	(-1.6)	(21.5)	(-1.0)	(21.1)	(-0.4)
	(C)	(-2.2)	(1.9)	(-0.4)	(0.6)	(-0.4)	(1.6)	(-0.4)	(1.7)
	High	0.05	0.07	0.07	0.06	0.06	0.06	0.06	0.07
	(A)	(11.9)	(17.9)	(19.1)	(10.3)	(20.1)	(5.8)	(19.9)	(6.8)
	(B)	(11.9)	(3.3)	(19.1)	(-1.3)	(20.1)	(-0.3)	(19.9)	(0.4)
	(C)	(-1.8)	(0.8)	(-0.9)	(0.4)	(-1.0)	(1.5)	(-1.0)	(1.7)

The table reports the association between net debt issuance and net capital expenditure, as specified in (34). Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV. See previous table notes for details on standard regression settings.

Table 3.6.4: Net debt issuance and R&D expenditure across firm stages and regimes

		Dependent variable: R&D expenditure (bps)							
		Other	*2yr-low-for-1yr*	*Other*	*10yr-low-for-2yr*	*Other*	*QE*	*Other*	*ZLB*
Age	*Young*	0.25	0.48	0.43	0.10	0.36	0.52	0.37	0.32
	(A)	(2.9)	(4.6)	(5.3)	(0.6)	(4.8)	(1.4)	(4.9)	(1.0)
	(B)	(2.9)	(1.8)	(5.3)	(-1.8)	(4.8)	(0.4)	(4.9)	(-0.2)
	(C)	(2.9)	(4.5)	(5.3)	(0.6)	(4.8)	(1.4)	(4.9)	(1.0)
	Medium	0.02	0.53	0.41	0.30	0.41	0.09	0.41	0.15
	(A)	(0.1)	(5.0)	(4.1)	(2.1)	(4.6)	(0.4)	(4.4)	(0.8)
	(B)	(0.1)	(2.9)	(4.1)	(-0.6)	(4.6)	(-1.3)	(4.4)	(-1.2)
	(C)	(-1.5)	(0.3)	(-0.1)	(1.0)	(0.5)	(-1.0)	(0.3)	(-0.5)
	Old	-0.66	0.57	0.59	0.39	0.51	0.39	0.60	0.15
	(A)	(-3.8)	(2.9)	(2.1)	(2.7)	(2.4)	(2.0)	(2.6)	(0.9)
	(B)	(-3.8)	(4.7)	(2.1)	(-0.7)	(2.4)	(-0.5)	(2.6)	(-1.6)
	(C)	(-4.6)	(0.4)	(0.6)	(1.3)	(0.7)	(-0.3)	(0.9)	(-0.5)
MB	*Low*	-0.20	0.11	0.01	-0.12	-0.04	0.24	-0.02	-0.03
	(A)	(-1.9)	(0.7)	(0.1)	(-0.8)	(-0.3)	(1.0)	(-0.2)	(-0.1)
	(B)	(-1.9)	(2.0)	(0.1)	(-0.8)	(-0.3)	(1.0)	(-0.2)	(0.0)
	(C)	(-1.9)	(0.7)	(0.1)	(-0.8)	(-0.3)	(1.0)	(-0.2)	(-0.1)
	Medium	0.08	0.24	0.26	0.02	0.20	0.16	0.22	-0.01
	(A)	(0.7)	(2.9)	(3.3)	(0.2)	(2.7)	(0.9)	(2.9)	(0.0)
	(B)	(0.7)	(1.3)	(3.3)	(-1.5)	(2.7)	(-0.2)	(2.9)	(-1.4)
	(C)	(2.0)	(0.8)	(1.8)	(0.7)	(1.7)	(-0.3)	(1.7)	(0.1)
	High	0.66	1.30	1.26	1.11	1.23	0.96	1.26	0.91
	(A)	(3.4)	(10.5)	(8.9)	(6.9)	(10.5)	(3.9)	(10.3)	(4.0)
	(B)	(3.4)	(2.8)	(8.9)	(-0.7)	(10.5)	(-1.0)	(10.3)	(-1.4)
	(C)	(3.9)	(5.8)	(6.3)	(5.6)	(7.2)	(2.1)	(7.0)	(3.2)
Size	*Small*	0.33	0.86	0.65	0.83	0.64	1.78	0.67	0.99
	(A)	(2.6)	(6.5)	(5.9)	(3.5)	(6.1)	(3.0)	(6.3)	(2.0)
	(B)	(2.6)	(3.0)	(5.9)	(0.7)	(6.1)	(1.9)	(6.3)	(0.6)
	(C)	(2.6)	(6.5)	(5.9)	(3.5)	(6.1)	(3.0)	(6.3)	(2.0)
	Medium	0.08	0.37	0.29	0.20	0.25	0.41	0.26	0.32
	(A)	(0.9)	(3.9)	(3.5)	(1.6)	(3.3)	(2.0)	(3.3)	(1.8)
	(B)	(0.9)	(2.2)	(3.5)	(-0.6)	(3.4)	(0.7)	(3.3)	(0.3)
	(C)	(-1.7)	(-3.0)	(-2.7)	(-2.4)	(-3.0)	(-2.2)	(-3.2)	(-1.3)
	Large	0.16	0.27	0.42	0.01	0.35	-0.20	0.38	-0.17
	(A)	(0.9)	(1.2)	(1.4)	(0.1)	(1.4)	(-1.6)	(1.5)	(-1.5)
	(B)	(0.9)	(0.9)	(1.4)	(-1.5)	(1.4)	(-2.0)	(1.5)	(-1.9)
	(C)	(-0.8)	(-2.2)	(-0.7)	(-3.1)	(-1.1)	(-3.3)	(-1.0)	(-2.3)
Leverage	*Low*	0.69	1.73	1.56	1.34	1.47	1.53	1.52	1.19
	(A)	(3.5)	(10.1)	(8.8)	(6.2)	(9.3)	(3.9)	(9.3)	(3.5)
	(B)	(3.5)	(4.4)	(8.8)	(-0.9)	(9.3)	(0.1)	(9.3)	(-0.9)
	(C)	(3.5)	(10.1)	(8.8)	(6.2)	(9.3)	(3.9)	(9.3)	(3.5)
	Medium	0.11	0.21	0.27	-0.08	0.20	-0.03	0.22	-0.14
	(A)	(0.9)	(1.6)	(1.9)	(-0.7)	(1.7)	(-0.2)	(1.8)	(-1.1)
	(B)	(0.9)	(0.7)	(1.9)	(-2.0)	(1.7)	(-1.2)	(1.8)	(-2.0)
	(C)	(-2.8)	(-8.4)	(-6.8)	(-6.2)	(-8.1)	(-3.8)	(-8.0)	(-3.7)
	High	-0.33	-0.07	-0.15	-0.11	-0.12	-0.26	-0.12	-0.24
	(A)	(-4.2)	(-1.1)	(-2.8)	(-1.0)	(-2.4)	(-1.5)	(-2.3)	(-1.8)
	(B)	(-4.2)	(2.9)	(-2.8)	(0.4)	(-2.4)	(-0.8)	(-2.3)	(-0.8)
	(C)	(-4.8)	(-10.1)	(-9.3)	(-6.3)	(-9.7)	(-4.2)	(-9.7)	(-3.9)

The table reports the association between net debt issuance and R&D expenditure, as specified in (34). Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV. See previous table notes for details on standard regression settings.

Table 3.6.5: Net debt issuance and acquisition across firm stages and regimes

		Dependent variable: Acquisition expenditure (bps)							
		Other	*2yr-low-for-1yr*	*Other*	*10yr-low-for-2yr*	*Other*	*QE*	*Other*	*ZLB*
Age	*Young*	3.19	8.56	5.67	9.72	6.18	8.35	6.05	10.08
	(A)	(13.7)	(25.0)	(23.4)	(15.4)	(26.3)	(7.3)	(25.7)	(9.0)
	(B)	(13.7)	(13.3)	(23.4)	(6.1)	(26.3)	(1.9)	(25.7)	(3.5)
	(C)	(13.7)	(25.0)	(23.4)	(15.4)	(26.3)	(7.3)	(25.7)	(9.0)
	Medium	3.10	7.44	5.68	7.98	5.98	8.94	5.89	9.28
	(A)	(10.1)	(24.3)	(21.8)	(14.8)	(24.3)	(8.6)	(23.7)	(9.6)
	(B)	(10.1)	(10.4)	(21.8)	(4.0)	(24.3)	(2.8)	(23.7)	(3.4)
	(C)	(-0.2)	(-2.6)	(0.0)	(-2.2)	(-0.7)	(0.4)	(-0.5)	(-0.6)
	Old	6.40	8.81	8.17	9.28	8.42	9.98	8.02	10.91
	(A)	(6.4)	(24.7)	(19.0)	(18.9)	(23.3)	(13.1)	(22.2)	(14.7)
	(B)	(6.4)	(2.3)	(19.0)	(1.8)	(23.3)	(2.0)	(22.2)	(3.7)
	(C)	(3.1)	(0.5)	(5.2)	(-0.6)	(5.4)	(1.2)	(4.7)	(0.6)
MB	*Low*	2.57	6.41	4.64	6.09	4.90	5.61	4.75	6.79
	(A)	(11.1)	(21.2)	(19.3)	(13.1)	(21.5)	(7.7)	(20.8)	(9.4)
	(B)	(11.2)	(10.8)	(19.3)	(2.9)	(21.5)	(1.0)	(20.8)	(2.7)
	(C)	(11.1)	(21.2)	(19.3)	(13.1)	(21.5)	(7.7)	(20.8)	(9.4)
	Medium	4.37	9.99	7.71	11.19	8.29	12.85	8.04	13.90
	(A)	(11.0)	(29.7)	(25.4)	(19.6)	(29.0)	(11.8)	(28.3)	(14.2)
	(B)	(11.0)	(11.2)	(25.4)	(5.6)	(29.0)	(4.1)	(28.3)	(5.9)
	(C)	(4.0)	(8.7)	(8.6)	(7.3)	(10.2)	(5.6)	(10.0)	(6.1)
	High	4.26	9.07	7.22	10.48	7.94	11.11	7.71	11.82
	(A)	(7.6)	(26.0)	(20.6)	(18.9)	(24.7)	(11.2)	(23.9)	(13.3)
	(B)	(7.6)	(7.3)	(20.6)	(5.1)	(24.7)	(3.1)	(23.9)	(4.4)
	(C)	(2.8)	(6.0)	(6.2)	(6.2)	(8.0)	(4.5)	(7.7)	(4.5)
Size	*Small*	2.90	5.75	4.61	5.94	4.81	6.20	4.77	6.71
	(A)	(10.3)	(20.3)	(19.3)	(12.0)	(21.1)	(6.6)	(20.8)	(6.8)
	(B)	(10.3)	(7.9)	(19.3)	(2.6)	(21.0)	(1.5)	(20.8)	(2.0)
	(C)	(10.3)	(20.4)	(19.3)	(12.0)	(21.1)	(6.6)	(20.9)	(6.8)
	Medium	3.47	9.09	6.78	8.97	7.15	8.89	6.96	10.18
	(A)	(10.8)	(25.2)	(22.4)	(16.0)	(25.1)	(9.8)	(24.3)	(11.2)
	(B)	(10.8)	(12.0)	(22.4)	(3.6)	(25.0)	(1.9)	(24.3)	(3.5)
	(C)	(1.4)	(7.5)	(5.8)	(4.1)	(6.7)	(2.1)	(6.2)	(2.6)
	Large	3.98	11.44	8.40	12.08	9.49	11.15	9.16	12.0
	(A)	(8.1)	(27.2)	(19.2)	(20.4)	(24.6)	(12.7)	(23.4)	(14.9)
	(B)	(8.1)	(12.1)	(19.2)	(5.2)	(24.7)	(1.8)	(23.4)	(3.3)
	(C)	(1.9)	(11.3)	(7.6)	(8.0)	(10.5)	(3.8)	(9.7)	(4.1)
Leverage	*Low*	4.00	8.17	6.59	8.94	7.02	9.74	6.76	11.08
	(A)	(8.8)	(24.0)	(20.3)	(16.3)	(23.5)	(9.7)	(22.7)	(11.9)
	(B)	(8.8)	(7.6)	(20.3)	(3.9)	(23.5)	(2.7)	(22.7)	(4.5)
	(C)	(8.8)	(24.0)	(20.1)	(16.2)	(23.5)	(9.7)	(22.7)	(11.9)
	Medium	3.38	9.12	6.64	9.69	7.18	10.03	7.01	10.68
	(A)	(11.3)	(28.1)	(23.8)	(18.6)	(27.6)	(10.9)	(26.8)	(12.8)
	(B)	(11.2)	(13.5)	(23.8)	(5.4)	(27.6)	(3.1)	(26.8)	(4.3)
	(C)	(-1.1)	(2.2)	(0.1)	(1.0)	(0.4)	(0.2)	(0.7)	(-0.3)
	High	2.99	7.67	5.45	8.50	5.93	8.74	5.74	9.63
	(A)	(11.1)	(23.5)	(20.5)	(16.2)	(23.2)	(10.2)	(22.5)	(11.4)
	(B)	(11.1)	(11.6)	(20.5)	(5.5)	(23.2)	(3.3)	(22.6)	(4.5)
	(C)	(-1.9)	(-1.1)	(-2.8)	(-0.6)	(-2.9)	(-0.8)	(-2.7)	(-1.2)

The table reports the association between net debt issuance and acquisition expenditure, as specified in (34). Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV. See previous table notes for details on standard regression settings.

Table 3.6.5 suggests that net debt issuance is strongly correlated with higher acquisition expenditure under broader monetary easing conditions, a trend observed across most firm types, except for some groups of firms during QE periods. As noted in Chapter 2, this pattern likely reflects the targeted nature of QE programs—certain firms do not benefit from these policies and therefore face higher debt issuance costs. Consequently, such firms prioritize liquidity hoarding and selectively commit to investment that enhance valuation.[30]

3.7. Robustness and Extensions

3.7.1. Debt issuance and investment across firm lifecycles

In this section, we extend our cross-sectional analysis by examining how debt issuance relates to investment across different firm lifecycle stages, categorized according to the cash flow patterns proposed by Dickinson (2011). The estimated coefficients, β, are conditioned on lifecycle proxies alongside issuer and redeemer indicators, as specified in (32). This allows us to assess whether firms in the intro, growth, mature, decline, or shakeout stages conduct varying investment when they are issuing debt.

Table 3.7.1 provides a detailed cross-sectional analysis of the association between net debt issuance and investment across different lifecycle stages, with coefficients' stand-alone significance tests provided in Appendix 3.A Table 3.A.3. Again, we focus exclusively on the scenario of positive changes in debt levels and report the estimated β_1 and β_2. Firms in the intro stage, characterized by high growth potential but limited cash inflows, rely heavily on external financing to fuel initial expansion. Investment in this stage relates significantly to increases in debt levels, with net debt issuance positively associated with various types of investment.

As firms transition to their growth stages, they experience stronger revenue growth, increased market presence, and rising investment activities. The positive links between net debt issuance and investment persist but show distinct cross-sectional patterns across investment categories: net

[30]Table 3.A.4 in Appendix 3.A reports the double-sorting results for total investment as a whole. The unclear patterns reinforce the necessity of analyzing components of total investment separately.

Table 3.7.1: Net debt issuance and investment across firm lifecycle stages

	Dependent variable: $\text{Inv}_{i,t+1}$				
	Net capital expenditure (%)	Total investment (%)	Investing cash flow (%)	R&D expenditure (bps)	Acquisition expenditure (bps)
$I^d_{i,t+1}/A_{it}$	0.07	0.19	0.25	0.75	7.00
	(21.4)	(30.9)	(29.6)	(6.4)	(22.8)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Growth}}_{it}$	0.04	0.17	0.26	-0.41	6.54
	(8.6)	(19.3)	(23.6)	(-2.5)	(14.2)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Mature}}_{it}$	-0.04	-0.10	-0.17	-0.43	-2.18
	(-6.6)	(-10.0)	(-14.2)	(-2.4)	(-4.2)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Shakeout}}_{it}$	-0.06	-0.19	-0.37	0.58	-5.21
	(-8.5)	(-15.9)	(-20.2)	(1.5)	(-10.7)
$I^d_{i,t+1}/A_{it} \times 1^{\text{Decline}}_{it}$	-0.07	-0.17	-0.26	1.03	-5.54
	(-10.9)	(-15.8)	(-14.1)	(2.8)	(-13.4)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and investment, conditioning on firm lifecycle stages, which are defined based on cash flow patterns following Dickinson (2011), as specified in (32). Firms are identified at each point in time by group indicators formed based on the signs of their cash flows from operations, investing, and financing activities. The presented coefficients β_1 and β_2 are for debt issuance and its interaction with firm stage indicators where the issuer indicator is activated. The key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

capital expenditure and acquisition increase more sharply, while debt-financed R&D expenditure declines relative to intro-stage firms. This suggests a strategic shift in capital allocation, with the funds being used to scale operations and strengthen market positioning.

Mature firms tend to have established market positions, stable cash flows, and moderate growth prospects. Net debt issuance in this stage is often directed towards optimizing capital structure, refinancing existing debt, and investing in efficiency improvements rather than aggressive expansion. Therefore, mature firms' net debt issuance relates to significantly less investment in various types compared to intro firms.

In the decline stage, where firms face shrinking market share, falling revenues, and reduced investment activities, the association between net debt issuance and investment weakens significantly across all categories except for R&D expenditure. This suggests that some firms may attempt restructuring or innovation-driven recovery. A similar pattern is observed in the shakeout

stage, highlighting the transitional nature of these firms and their strategic realignment efforts.

Overall, firms in the introductory and growth stages rely on newly issued debt to finance expansion, whereas mature and declining firms exhibit weaker association between net debt issuance and investment. Conditioning on lifecycle proxies provides consistent insight into how firms allocate debt-financed capital across different stages, confirming our understanding of the evolving relation between debt and investment.

3.7.2. Debt issuance and investment during extended periods of low interest rates

To further explore whether the impact of accommodative monetary policy on the association between debt issuance and investment strengthens during extended periods of low interest rates, we incorporate the Years-in-Low (YIL) measure from Chapter 2. This variable captures the cumulative number of years that the FF rate has remained at low levels or at the ZLB, whichever is higher. We define multiple thresholds for low-rate conditions, including two-year-low, five-year-low, and ten-year-low benchmarks. To assess the evolving effects of extended monetary easing, regression (33) is re-estimated, with the easy monetary policy indicator replaced with the YIL variable.

As shown in Table 3.7.2, the positive and significant coefficients for $I^d_{i,t+1}/A_{it} > 0$ in the first rows of each panel confirm that, on average, investment is consistently positively associated with net debt issuance. However, the effect of accommodative monetary policy on debt-financed investment evolves in different manners as low interest rates persist.

Under a moderate low-rate setting, Panel A shows that net capital expenditure, as the essential maintenance capital, is not sensitive to low-rate conditions. Instead, as the number of years in a low-interest-rate environment increases, total investment—containing net capital expenditure, R&D, and acquisition—becomes the primary channel through which firms capitalize on lower borrowing costs. This effect is largely driven by a sustained increase in acquisition, as shown in the last column. Conversely, other types of financial investment, captured through investing cash flow, decline as the duration of low-rate periods lengthens. This decline offsets the reinforced acquisition activity, leading to relatively stable overall investing cash flow over time.

Table 3.7.2: Net debt issuance and investment under low interest rate

	Dependent variable: $\text{Inv}_{i,t+1}$				
	Net capital expenditure (%)	Total investment (%)	Investing cash flow (%)	R&D expenditure (bps)	Acquisition expenditure (bps)
Panel A. *2-year low interest rate*					
$I^d_{i,t+1}/A_{it}$	0.07	0.16	0.30	0.32	4.36
	(23.8)	(31.2)	(29.4)	(3.5)	(20.8)
$I^d_{i,t+1}/A_{it} \times \text{YIL}_t$	0.00	0.01	0.00	0.03	0.94
	(-1.7)	(8.6)	(-0.1)	(1.7)	(14.1)
Panel B. *5-year low interest rate*					
$I^d_{i,t+1}/A_{it}$	0.07	0.17	0.30	0.43	5.53
	(26.3)	(37.8)	(37.3)	(4.6)	(27.4)
$I^d_{i,t+1}/A_{it} \times \text{YIL}_t$	0.00	0.01	0.00	-0.02	0.96
	(-0.4)	(6.6)	(-1.2)	(-0.6)	(10.0)
Panel C. *10-year low interest rate*					
$I^d_{i,t+1}/A_{it}$	0.07	0.18	0.30	0.43	5.74
	(27.8)	(40.9)	(38.4)	(5.0)	(30.1)
$I^d_{i,t+1}/A_{it} \times \text{YIL}_t$	0.00	0.01	0.00	-0.02	0.96
	(-2.6)	(5.1)	(-0.4)	(-0.7)	(10.0)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and investment, $\text{Inv}_{i,t+1}$, conditioning on the number of years the FF rate has been at its low levels. The presented coefficients are for net debt issuance and its interaction with "Years-in-Low (YIL)", as specified in (33). The key regressor are measured in percentages. Ten firm-specific control variables, six time-specific control variables, along with year and firm fixed effects, are included in the regressions. Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II–2023.IV.

These patterns persist across different YIL thresholds. As seen in Panels B and C, the investment responses under the five-year and ten-year benchmarks align with those observed under the two-year threshold. These findings reinforce our earlier cross-regime results, where acquisition—among all types of investment—emerges as the most responsive component to broader accommodative monetary conditions. The sustained reduction in borrowing costs fosters a lasting incentive for firms to issue debt and finance acquisition over time.[31]

[31] We thank the examiner for suggesting the use of quantile regression as a potential extension. While our current analysis focuses on average effects, future research could apply quantile regression methods to more thoroughly explore distributional heterogeneity in the relation between debt issuance and investment.

3.8. Conclusion

This chapter analyzes the interaction between firm financial policies and investment, emphasizing firm heterogeneity and variations across accommodative monetary conditions.

Using real-term data from a broad cross-section of public US non-financial firms spanning 1975.II to 2023.IV, we demonstrate that younger, growth, smaller, lower-leverage, or higher-cash firms, which we regard as less established firms, exhibit increased net capital expenditure or R&D spending associated with net debt issuance. This behavior aligns with greater stock price appreciation observed in Chapter 2, reflecting the aggressive growth strategies of firms in their early stages of development. By contrast, more established firms are more likely to engage in debt-financed acquisition, consistent with their moderate growth potential. Unlike net capital expenditure or R&D, acquisition activities exhibit muted stock market reactions and are likely to be financed through a combination of debt and equity, highlighting firms' active capital structure management.

While accommodative monetary policies generally stimulate debt-financed investment, the nature and magnitude of this effect vary across investment types, firm characteristics, and monetary regimes. Net debt issuance strongly correlates with higher net capital expenditure and R&D spending during moderate low-rate periods, primarily driven by select firm types. In contrast, debt-financed acquisition expands under broader accommodative monetary conditions, affecting most firms in our sample.

These findings underscore the importance of accounting for firm-specific factors and macroeconomic conditions when assessing the effectiveness of monetary policy transmission through corporate debt activities. While accommodative monetary policies can foster debt financing and investment, their impact is neither uniform across investment types nor consistent across firm types. These insights are particularly relevant for policymakers and corporate managers seeking to navigate evolving monetary conditions and optimize financial and investment strategies in response to changing economic landscapes.

Appendix

3.A. Additional Tables

Table 3.A.1: Net debt issuance and investment across firm types—subsample

		Dependent variable: $\text{Inv}_{i,t+1}$				
		Net capital expenditure (%)	Total investment (%)	Investing cash flow (%)	R&D expenditure (bps)	Acquisition expenditure (bps)
Age	$I^d_{i,t+1}/A_{it}$ (Young)	0.07	0.20	0.33	0.31	6.74
		(23.7)	(36.2)	(33.1)	(4.3)	(26.9)
	$I^d_{i,t+1}/A_{it}$ (Medium)	0.06	0.18	0.30	0.49	6.99
		(19.5)	(32.7)	(33.0)	(5.7)	(25.3)
	$I^d_{i,t+1}/A_{it}$ (Old)	0.05	0.21	0.30	0.61	9.68
		(14.1)	(29.9)	(31.5)	(3.8)	(26.0)
Market-to-book	$I^d_{i,t+1}/A_{it}$ (Low)	0.06	0.16	0.29	0.27	5.58
		(18.7)	(29.5)	(29.4)	(2.1)	(22.6)
	$I^d_{i,t+1}/A_{it}$ (Medium)	0.06	0.23	0.35	0.16	9.70
		(19.2)	(36.5)	(37.2)	(2.5)	(29.7)
	$I^d_{i,t+1}/A_{it}$ (High)	0.06	0.20	0.30	0.55	8.55
		(17.4)	(29.3)	(31.3)	(4.8)	(25.5)
Size	$I^d_{i,t+1}/A_{it}$ (Small)	0.09	0.20	0.28	0.78	5.27
		(24.7)	(33.5)	(29.5)	(7.3)	(20.6)
	$I^d_{i,t+1}/A_{it}$ (Medium)	0.05	0.20	0.34	0.27	8.16
		(18.3)	(32.6)	(34.8)	(3.9)	(26.7)
	$I^d_{i,t+1}/A_{it}$ (Large)	0.04	0.20	0.34	0.40	10.24
		(11.6)	(28.2)	(33.0)	(2.0)	(27.6)
Leverage	$I^d_{i,t+1}/A_{it}$ (Low)	0.06	0.19	0.29	1.27	7.97
		(16.4)	(28.0)	(28.0)	(7.2)	(22.9)
	$I^d_{i,t+1}/A_{it}$ (Medium)	0.06	0.21	0.32	0.34	8.88
		(19.6)	(36.5)	(35.9)	(2.8)	(29.7)
	$I^d_{i,t+1}/A_{it}$ (High)	0.07	0.19	0.32	0.09	6.59
		(20.6)	(32.2)	(32.3)	(2.6)	(24.1)
Cash rate	$I^d_{i,t+1}/A_{it}$ (Low)	0.07	0.21	0.34	0.20	8.23
		(22.5)	(36.6)	(38.1)	(4.1)	(28.3)
	$I^d_{i,t+1}/A_{it}$ (Medium)	0.06	0.21	0.34	0.44	8.29
		(18.4)	(33.8)	(35.0)	(3.4)	(27.1)
	$I^d_{i,t+1}/A_{it}$ (High)	0.05	0.16	0.25	1.06	5.95
		(14.7)	(24.3)	(22.1)	(6.6)	(19.6)
Profitability	$I^d_{i,t+1}/A_{it}$ (Low)	0.07	0.18	0.27	0.63	5.39
		(21.5)	(31.1)	(29.5)	(5.2)	(22.9)
	$I^d_{i,t+1}/A_{it}$ (Medium)	0.06	0.22	0.36	0.22	9.63
		(20.1)	(37.0)	(38.2)	(3.2)	(30.1)
	$I^d_{i,t+1}/A_{it}$ (High)	0.05	0.19	0.34	0.31	8.48
		(16.8)	(30.4)	(32.7)	(3.4)	(25.6)

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and investment, $\text{Inv}_{i,t+1}$, conditioning on firm characteristics. Each column reports on one investment measure as the dependent variable. The presented estimated coefficients β are for debt issuance, as specified in (30), after stratifying the data into subsamples by group indicators. See Table 3.5.1 table note for other details.

Table 3.A.2: Net debt issuance and investment across monetary policy regimes—subsample

	Dependent variable: $\text{Inv}_{i,t+1}$				
	Net capital expenditure (%)	Total investment (%)	Investing cash flow (%)	R&D expenditure (bps)	Acquisition expenditure (bps)
$I^d_{i,t+1}/A_{it}$ (Other)	0.05	0.11	0.29	0.18	3.30
	(15.9)	(21.6)	(16.0)	(2.8)	(15.1)
$I^d_{i,t+1}/A_{it}$ (2yr-low-for-1yr)	0.07	0.22	0.32	0.58	9.14
	(27.8)	(50.6)	(51.8)	(6.7)	(40.5)
$I^d_{i,t+1}/A_{it}$ (Other)	0.07	0.19	0.32	0.51	6.69
	(28.4)	(45.4)	(45.5)	(5.9)	(34.9)
$I^d_{i,t+1}/A_{it}$ (10yr-low-for-2yr)	0.05	0.21	0.30	0.41	10.07
	(15.3)	(31.6)	(32.9)	(4.7)	(27.7)
$I^d_{i,t+1}/A_{it}$ (Other)	0.06	0.19	0.32	0.50	7.35
	(30.2)	(50.7)	(53.0)	(6.4)	(39.7)
$I^d_{i,t+1}/A_{it}$ (QE)	0.05	0.22	0.30	0.27	10.30
	(10.0)	(18.7)	(17.6)	(1.9)	(16.8)
$I^d_{i,t+1}/A_{it}$ (Other)	0.06	0.19	0.31	0.52	7.10
	(29.6)	(49.3)	(51.2)	(6.5)	(38.6)
$I^d_{i,t+1}/A_{it}$ (ZLB)	0.05	0.24	0.34	0.22	11.20
	(11.1)	(22.2)	(23.0)	(2.0)	(20.0)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and investment, $\text{Inv}_{i,t+1}$, conditioning on monetary regimes. The monetary policy indicator equals one if the beginning of the period is identified as 2yr-low-for-1yr, 10yr-low-for-2yr, QE, or ZLB. Each column reports on one investment measure as the dependent variable. The estimated coefficients and t-statistics are for debt issuance, as specified in (30), after stratifying the data into subsamples by regime indicators. See Table 3.6.2 table note for other details.

Table 3.A.3: Net debt issuance and investment across firm lifecycle stages—subsample

	Dependent variable: $\text{Inv}_{i,t+1}$				
	Net capital expenditure (%)	Total investment (%)	Investing cash flow (%)	R&D expenditure (bps)	Acquisition expenditure (bps)
$I^d_{i,t+1}/A_{it}$ (Intro)	0.07	0.22	0.29	0.82	8.35
	(21.1)	(32.3)	(34.8)	(6.1)	(23.4)
$I^d_{i,t+1}/A_{it}$ (Growth)	0.09	0.35	0.49	0.30	14.10
	(21.8)	(49.3)	(63.5)	(2.4)	(34.8)
$I^d_{i,t+1}/A_{it}$ (Mature)	0.03	0.08	0.08	0.44	4.21
	(5.0)	(9.0)	(8.3)	(2.7)	(8.5)
$I^d_{i,t+1}/A_{it}$ (Shakeout)	0.01	0.01	-0.12	1.36	1.74
	(1.7)	(0.8)	(-6.5)	(3.3)	(3.5)
$I^d_{i,t+1}/A_{it}$ (Decline)	0.01	0.04	-0.07	2.43	1.30
	(1.6)	(2.6)	(-3.8)	(4.0)	(2.7)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes
Time-specific controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

The table reports the association between net debt issuance, $I^d_{i,t+1}/A_{it} > 0$, and investment, after stratifying the data into subsamples by firm lifecycle stages, along with issuer and redeemer indicators, as specified in (30). Firm lifecycle are defined based on cash flow patterns following Dickinson (2011). Firms are identified at each point in time by group indicators formed based on the signs of their cash flows from operations, investing, and financing activities. The key regressor are measured in percentages. The regressions include ten firm-specific control variables, six time-specific control variables, as well as fixed effects for year and firm. Standard errors are clustered by firm. t-statistics are presented in parentheses. The sample period is 1975.II–2023.IV.

Table 3.A.4: Net debt issuance and total investment across firm stages and regimes

		Dependent variable: $\text{Inv}_{i,t+1}$ *(%) Total investment*							
		Other	*2yr-low-for-1yr*	*Other*	*10yr-low-for-2yr*	*Other*	*QE*	*Other*	*ZLB*
Age	*Young*	0.12	0.25	0.18	0.25	0.19	0.25	0.19	0.29
	(A)	(18.7)	(35.1)	(33.1)	(20.1)	(36.1)	(9.7)	(35.2)	(12.8)
	(B)	(18.7)	(13.1)	(33.1)	(5.3)	(36.1)	(2.3)	(35.2)	(4.5)
	(C)	(18.7)	(35.1)	(33.1)	(20.1)	(36.1)	(9.7)	(35.2)	(12.8)
	Medium	0.09	0.21	0.17	0.20	0.17	0.20	0.17	0.22
	(A)	(12.9)	(31.5)	(28.1)	(18.2)	(31.4)	(9.8)	(30.7)	(11.1)
	(B)	(12.9)	(11.8)	(28.1)	(2.6)	(31.4)	(1.5)	(30.7)	(2.4)
	(C)	(-3.3)	(-4.6)	(-2.5)	(-3.6)	(-3.1)	(-1.5)	(-2.9)	(-2.6)
	Old	0.19	0.20	0.21	0.19	0.20	0.21	0.19	0.23
	(A)	(8.0)	(27.4)	(21.9)	(20.9)	(26.0)	(14.2)	(24.6)	(16.1)
	(B)	(8.0)	(0.3)	(21.9)	(-1.2)	(26.0)	(0.4)	(24.6)	(2.2)
	(C)	(2.8)	(-4.7)	(2.2)	(-4.1)	(0.9)	(-1.6)	(0.5)	(-2.5)
MB	*Low*	0.09	0.19	0.14	0.18	0.15	0.19	0.14	0.21
	(A)	(14.5)	(26.8)	(24.8)	(16.3)	(27.1)	(10.0)	(26.3)	(11.7)
	(B)	(14.5)	(11.5)	(24.8)	(3.1)	(27.1)	(2.0)	(26.3)	(3.5)
	(C)	(14.5)	(26.8)	(24.8)	(16.3)	(27.1)	(10.0)	(26.3)	(11.7)
	Medium	0.14	0.24	0.21	0.23	0.22	0.25	0.21	0.28
	(A)	(14.7)	(36.4)	(33.3)	(21.7)	(36.6)	(12.2)	(35.8)	(15.3)
	(B)	(14.7)	(8.7)	(33.3)	(1.7)	(36.6)	(1.5)	(35.8)	(3.4)
	(C)	(4.8)	(6.2)	(8.9)	(3.7)	(9.4)	(2.3)	(9.2)	(2.9)
	High	0.19	0.22	0.21	0.21	0.21	0.20	0.21	0.22
	(A)	(12.9)	(31.3)	(27.4)	(20.6)	(31.7)	(11.7)	(30.7)	(14.1)
	(B)	(12.9)	(1.7)	(27.4)	(-0.2)	(31.7)	(-0.4)	(30.7)	(0.8)
	(C)	(6.3)	(2.9)	(7.4)	(2.1)	(7.8)	(0.8)	(7.7)	(0.7)
Size	*Small*	0.15	0.20	0.19	0.18	0.18	0.17	0.18	0.18
	(A)	(17.7)	(29.8)	(30.2)	(16.8)	(31.9)	(8.7)	(31.7)	(9.2)
	(B)	(17.7)	(4.8)	(30.3)	(-0.6)	(31.9)	(-0.6)	(31.7)	(0.0)
	(C)	(17.7)	(29.8)	(30.3)	(16.8)	(31.9)	(8.7)	(31.7)	(9.2)
	Medium	0.09	0.23	0.18	0.22	0.18	0.23	0.18	0.25
	(A)	(12.7)	(31.6)	(27.5)	(19.4)	(30.6)	(12.1)	(30.0)	(13.4)
	(B)	(12.7)	(13.6)	(27.5)	(3.1)	(30.6)	(2.2)	(30.0)	(3.4)
	(C)	(-5.1)	(3.5)	(-0.7)	(2.6)	(0.1)	(2.0)	(-0.3)	(2.3)
	Large	0.09	0.23	0.17	0.23	0.19	0.23	0.18	0.26
	(A)	(8.6)	(27.7)	(19.5)	(21.3)	(24.6)	(13.4)	(22.9)	(16.3)
	(B)	(8.6)	(11.2)	(19.5)	(4.5)	(24.6)	(2.0)	(22.9)	(4.5)
	(C)	(-4.8)	(2.6)	(-1.1)	(3.7)	(0.6)	(2.1)	(-0.4)	(2.9)
Leverage	*Low*	0.15	0.21	0.19	0.21	0.20	0.20	0.19	0.23
	(A)	(12.4)	(30.6)	(26.8)	(19.5)	(30.6)	(10.2)	(29.8)	(13.0)
	(B)	(12.4)	(4.7)	(26.8)	(1.6)	(30.6)	(0.2)	(29.8)	(2.0)
	(C)	(12.4)	(30.6)	(26.8)	(19.5)	(30.6)	(10.2)	(29.8)	(13.0)
	Medium	0.11	0.23	0.19	0.22	0.19	0.23	0.19	0.25
	(A)	(14.7)	(35.3)	(31.3)	(21.3)	(34.8)	(12.9)	(33.9)	(15.0)
	(B)	(14.7)	(12.1)	(31.3)	(2.3)	(34.8)	(2.1)	(33.9)	(3.3)
	(C)	(-2.5)	(2.5)	(0.0)	(0.4)	(-0.2)	(1.3)	(-0.1)	(0.8)
	High	0.11	0.21	0.17	0.20	0.17	0.20	0.17	0.23
	(A)	(14.9)	(29.5)	(27.5)	(18.9)	(30.3)	(10.5)	(29.5)	(12.6)
	(B)	(14.9)	(10.3)	(27.5)	(2.6)	(30.3)	(1.4)	(29.5)	(3.2)
	(C)	(-3.0)	(-0.3)	(-2.5)	(-0.9)	(-2.9)	(-0.1)	(-2.8)	(0.0)

The table reports the association between net debt issuance and total investment, as specified in (34). Standard errors are clustered by firm, and t-statistics are reported in parentheses. The sample period is 1975.II to 2023.IV. See previous table notes for details on standard regression settings.

4. Concluding Remarks

This thesis comprises three chapters that examine the association between debt issuance and asset revaluation. The first chapter explores the cross-sectional differences in the relation between debt issuance and asset revaluation, attributing the value creation to various firm stakeholders. The second chapter investigates how monetary easing influences this relation, also further conditioning the analysis on firm types. The third chapter focuses exclusively on investment as a channel of asset revaluation, applying the estimation framework to examine how debt issuance relates to investment decisions.

Overall, this thesis identifies two potential passthrough mechanisms. First, net capital expenditure and R&D spending are primarily undertaken by less established firms. These firms issue equity alongside debt adjustment to finance their investments, signaling stock price appreciation. This mechanism is particularly responsive to moderate low-rate periods. In contrast, acquisitions are more commonly conducted by established firms, financed through a combination of equity and debt. While such activities are encouraged by broader accommodative monetary conditions, they are associated with relatively limited stock market responses.

References

Acharya, V., Y. Amihuda, S. Bharat, 2013. Liquidity risk of corporate bond returns: Conditional approach. Journal of Financial Economics 110, 358–386.

Acharya, V., G. Plantin, 2023. Monetary Easing, Leveraged Payouts and Lack of Investment. Working paper, New York University.

Acharya, V., S. Steffen, 2020. The Risk of Being a Fallen Angel and the Corporate Dash for Cash in the Midst of COVID. Review of Corporate Finance Studies 9, 430–471.

Acharya, V. V., H. Almeida, M. Campello, 2007. Is cash negative debt? A hedging perspective on corporate financial policies. Journal of Financial Intermediation 16, 515–554.

Admati, A., P. Demarzo, M. Hellwig, P. Pfleiderer, 2018. The Leverage Ratchet Effect. Journal of Finance 73, 145–198.

Alti, A., 2006. How Persistent Is the Impact of Market Timing on Capital Structure?. Journal of Finance 61, 1681–1710.

Ball, R., J. Gerakos, J. T. Linnainmaa, V. Nikolaev, 2020. Earnings, Retained Earnings, and Book-to-market in the Cross Section of Expected Returns. Journal of Financial Economics 135(1), 231–254.

Bargeron, L., D. Denis, K. Lehn, 2018. Financing Investment Spikes in the Years Surrounding World War I. Journal of Financial Economics 130, 215–236.

Barth, M. E., R. Kasznik, M. F. McNichols, 2001. Analyst Coverage and Intangible Assets. Journal of Accounting Research 39, 1–34.

Becker, B., V. Ivashina, 2014. Cyclicality of Credit Supply: Firm Level Evidence. Journal of Monetary Economics 62, 76–93.

Begenau, J., J. Salomao, 2019. Firm Financing over the Business Cycle. Review of Financial Studies 32, 1235–1274.

Bekaert, G., E. C. Engstrom, N. R. Xu, 2021. The Time Variation in Risk Appetite and Uncertainty. Management Science 68, 3975–4004.

Bernanke, B., M. Gertler, S. Gilchrist, 1996. The Financial Accelerator and the Flight to Quality. Review of Economics and Statistics 78(1), 1–15.

Berndt, A., J. Helwege, 2024. Adaptive Risk Preferences: Unraveling the Impact of Monetary Policy on Output. Working paper, Australian National University.

Bianchi, F., M. Lettau, S. Ludvigson, 2022. Monetary Policy and Asset Valuation. Journal of Finance 77, 967–1017.

Biddle, G. C., G. Hilary, R. S. Verdi, 2009. How Does Financial Reporting Quality Relate to Investment Efficiency?. Journal of Accounting and Economics 48, 112–131.

Bolton, P., H. Chen, N. Wang, 2011. A Unified Theory of Tobin's q, Corporate Investment, Financing, and Risk Management. Journal of Finance 66.

Boons, M., F. Duarte, F. de Roon, M. Szymanowska, 2020. Time-varying Inflation Risk and Stock Returns. Journal of Financial Economics 136, 444–470.

Chaderina, M., P. Weiss, J. Zechner, 2022. The Maturity Premium. Journal of Financial Economics 144, 670–694.

Chang, X., Y. Chen, S. Dasgupta, 2019. Macroeconomic Conditions, Financial Constraints, and Firms' Financing Decisions. Journal of Banking and Finance 101, 242–255.

Chava, S., M. Roberts, 2008. How Does Financing Impact Investment? The Role of Debt Covenants. Journal of Finance 63, 2085–2121.

Chen, H., Y. Xu, J. Yang, 2021. Systematic Risk, Debt Maturity, and the Term Structure of Credit Spreads. Journal of Financial Economics 139, 770–799.

Chen, N., P. Glasserman, B. Nouri, M. Pelger, 2017. Contingent Capital, Tail Risk, and Debt-Induced Collapse. Review of Financial Studies 30, 3921–3969.

Chen, S., T. Li, 2022. A Unified Duration-based Explanation of the Value, Profitability, and Investment Anomalies. Working paper, City University of Hong Kong.

Chen, Z., D. Hackbarth, I. A. Strebulaev, 2022. A Unified Model of Distress Risk Puzzles. Journal of Financial Economics 146, 357–384.

Choi, J., 2013. What Drives the Value Premium?: The Role of Asset Risk and Leverage. Review of Financial Studies 26, 2845–2875.

Choi, J., M. Richardson, 2016. The Volatility of a Firm's Assets and the Leverage Effect. Journal of Financial Economics 121, 254–277.

Cochrane, J., M. Piazzesi, 2005. Bond Risk Premia. American Economic Review 95, 138–160.

Crouzet, N., 2018. Aggregate Implications of Corporate Debt Choices. Review of Economic Studies 85, 1635–1682.

——— , 2021. Credit Disintermediation and Monetary Policy. IMF Economic Review 69, 23–89.

Dangl, T., J. Zechner, 2021. Debt Maturity and the Dynamics of Leverage. Review of Financial Studies 34, 5796–5840.

Danis, A., D. A. Rettl, T. M. Whited, 2014. Refinancing, profitability, and capital structure. Journal of Financial Economics pp. 424–443.

Darmouni, O., O. Giesecke, A. Rodnyansky, 2022. The Bond Lending Channel of Monetary Policy. Working paper, Columbia Business School.

Darmouni, O., M. Papoutsi, 2023. The Rise of Bond Financing in Europe: Five Facts about New and Small Issuers. Working paper, Columbia Business School.

Darmouni, O., K. Siani, 2022. Bond Market Stimulus: Firm-Level Evidence from 2020-21. Working paper, Columbia Business School.

Dasgupta, S., T. H. Noe, Z. Wang, 2011. Where Did All the Dollars Go? The Effect of Cash Flows on Capital and Asset Structure. Journal of Financial and Quantitative Analysis 46, 1259–1294.

Daskalakis, N., D. Balios, V. Dalla, 2017. The Behaviour of SMEs' Capital Structure Determinants in Different Macroeconomic States. Journal of Corporate Finance 46, 248–260.

Davydiuk, T., S. Richard, I. Shaliastovich, A. Yaron, 2023. How Risky Are U.S. Corporate Assets?. Journal of Finance pp. 141–208.

De Santis, R., A. Zaghini, 2021. Unconventional Monetary Policy and Corporate Bond Issuance. European Economic Review 135, 103727.

DeAngelo, H., 2022. The Capital Structure Puzzle: What Are We Missing?. Journal of Financial and Quantitative Analysis 57, 413–454.

DeAngelo, H., L. DeAngelo, R. Stultz, 2006. Dividend Policy and the Earned/Contributed Capital Mix: A Test of the Life-Cycle Theory. Journal of Financial Economics 81, 227–254.

DeAngelo, H., L. DeAngelo, R. M. Stulz, 2010. Seasoned Equity Offerings, Market Timing, and the Corporate Lifecycle. Journal of Financial Economics 95, 275–295.

DeAngelo, H., L. DeAngelo, T. Whited, 2011. Capital Structure Dynamics and Transitory Debt. Journal of Financial Economics 99, 235–261.

DeAngelo, H., A. Gonçalves, R. Stulz, 2018. Corporate Deleveraging and Financial Flexibility. Review of Financial Studies 31, 3122–3174.

——— , 2022. Leverage and Cash Dynamics. Review of Finance 26, 1101–1144.

Dechow, P. M., R. G. Sloan, M. T. Soliman, 2004. Implied Equity Duration: A New Measure of Equity Risk. Review of Accounting Studies 9, 197–228.

Demarzo, P., Z. He, 2021. Leverage Dynamics without Commitment. Journal of Finance 76, 1195–1250.

Denis, D., S. McKeon, 2012. Debt Financing and Financial Flexibility Evidence from Proactive Leverage Increases. Review of Financial Studies 25, 1897–1929.

Dickinson, V., 2011. Cash Flow Patterns as a Proxy for Firm Life Cycle. The Accounting Review 86, 1969–1994.

Dinlersoz, E., S. Kalemli-Ozcan, H. R. Hyatt, V. Penciakova, 2018. Leverage Over the Life Cycle and Implications for Firm Growth and Shock Responsiveness. NBER Working Paper No. 25226.

Duan, J.-C., J. Sun, T. Wang, 2012. Multiperiod Corporate Default Prediction—A Forward Intensity Approach. Journal of Econometrics 170, 191–209.

Duffie, D., L. Saita, K. Wang, 2007. Multiperiod Corporate Default Probabilities with Stochastic Covariates. Journal of Financial Economics 83, 635–665.

Duguid, K., 2023. Companies Rush to Tap US Bond Market as Credit Conditions Ease. Financial Times article from January 7.

Durante, E., A. Ferrando, P. Vermeulen, 2022. Monetary Policy, Investment and Firm Heterogeneity. European Economic Review 148, 104251.

Elsas, R., M. J. Flannery, J. A. Garfinkel, 2014. Financing Major Investments: Information about Capital Structure Decisions. Review of Finance 18, 1341–1386.

Farre-Mensa, J., R. Michaely, M. Schmalz, 2024. Financing Payouts. Forthcoming, Journal of Financial and Quantitative Analysis.

Foley-Fisher, N., R. Ramcharan, E. Yu, 2016. The impact of unconventional monetary policy on firm financing constraints: Evidence from the maturity extension program. Journal of Financial Economics 122, 409–429.

Gao, N., C. Hua, A. Khurshed, 2021. Loan Price in Mergers and Acquisitions. Journal of Corporate Finance 67, 101754.

Gao, X., T. Whited, N. Zhang, 2021. Corporate Money Demand. Review of Financial Studies 34, 1834–1866.

Giambona, E., R. Matta, J. Peydró, Y. Wang, 2020. Quantitative Easing, Investment, and Safe Assets: The Corporate-Bond Lending Channel. Working paper, Syracuse University.

Gilchrist, S., E. Zakrajsek, 2007. Investment and the Cost of Capital: New Evidence from the Corporate Bond Market. NBER Working Paper No. 13174.

Gilchrist, S., E. Zakrajšek, 2012. Credit Spreads and Business Cycle Fluctuations. American Economic Review 102, 1692–1720.

Gonçalves, A. S., 2021. The Short Duration Premium. Journal of Financial Economics 141, 919–945.

Greenwood, R., S. Hanson, 2013. Issuer Quality and Corporate Bond Returns. Review of Financial Studies 26, 1483–1525.

Grundy, B. D., P. Verwijmeren, 2020. The External Financing of Investment. Journal of Corporate Finance 65, 101745.

Gurkaynak, R., B. Sack, J. Wright, 2007. The U.S. Treasury Yield Curve: 1961 to the Present. Journal of Monetary Economics 54, 2291–2304.

Hackbarth, D., C. A. Hennessy, H. E. Leland, 2007. Can the Trade-off Theory Explain Debt Structure?. Review of Financial Studies 20(5), 1389–1428.

Haddad, V., A. Moreira, T. Muir, 2021. When Selling Becomes Viral: Disruptions in Debt Markets in the COVID-19 Crisis and the Fed's Response. Review of Financial Studies 34, 5309–5351.

Hadlock, C. J., J. R. Pierce, 2010. New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index. Review of Financial Studies 23, 1909–1940.

Halling, M., J. Yu, J. Zechner, 2016. Leverage Dynamics over the Business Cycle. Journal of Financial Economics 122, 21–41.

——— , 2022. The Dynamics of Corporate Debt Structure. Working paper, University of Luxembourg.

Hotchkiss, E., G. Nini, D. Smith, 2022. The Role of External Capital in Funding Cash Flow Shocks: Evidence From the COVID-19 Pandemic. Working paper, Boston College.

Huang, R., J. Ritter, 2009. Testing Theories of Capital Structure and Estimating the Speed of Adjustment. Journal of Financial and Quantitative Analysis 44, 237–271.

Huang, R., J. R. Ritter, 2022. The Puzzle of Frequent and Large Issues of Debt and Equity. Journal of Financial and Quantitative Analysis 57, 170–206.

Im, H. J., C. Mayer, O. Sussman, 2020. Heterogeneity in Investment Spike Financing. Working Paper, The University of Seoul.

Jordà, O., K. Knoll, D. Kuvshinov, M. Schularick, A. M. Taylor, 2019. The Rate of Return on Everything, 1870–2015. The Quarterly Journal of Economics 134, 1225–1298.

Jostova, G., S. Nikolova, A. Philipov, C. Stahel, 2013. Momentum in Corporate Bond Returns. Review of Financial Studies 26, 1649–1693.

Julio, B., W. Kim, M. Weisbach, 2007. What Determines the Structure of Corporate Debt Issues?. NBER Working Paper No. 13706.

Jurado, K., S. C. Ludvigson, S. Ng, 2015. Measuring Uncertainty. American Economic Review 105, 1177–1216.

Kargar, M., B. Lester, D. Lindsay, S. Liu, P.-O. Weill, D. Zúñiga, 2021. Corporate Bond Liquidity during the COVID-19 Crisis. Review of Financial Studies 34, 5352–5401.

Korajczyk, R. A., A. Levy, 2003. Capital Structure Choice: Macroeconomic Conditions and Financial Constraints. Journal of Financial Economics 68, 75–109.

Korteweg, A., 2010. The Net Benefits to Leverage. Journal of Finance 65, 2137–2170.

Korteweg, A., M. Schwert, I. Strebulaev, 2022. Proactive Capital Structure Adjustments: Evidence from Corporate Filings. Journal of Financial and Quantitative Analysis 57, 31–66.

Korteweg, A. G., I. A. Strebulaev, 2015. An Empirical Target Zone Model of Dynamic Capital Structure. Working paper, University of Southern California.

Kraus, A., R. H. Litzenberger, 1973. A State-Preference Model of Optimal Financial Leverage. Journal of Finance 28, 911.

Krishnamurthy, A., A. Vissing-Jorgensen, 2011. The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy. NBER Working Paper No. 17555.

Lakdawala, A., T. Moreland, 2021. Monetary Policy and Firm Heterogeneity: The Role of Leverage Since the Financial Crisis. Working paper, Wake Forest University.

Lewis, C. M., Y. Tan, 2016. Debt-equity Choices, R&D Investment and Market Timing. Journal of Financial Economics 119, 599–610.

Ma, Y., 2019. Nonfinancial Firms as Cross-Market Arbitrageurs. Journal of Finance 74, 3041–3087.

Miller, M. H., 1977. Debt and Taxes. Journal of Finance 32(2), 261–275.

Modigliani, F., M. H. Miller, 1958. The Cost of Capital, Corporation Finance and the Theory of Investment. American Economic Review 48(3), 261–297.

——— , 1963. Corporate Income Taxes and the Cost of Capital: A Correction. American Economic Review 53(3), 433–443.

Myers, S. C., 1984. The Capital Structure Puzzle. Journal of Finance 39, 574–592.

——— , 2001. Capital Structure. Journal of Economic Perspectives 15, 81–102.

Myers, S. C., N. S. Majluf, 1984. Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have. Journal of Financial Economics 13, 187–221.

Nelson, R., F. Siegel, 1987. Parsimonious Modeling of Yield Curves. Journal of Business 60, 473–489.

Nozawa, Y., 2017. What Drives the Cross-Section of Credit Spreads?: A Variance Decomposition Approach. Journal of Finance 72, 2045–2072.

O'Hara, M., X. Zhou, 2021. Anatomy of a Liquidity Crisis: Corporate Bonds in the COVID-19 Crisis. Journal of Financial Economics 142, 46–68.

Ottonello, P., T. Winberry, 2020. Financial Heterogeneity and the Investment Channel of Monetary Policy. Econometrica 88, 2473–2502.

Rauh, J., A. Sufi, 2010. Capital Structure and Debt Structure. Review of Financial Studies 23, 4242–4280.

Richardson, S., 2006. Over-investment of Free Cash Flow. Review of Accounting Studies 11, 159–189.

Roberts, M. R., M. Schwert, 2020. Interest Rates and the Design of Financial Contracts. NBER Working Paper No. 27195.

Rodnyansky, A., O. M. Darmouni, 2017. The Effects of Quantitative Easing on Bank Lending Behavior. Review of Financial Studies 30, 3858–3887.

Saunders, A., A. Spina, S. Steffen, D. Streitz, 2022. Corporate Loan Spreads and Economic Activity. Working paper, New York University.

Siani, K., 2021. Global Demand Spillovers: When the Central Bank Buys Corporate Bonds. Working paper, MIT Sloan.

Spiess, D. K., J. Affleck-Graves, 1999. The long-run performance of stock returns following debt offerings. Journal of Financial Economics 54, 45–73.

Strebulaev, I. A., B. Yang, 2013. The Mystery of Zero-Leverage Firms. Journal of Financial Economics 109, 1–23.

Swanson, E. T., 2015. Measuring the Effects of Unconventional Monetary Policy on Asset Prices. NBER Working Paper No. 21816.

Taylor, J. B., 1993. Discretion versus Policy Rules in Practice. Carnegie-Rochester Conference Series on Public Policy 39, 195–214.

Todorov, K., 2020. Quantify the Quantitative Easing: Impact on Bonds and Corporate Debt Issuance. Journal of Financial Economics 135, 340–358.

van Binsbergen, J., J. Graham, J. Yang, 2010. The Cost of Debt. Journal of Finance 65, 2089–2136.

Vlasic, B., 2009. Choosing Its Own Path, Ford Stayed Independent. New York Times article from April 9.

Weber, M., 2018. Cash flow duration and the term structure of equity returns. Journal of Financial Economics 128, 486–503.

Xu, Q., 2018. Kicking Maturity Down the Road: Early Refinancing and Maturity Management in the Corporate Bond Market. Review of Financial Studies 31, 3061–3097.