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Disclosing the Undisclosed:

Commercial Paper As Hidden Liquidity Buffers

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Commercial Paper As Hidden Liquidity Buffers*

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Abstract

Using new transaction-level data for non-financial commercial paper (CP) in the U.S., we show that companies systematically reduce their outstanding short-term debt on quarterly and annual disclosure dates. Constraints on CP lending supply cannot explain this pattern. Instead, companies optimize their disclosed liquidity buffers and strategically repay CP debt if doing so strengthens common accounting ratios, such as the current ratio. Unlike other CP issuers, firms that repay their CP debt neither hold lower cash buffers nor use CP as bridge financing, suggesting an alternative role of CP debt as "hidden liquidity buffer".

Keywords: Commercial paper; balance sheet management; disclosure; cash management; window dressing.

JEL: G32; G23; G14

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Introduction

The level of short-term on corporate balance sheets is a first-order concern for many corporate stakeholders. For instance, the ratio between current assets and current liabilities—also known as current ratio—is a common loan covenant (Sufi, 2009) and rating agencies are cautious if companies are "overly reliant on bank borrowings or commercial paper" (Standard & Poor's, 2016). Because stakeholders typically assess the importance of short-term debt on corporate balance sheets based on disclosed information from quarterly and annual reports, companies have an incentive to alter their capital structure around disclosure dates and strategically understate their short-term debt. Such strategic behavior can hide funding fragility in the corporate sector and potentially affect financial stability. Yet, there is no study of corporate short-term debt on a high frequency that examines whether companies systematically reduce their short-term debt around disclosure dates.

We fill this void by using a new database of non-financial commercial paper (CP) transactions that allows us to compare companies' outstanding short-term debt on quarterly disclosure dates to their debt levels *within* reporting quarters. Firms systematically reduce their CP debt before quarterly reporting dates and these reductions are even more pronounced on annual reporting dates. Lending supply frictions at reporting dates cannot explain these reductions. Instead, firms strategically reduce their outstanding CP debt before reporting dates if doing so strengthens common accounting ratios, such as the current ratios. The systematic drops in outstanding CP volumes we document are entirely driven by the subsample of firm-quarters with a current surplus, when using cash to repay outstanding short-term debt increases the current ratio. Hence, strategic CP repayments are not driven by low-quality firms hiding their short-term debt in an attempt to pool with high-quality firms, but by firms with high liquidity buffers that use CP repayments to optimize their disclosed

current ratios.

We conduct our analysis of strategic CP repayments by non-financial firms in five steps. First, focusing on the aggregate non-financial CP market, Figure 1 shows sharp drops in non-financial CP volumes at common reporting dates (calendar quarter-end dates). On average, non-financial CP volumes drop by $30 billion at quarter-end dates and $55 billion if the quarter-end date aligns with the end of the calendar year. Using panel regressions we confirm that these drops are concentrated on companies' individual reporting dates and that the drops in outstanding volumes are substantially more pronounced at the end of the individual firms' reporting years.

Second, we provide a set of results suggesting that the observed drops in CP volumes are not driven by quarter-end or year-end frictions in money markets.[1] We first test if reduced quarter-end volumes are a general pattern in CP markets and find that systematic drops in outstanding CP volumes are unique to non-financial CPs and not present in financial or asset-backed CP markets. Moreover, while lending supply frictions are strongest at the end of the calendar year, firms reduce their outstanding CP debt most significantly on *their* annual disclosure dates, even if these dates do not align with the end of the calendar year. Finally, if lending supply frictions at quarter-end and year-end dates were a first-order concern, the yields of CPs that mature in the following calendar quarter or calendar year would be higher than those of comparable CPs that mature within the same quarter or year. However, using our transaction-level data, we find no evidence of elevated financing costs at quarter-end dates and modest (borderline significant) increases of approximately one basis point for CPs

[1] Given the large literature on quarter-end or year-end frictions in money markets (e.g., Musto, 1997, Griffiths and Winters, 1997, Musto, 1999, Griffiths and Winters, 2005, Covitz and Downing, 2007, Duffie, 2017, Du, Tepper, and Verdelhan, 2018, Klingler and Syrstad, 2020, among many others), a simple explanation for the observed drops in CP volumes could be that reduced lending supply forces companies to reduce their CP debt.

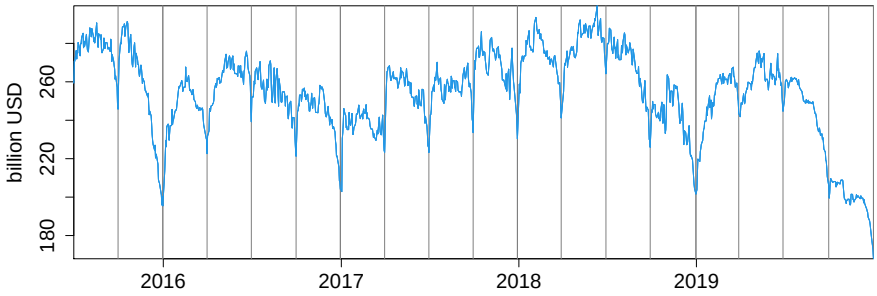


Figure 1: **Outstanding volume of USD non-financial commercial paper.** This figure shows aggregated daily outstanding volumes for all issuers in our matched DTCC sample. Vertical lines mark the last observation in a calendar quarter.

crossing the end of the calendar year.

Third, we explore the motives behind strategic CP repayments and argue that it is not simply the level of short-term debt that stakeholders scrutinize but the balance between short-term debt and liquid assets. In line with our argument, corporate stakeholders focus on accounting ratios (e.g., the current ratio) to assess a firm's liquidity risk. Hence, while using cash to repay short-term debt does not affect a company's net debt, doing so can improve its perceived credit quality if it improves the relevant accounting ratios. We therefore hypothesize that CP repayments are driven by firms optimizing their current ratios. Hence, only firms with current assets exceeding current liabilities should repay their CP debt before disclosure dates because this is the only situation where strategic repayments improve the current ratio.

To test this hypothesis, we separate firms based on whether they have a current surplus and find that *the systematic drops in outstanding CP debt are entirely driven by firms whose current assets exceed their current liabilities.* To illustrate the economic magnitude of these CP repayments, we split firm-years into quartiles based on the current ratio and find that

the percentage difference between year-average and year-end CP debt outstanding is around 10% for firms in the lowest current ratio quartile and above 50% for firms in the highest current ratio quartile. These debt repayments are sizable compared to the disclosed short-term debt—by repaying CP debt before the annual reporting date, the average firm with a high cash ratio reduces its disclosed short-term debt by more than 60%. These effects become even more pronounced when we focus on a more granular accounting ratio that weighs cash holdings against short-term debt.

Fourth, we discuss and test two alternative hypotheses for CP repayments: Firms might (i) repay their CP debt to simply reduce their disclosed cash instead of spending it on other expenses, like dividends, or (ii) reduce their CP debt simply because they are risky companies that want to appear safer than they actually are. To test these alternative explanations against our hypothesis of current ratio optimization, we run ordinary least squares (OLS) and logistic regressions of CP repayments on current ratios and a battery of additional controls. While we find weak evidence in favor of the two alternative hypotheses, this analysis confirms the current ratio as main driver of CP repayments which is robust to including proxies for alternative hypotheses and various other controls, including firm size, measures of cash distribution and investment, riskiness, and industry or issuer fixed effects.

Finally, we separate firms with CP repayments from other CP issuers and compare different balance sheet items of the firms in our CP issuer samples to firms of similar size in the same industry that are not part of our issuer sample. Doing so allows us to relate our results to previous studies on corporate CP usage (Calomiris, Himmelberg, and Wachtel, 1995 and Kahl, Shivdasani, and Wang, 2015).In line with the view that access to the CP market allows firms to operate with lower cash buffers, firms without CP repayments have lower cash holdings and more short-term debt than the control sample. However, this dif-

ference vanishes for firms with full CP repayments. Examining the role of CP as bridge financing, we next find that firms without CP repayments have capital expenditures higher than the control sample. As before, this difference vanishes for firms with CP repayments. In addition, because Kahl et al. (2015) show that firms often refinance CP debt with long-term debt, we conclude by examining if CP repayments in one year predict more long-term debt issuance the following year and find that CP repayments predict a 1.52 percentage points lower long-term debt issuance. Taken together, these results suggest an alternative use of CP debt as *hidden liquidity buffers.*

Our study is related to the growing literature on the CP markets (Hahn, 1993, Calomiris et al., 1995, Gatev and Strahan, 2006, Covitz and Downing, 2007, Anderson and Gascon, 2009, Covitz, Liang, and Suarez, 2009, Kahl et al., 2015, Pérignon, Thesmar, and Vuillemey, 2018, Kacperczyk, Perignon, and Vuillemey, 2021, among others) and we contribute to this literature by examining the micro-structure of the non-financial CP market and showing that firms strategically reduce their CP debt around disclosure dates. These strategic repayments are akin to "window dressing"—a pattern where portfolio managers (e.g., Lakonishok, Shleifer, Thaler, and Vishny, 1991, Musto, 1997, Musto, 1999) or banks (Allen and Saunders, 1992, Kotomin and Winters, 2006, Owens and Wu, 2015, Duffie, 2017, Munyan, 2017, or Klingler and Syrstad, 2020, among many others) alter their positions to appear safer than they actually are. While window dressing often refers to the attempt by low-quality entities to pool with high-quality ones (Kedia and Philippon, 2007), the phenomenon we document is different; firms with current assets in excess of current liabilities repay their CP debt to *further* strengthen their disclosed liquidity ratios and perceived credit quality.

To the best of our knowledge, this is the first paper examining the CP debt of non-financial firms at a high frequency and analyzing firms' short-term debt *within* reporting periods. Our

findings suggest that companies value access to an additional liquidity buffer—despite being able to fully repay the debt around disclosure dates, companies regularly issue CP debt. This finding contributes to the vast literature on corporate liquidity management policies (Bates, Kahle, and Stulz, 2009, Denis and Sibilkov, 2010, Duchin, 2010, Lins, Servaes, and Tufano, 2010, Graham and Leary, 2018, Cunha and Pollet, 2020, among many others) and to understanding corporate usage of short-term debt, as was previously done for credit lines (e.g., Acharya, Almeida, and Campello (2007), Sufi, 2009, Yun, 2009, Acharya, Almeida, and Campello, 2013, Acharya, Almeida, Ippolito, and Perez, 2014).

1 Background and Hypothesis

Investors and other stakeholders pay close attention to the information disclosed in companies' quarterly and annual reports. In response, companies carefully consider the impact of their disclosures (Verrecchia, 1983) and might strategically manage their income statements (Burgstahler and Dichev, 1997, Graham, Harvey, and Rajgopal, 2005, Roychowdhury, 2006, among many others) or balance sheets (e.g., Gramlich, McAnally, and Thomas, 2001 and Gramlich, Mayew, and McAnally, 2006). This focus on disclosure dates gives companies an incentive to strategically manage their short-term debt and we use a new database of CP transactions to contrast firms' disclosed short-term debt to outstanding short-term debt *within* reporting periods, enabling us to highlight strategic debt disclosures. In this section, we first provide a brief background on the non-financial CP market and then outline the potential incentives for strategically repaying short-term debt around disclosure dates afterwards. We conclude by deriving a set of testable hypothesis.

1.1 The Commercial Paper Market

CPs are uncollateralized short-term debt securities with an initial maturity of less than 270 days. Given their short maturity, companies typically use CPs to smooth transitory fluctuations in their working capital (Nayar and Rozeff, 1994) and to finance current assets, such as inventories or trade credit to other firms (Calomiris et al., 1995). Because companies view CPs as a stable source of short-term debt financing, firms with an active CP program tend to have lower cash holdings than industry peers (Kahl et al., 2015). In addition, companies can use CPs as "bridge financing" for long-term investments and Kahl et al. (2015) show that firms tend to be more active in the CP market when they have larger capital expenditures and that they refinance the short-term debt by issuing more long-term debt in the future.

To issue CPs, a firm needs to register a "CP program," which requires obtaining a short-term credit rating, specifying several legal characteristics that all issuances must satisfy, and finding a dealer (or group of dealers) that places the securities in the market (Barclays, 2020). Given these necessary steps, setting up a CP program is costly and more common for large firms. However, once a CP program is set up, issuing new CPs is easy because no additional legal documentation to investors is necessary (unlike for traditional longer-term bond issues) and Kahl et al. (2015) argue that CPs are a significantly cheaper source of financing than credit lines. Instead of relying on banks for credit lines, a company would typically place CPs in the market by contacting its dealer who purchases the entire issuance before selling the CPs to the ultimate investors (Eiger, Jennings-Mares, and Marlatt, 2017).

Compared to credit lines, for which we cannot observe daily drawdowns and repayments, our CP data have the advantage to provide us with insights into corporate liquidity management within reporting periods. In addition, there is a conceptual difference between credit

lines and CP debt: While credit lines constitute a liquidity buffer in themselves without being drawn on—a company can simply draw on them if needed—our conversations with market participants suggest that regular CP issuance is necessary to build a stable investor basis and ensure smooth access to the CP market. Hence, drawing on CP financing is more common than drawing on credit lines and the preference to disclose low short-term debt should be most visible in the CP market.

1.2 Concerns About Corporate Short-Term Debt

Short-term debt on corporate balance sheets can lower a company's perceived credit quality. For instance, Moody's Analytics (2015) overweighs short-term debt when calculating their Expected Default Frequency (EDF) and Crosbie and Bohn (2019) highlight that "the asset value at which the firm will default, generally lies somewhere between total liabilities and [...] short-term liabilities." Standard & Poor's (2016) notes in its corporate rating methodology that it is cautious if "a firm is overly reliant on bank borrowings or commercial paper" and emphasizes that a growing component of short-term debt can lead to a rating downgrade. Similarly, Fitch (2016) states that "it reviews commercial paper issuers to determine if full (100%) liquidity back-up available exists for outstanding CP."

While one common liquidity backup for CP debt are credit lines, the drawback of this backup is that credit lines have performance-related covenants that can restrict their availability precisely when a firm faces adverse funding conditions (Sufi, 2009). Because of that issue, credit lines are an imperfect backup for short-term debt as noted, for instance, by Standard & Poor's (2016): "[Credit lines] are far from a guarantee that liquidity will, in the end, be available." To mitigate liquidity concerns, firms need a cash buffer against maturing CP debt and Fitch (2016) notes that liquidity backup should also include "freely available

cash and cash equivalents." Standard & Poor's (2016) agrees that "available cash or marketable securities are ideal to provide backup" and state that "[a]ll issuers—even if they provide 100% backup—must always match the first few days of maturities with excess cash or funding facilities that provide for immediate availability."

These considerations highlight that companies have an incentive to carefully consider their cash and short-term debt disclosures. Further complicating the considerations, investors and other stakeholders cannot always assess if disclosed cash holdings provide the liquidity benefits typically associated with cash—disclosed cash holdings could be earmarked for a specific purpose (e.g., an acquisition), used as collateral in derivative positions, trapped abroad (Foley, Hartzell, Titman, and Twite, 2007, Harford, Wang, and Zhang, 2017, Laplante and Nesbitt, 2017, Faulkender, Hankins, and Petersen, 2019, among others), or invested in risky assets (Duchin, Gilbert, Harford, and Hrdlicka, 2017 and Darmouni and Mota, Darmouni and Mota), and potentially misused by managers (e.g., Jensen, 1986, Stulz, 1990, Opler, Pinkowitz, Stulz, and Williamson, 1999, Harford, 1999, Dittmar and Mahrt-Smith, 2007). Picking up on these issues, Standard & Poor's (2016) states that "it may be necessary to haircut their [cash and marketable securities] apparent value to account for fluctuations in value or tollgate taxes surrounding a sale" while Fitch (2016) haircuts the value of different marketable securities "based on their characteristics" and "takes into account where the cash is located within the corporate group" and if "there are material costs, contractual permitted dividend payment mechanisms, or capital controls affecting its availability to the rated entity."

1.3 Hypotheses

The importance of credit ratings for firms' stock returns (Nayar and Rozeff, 1994) and balance sheets (Kisgen, 2006 and Alissa, Bonsall, Koharki, and Penn, 2013) gives firms an incentive to strategically disclose lower levels of short-term debt. Resonating with this view, a common accounting trick is to reclassify CP debt as long-term debt (e.g., Gramlich et al., 2001, Ross, Westerfield, and Jordan, 2008, Kahl et al., 2015) and we argue that strategically repaying the short term debt is an even better approach as it entirely removes the debt from the balance sheet. These arguments lead to our first hypothesis: *Firms reduce their short-term debt around quarterly disclosure dates.*

We collect additional anecdotal evidence on issues with CP debt on corporate balance sheets in the appendix (Table A2) and now discuss how companies can improve their perceived credit quality by strategically repaying CP debt. The focus of credit and equity analysts is usually not on the level of short-term debt per se but on accounting ratios that measure the balance between short-term debt and liquid assets. The most common accounting variable measuring a company's short-term liquidity is the *Current Ratio* between current assets and current (or short-term) liabilities, which is often used to benchmark companies against industry peers (Gramlich et al., 2001) or as loan covenant in credit lines (Sufi, 2009). This focus on accounting ratios allows firms whose current assets exceed current liabilities to strengthen their perceived credit quality and position among industry peers by using cash to repay short-term debt.

To illustrate our point, consider a simple example: Firm A and B both hold \$5 of cash and have a total of \$8 in current liabilities out of which \$5 are CP debt. The companies differ in their remaining current assets with firm A holding \$5 and firm B only holding \$1. As company A's current assets exceed its current liabilites, the firm can improve its current ratio

from $\frac{10}{5+3} = \frac{5}{4}$ to $\frac{5}{0+3} = \frac{5}{3}$ by repaying its CP debt. By contrast, Company B's current ratio would deteriorate from $\frac{6}{5+3} = \frac{3}{4}$ to $\frac{1}{0+3} = \frac{1}{3}$ if it repays its CP debt. Hence, CP repayments improve the disclosed liquidity ratio only if a company has a current surplus to begin with, giving these firms an incentive for strategic repayments. Hence, our second hypothesis is that *companies use CP repayments to optimize their current ratios.*

Before we discuss alternative explanations, we note that analysts might also consider more granular proxies than the current ratio. For instance, rating agencies (e.g., Fitch, 2016) examine ratios between cash holdings and debt instruments maturing within the next 12 months.[2] However, because the current ratio is the most common accounting variable capturing corporate liquidity, we first focus on this measure and show later that our results improve further when focusing on the ratio between cash and short-term debt.

Alternative Explanations

One alternative explanation for the drops in outstanding CP volumes around quarter-end and year-end dates are lending supply frictions in money markets. As explained by Musto (1997) and Musto (1999), year-end lending supply frictions in CP markets could be driven by money market mutual funds (MMFs) and their annual disclosure requirements. Griffiths and Winters (1997) and Griffiths and Winters (2005) argue that investors have an elevated demand for cash before year-ends. However, disclosure requirements by MMFs are less important during our sample period because MMFs disclose their holdings every month and not only at year-end. In addition, Griffiths and Winters (2005) argue that any elevated cash demand is usually resolved before the end of the calendar year and show that CP yields converge back to normal levels on the last days of the year. While these arguments

[2]Throughout the paper, we use the term cash holdings as short hand for cash and liquid asset holdings.

are inconsistent with lending supply frictions as potential explanation, recent changes in bank regulation, such as the introduction leverage ratio disclosures in 2015, lower dealers' incentives to act as intermediaries in money markets (Duffie, 2017) and potentially increase lending supply frictions at quarter-end dates (Du et al., 2018) and we therefore examine the *lending supply hypothesis* as alternative explanation.

In addition, we explore two alternative explanations for why companies would want to reduce their outstanding CP debt around disclosure dates. First, firms might prefer to repay their short-term debt instead of disclosing high liquidity buffers, which might trigger conflicts if investors prefer that the company spends its cash on investments or dividends. We label this alternative explanation *spending hypothesis* and discuss a set of potential measures that could capture this motive in Section 4.3. Second, a *risk hypothesis* would suggest that riskier companies reduce their outstanding CP debt to appear safer than they actually are. As for the spending hypothesis, we discuss empirical proxies for this hypothesis in Section 4.3 and examine how they affect surplus cash as driver.

2 Data

Our analysis builds on a novel data set of U.S. non-financial CP transactions, obtained from the Depository Trust and Clearing Corporation (DTCC). We use these issuance data to construct time series of outstanding CP debt at the issuer level, which we hand-match to balance sheet information from Compustat. The resulting sample comprises 378 firms and represents approximately 85% of the outstanding dollar-denominated non-financial CP debt reported by the New York FED.[3]

[3]The transactions in the DTCC data are typically placements by the issuing party or dealer, but also include repurchases and secondary market transactions. Because there is no identifier for the type of transac-

Table 1 provides detailed summary statistics of our data set. As shown in Panel A, we have a total of 378 firms in our matched sample, and grouping them into sectors based on the first two digits of their NAICs code shows that a majority of 103 firms in our sample are in the utilities industry while the largest share of CP issuance is by industrial companies. In addition to the results in the table, we note that approximately 80% of the issuers in our sample are incorporated in the US. Panel A also shows that, even though our sample comprises a relatively small number of firms, it captures a significant part of all Compustat firms—aggregating the firm assets in our sample shows that it captures close to 40% of the total assets in Compustat.

Panel B shows issuance volumes, aggregated by issuer and calendar week, for different maturity categories, ranging from "1 to 3 days" to "more than 180" days. The panel gives summary statistics of the CP issuance volumes by initial maturity and shows that the vast majority of CP issuance is with maturity below 90 days. This short maturity gives firms the flexibility to repay short-term debt at regulatory reporting dates instead of rolling the debt over.

Panel C gives an overview of the main balance sheet characteristics of the CP issuers in our sample. Throughout the paper, we wincorize all continuous variables at the 1% and 99% quantiles to avoid our results being driven by extreme outliers. A detailed description of all balance sheet items and data sources can be found in Table A1 in the appendix. The average firm in our sample has $51.78 billion assets, confirming that our sample comprises

tion, we follow the industry practice of constructing issuance volumes as the sum of all transactions occurring before the CP reaches half its time to maturity in the body of the paper. While our sample differs from that used by the New York FED—we only include issuers that we can match to Compustat and the New York FED applies a credit rating filter to the data, which we do not—Figure A1 in the appendix suggests that our methodology gives similar volume estimates as those by the New York FED, despite the different sampling methodology. We also conduct additional robustness tests in the appendix, where we construct outstanding volumes using only transactions at issuance. This proxy tends to underestimate a company's CP volumes, but we show in the appendix that our results remain virtually unchanged when using that proxy instead.

Table 1: **Description of the matched dataset.** This table provides descriptive statistics for our matched dataset. Panel A shows the number of firms in each NAICs sector, the percentage of firms and CP issuance in that sector (relative to the entire sample), the largest issuer (with the largest average CP outstanding over the sample period), and the percentage of total firm size relative to the total firm size in Compustat. Panel B shows the distribution of CP size by issuer-week-maturity. For each maturity bucket, we report percentiles of the distribution of the amount issued. In the last column we report the share of issuance in each maturity category. Panel C provides descriptive statistics of different balance sheet characteristics of CP issuers. For a detailed description of these variables see Table A1

Panel A: Distribution by sector

Sector	#Firms	%Firms	%Issued	Largest issuer	%Comp. size
All	379	100.00	100.00	—	39.71
Communication	17	4.49	2.36	Disney	38.28
Consumer Discr.	44	11.61	6.44	Ford	41.70
Consumer Staples	37	9.76	17.19	Coca Cola	57.21
Energy	45	11.87	12.44	Exxon Mobil	37.09
Health Care	33	8.71	7.14	Pfizer	42.90
Industrials	52	13.72	19.37	General Electric	33.80
IT	19	5.01	16.53	Apple	33.26
Materials	29	7.65	4.38	BASF	18.61
Utilities	103	27.18	14.15	Duke Energy	51.91

Panel B: Distribution of CP size and maturity

	CP size (in million USD)						
Initial Maturity	10^{th}	25^{th}	median	mean	75^{th}	90^{th}	% Issuance
1 to 3 days	14.5	36.5	100.0	346.7	250.0	605.0	23.72
4 to 9 days	19.0	40.0	93.0	260.0	204.2	449.7	15.13
10 to 19 days	20.0	40.0	90.8	206.1	205.0	435.0	10.61
20 to 39 days	25.0	53.0	124.1	279.8	278.9	571.3	20.61
40 to 79 days	25.0	58.8	144.8	402.6	326.3	743.7	14.34
80 to 99 days	25.0	57.1	150.0	364.9	326.5	728.4	6.36
100 to 179 days	16.5	56.0	174.1	424.3	432.9	945.9	3.21
more than 180 days	25.0	63.3	160.4	424.9	384.2	892.8	6.02

Panel C: Balance sheet summary statistics

	10^{th}	25^{th}	Mean	Median	75^{th}	90^{th}	N
Assets (billion USD)	5.29	9.89	51.78	23.66	57.02	129.91	1468
Debt (% of assets)	19.38	25.54	33.34	31.97	39.53	50.05	1468
Short-term debt (% of debt)	1.05	5.44	14.48	11.58	19.20	32.15	1468
year-end CP debt (% of short-term debt)	0.00	0.00	33.51	21.47	61.90	97.02	1468
year-avg CP debt (% of short-term debt)	3.86	15.02	64.50	42.31	88.59	212.08	1468
Current ratio	-26.56	-13.59	2.62	2.72	17.31	31.87	1444
Current surplus	0.00	0.00	0.54	1.00	1.00	1.00	1444
Cash ratio	-93.01	-64.91	-4.77	-9.12	52.15	89.10	1468

large firms. Moreover, as percentage of assets, the average debt is 33.34% of which 14.48% are classified as short-term debt (i.e., debt with less than one year to maturity). The year-end and year-average CP debt constitute on average 33.51% and 64.50% of the disclosed short-term debt. Importantly, the year-end CP debt is close to 100% of the disclosed short-term debt for 10% of our sample and the importance of CP debt more than doubles when we use year-average volumes.

Finally, the key variables of interest for our analysis are firms' current assets and liabilities. While the current ratio is typically defined as current assets divided by current liabilities, we modify this variable to mitigate the impact of large outliers and define it as $\frac{Cur\ at - Cur\ liab}{Cur\ at + Cur\ liab} \times 100$. As we can see from the table, this modified current ratio is marginally positive on average. We next define an indicator variable *Current surplus* that equals one if a company has more current assets than current liabilities and the table shows that 54% of our firm-year observations have a current surplus and we note that this variable fluctuates over time within the same issuer, which we later utilize to examine variation within the same issuers. Finally, as alternative liquidity ratio, we use firms' cash holdings, measured as ratio of "cash and short-term investments", relative to firms short term debt. As with the current ratio, we construct a continuous variable capturing the cash ratio, which we define as the difference between cash holdings and short-term debt, standardized by the sum of the two variables. This variable fluctuates between a 10% quantile of -93.01% to a 90% quantile of 89.10%.

3 Debt Repayments Around Disclosure Dates

We now establish the main stylized fact of our paper: Firms substantially reduce their outstanding short-term debt at their disclosure dates. We first show that non-financial CP

volumes drop at quarter-end and year-end dates in the aggregate market and then confirm that CP repayments (i.e., occasions when a company does not roll over its short-term debt) are a cross-sectional phenomenon that aligns with firms' reporting dates, independent of whether the reporting year aligns with the calendar year. Throughout this section, we examine if the lending supply hypothesis can explain the observed patterns.

As a starting point, we illustrate debt repayments around disclosure dates for six major CP issuers: Sanofi, Colgate, 3M Company, Dow Chemicals, Philip Morris, and Siemens. Figure 2 shows the outstanding CP debt for the six companies together with vertical lines indicating the last trading day of a calendar quarter. We highlight quarter-end dates because the quarterly reports of all six companies are based on numbers observed at the end of each calendar quarter and note that, with the exception of Sanofi, whose year-end reporting is based on September numbers, all companies' annual reporting aligns with the end of the calendar year. Figure 2 shows that these companies drastically reduce their CP debt at quarter-end dates, frequently repaying their entire CP debt. The figure also illustrates that CP repayments are qualitatively different from the "funding dry-ups" studies by Pérignon et al. (2018) because the companies immediately re-issue CPs after the disclosure date.

3.1 Market-Wide CP Repayments

We first examine the aggregate daily outstanding volume for our matched sample of 378 firms and use weekly outstanding CP volumes provided by the New York FED as additional test afterwards. To test for drops in CP volumes at quarter-end and year-end dates, we regress the time series of outstanding CP debt on two dummy variables QEnd_t^{Cal} and YEnd_t^{Cal} that equal one for the last observation in the calendar quarter and calendar year, respectively. To mitigate the impact of a potential time trend, we control for year-fixed effects.

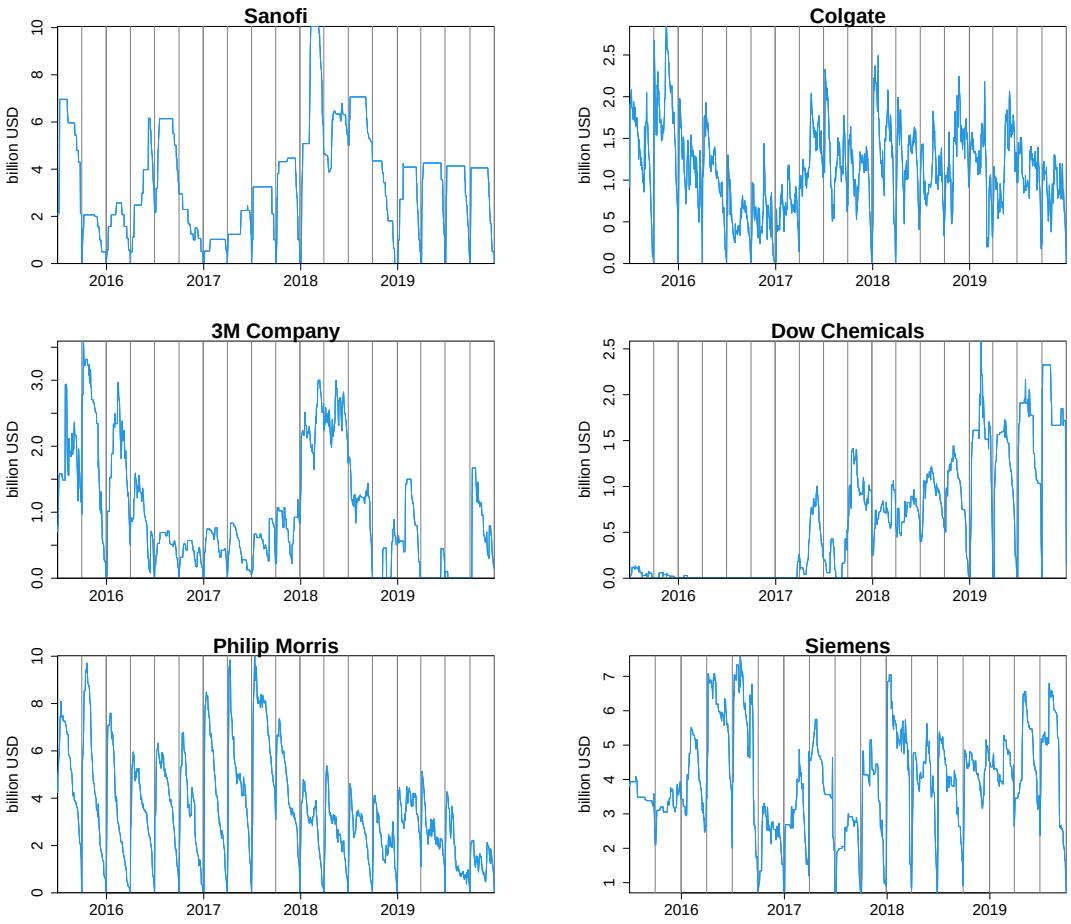


Figure 2: **Examples of strategic CP repayments.** This figure gives six examples of non-financial CP issuers that systematically reduce their CP volumes on regulatory reporting dates. The quarter-end of all six sample firms aligns with the end of the calendar quarter and the year-end of Sanofi falls on the end of September while the year end of all other firms aligns with the end of the calendar year. Vertical lines indicate the last trading day of a quarter.

Table 2: **Quarter-end and year-end effects on aggregate CP volumes.** Columns (1) and (2) show the results of regressing daily outstanding volumes of non-financial CP (constructed based on our sample of non-financial CP issuers) on two indicator variables QEnd_t^{Cal} and YEnd_t^{Cal}, which equal one in the last trading day of the calendar quarter and the last trading day of the calendar year, respectively. Columns (3) – (6) show the results of regressing weekly outstanding volumes of non-financial CPs (Columns (3) and (4)) and other CPs, which include asset backed CP and financial CP (Columns (5) and (6)), on two indicator variables QEnd_t^{Cal} and YEnd_t^{Cal}, which equal one in the last week of the calendar quarter and the last week of the calendar year, respectively. The weekly CP volumes in Columns (3) – (6) are observed every Wednesday and obtained from the New York FED. The sample is July 2015 to December 2019. The numbers in parantheses show heteroskedasticity-robust t-statistics. ***, **, and * indicate significance at a 1%, 5%, and 10% level, respectively.

	DTCC volumes		New York FED volumes			
	Non-financials		Non-financials		Other	
	(1)	(2)	(3)	(4)	(5)	(6)
QEnd_t^{Cal}	-30.71^{***}	-20.91^{***}	-14.25^{***}	-7.17^{**}	1.80	4.98
	(-5.85)	(-5.22)	(-3.20)	(-2.03)	(0.24)	(0.67)
YEnd_t^{Cal}		-35.30^{***}		-25.48^{***}		-11.43
		(-3.89)		(-2.80)		(-0.60)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.24	0.24	0.61	0.63	0.44	0.44
Num. obs.	1,153	1,153	235	235	235	235

In Columns (1) and (2) of Table 2, we examine the aggregate daily CP volumes from our matched sample and confirm that CP volumes drop on the last business day of the calendar quarter. Given that the average outstanding CP volume in our sample is approximately $250 billion, the average quarter-end drop of $30.71 billion suggests that the firms in our sample, on average, repay around 12% of their CP debt at quarter end dates. These repayments are significantly more pronounced at year-end dates, where the effect increases up to $56.21 $(20.91 + 35.30)$ billion, suggesting *average* repayments around 23%. Focusing on weekly non-financial CP volumes provided by the New York FED, Columns (3) to (4) corroborate the results for our matched sample; aggregate non-financial CP volumes drop at quarter-end

dates with significantly stronger drops at year-ends. Despite of a potential timing issue—the New York FED volumes are observed every Wednesday, which makes it difficult to capture the effect on the last day of the quarter or year—the magnitude of these repayments remains economically meaningful with average decreases of $14.25 billion at quarter-ends and $32.65 billion $(7.17 + 25.48)$ at year-ends.

To examine if these drops in CP volumes could simply reflect lending supply frictions in the CP market, we exploit that the New York FED also provides volumes for financial CPs and asset-backed CPs. In Columns (5) to (6), we repeat our analysis for the aggregate volume of financial and asset-backed CPs. In sharp contrast to the results for non-financial CPs in Columns (1) to (4), we find no significant drops in the volumes of these other segments of the CP market (Figure A1 in the appendix contains plots of the financial CP and asset-backed CP volumes).[4] Taken together, Columns (5) and (6) suggest that non-financial CP debt repayments are difficult to reconcile with limited lending supply at quarter-end and year-end dates, which would affect other CP segments too.

3.2 Issuer-Level CP Repayments

We next examine CP repayments at the issuer level more formally and study within-issuer variations in CP debt. To that end, we run panel regressions of the following form:

$$\log(Outst_{i,t} + 1) = \beta^{QEnd}\text{QEnd}_{i,t}^{Report} + \beta^{YEnd}\text{YEnd}_{i,t}^{Report} + FE_i \times FE_k + \varepsilon_{i,t}, \qquad (1)$$

[4]In contrast to non-financial issuers of CPs, banks and other financial intermediaries tend to engage in liquidity transformation, by financing long-term investments with short-term debt. Hence, it is less feasible for these issuers to repay their short-term debt at reporting dates. In addition, financial institutions have access to a wide range of short-term debt, such as overnight repurchase agreements, where window dressing is apparent (e.g., Klingler and Syrstad (2020), Du et al. (2018), Rime, Schrimpf, and Syrstad (2017), among many others).

where $\log(Outst_{i,t}+1)$ is the log amount of CPs outstanding for firm i at day t. Because the outstanding volumes can drop to zero, we add one dollar to ensure that the logarithm is bounded below. $\text{QEnd}_{i,t}^{Report}$ and $\text{YEnd}_{i,t}^{Report}$ are dummy variables that equal one on the quarter-end and year-end disclosure date of company i, taking firm-specific reporting dates into account instead of focusing on calendar quarter and calendar year effects. $FE_i \times FE_k$ capture firm-year fixed effects, which means that we effectively compare the outstanding volumes at quarterly and annual reporting dates to yearly averages.

Focusing first on the coefficient estimates of Equation (1) for the full sample, Columns (1) and (2) of Table 3 confirm our earlier results—outstanding CP volumes debt drop significantly at individual firms' quarter-end disclosure dates and the magnitude of these drops more than doubles on year-end disclosure dates. These results suggest that CP repayments are a persistent phenomenon across CP issuers that is most pronounced around year-end reporting dates.

We next use the fact that, for 81 of the 378 issuers in our sample, the reporting year does not align with the calendar year to distinguish reporting year effects from calendar year effects.[5] Column (3) shows that the drops in outstanding volumes at the end of the reporting year are qualitatively similar for firms whose reporting date aligns with the end of the calendar year ($Regular$) and firms whose reporting does not align with the end of the calendar year ($Irregular$). Hence, firms reduce their CP debt at their specific year-end date, independent of whether this year end corresponds to the end of the calendar year. As a second test, we examine if the CP repayments for firms whose reporting year does not align with the end of the calendar year, differ from other quarter-end dates at the end of

[5]For a small subsample of 31 firms, the end of the reporting quarter does not even align with the end of the calendar quarter. Given the small sample of firms whose quarterly reporting dates do not align with the end of the calendar quarter, we do not examine this sample separately.

Table 3: **Calendar year-end and reporting year-end effects on CP volumes.** This table compares the year-end effect on CP volumes for firms whose year-end aligns with the end of the calendar year (*Regular*) to the year-end effect for firms whose reporting year does not end at the end of the calendar year (*Irregular*). The dummy variables $\text{QEnd}_{i,t}^{Report}$ and $\text{YEnd}_{i,t}^{Report}$ equal one on the quarterly or annual reporting date of a firm. The dummy variable $\text{YEnd}_{i,t}^{Cal}$ equals one on the last day of the calendar year (and is equal to $\text{YEnd}_{i,t}^{Cal}$ for *Regular* issuers). *Regular* and *Irregular* are dummy variables that equal one if the year-end reporting date does or does not align with the end of the calendar year. The sample includes CP volumes for all matched issuers, conditional on the issuer having a positive average CP volume in a given reporting year. The sample period is July 2015 to December 2019. The numbers in parantheses show heteroskedasticity-robust t-statistics which are clustered at the firm and date level. ***, **, and * indicate significance at a 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
$\text{QEnd}_{i,t}^{Report}$	-0.84^{***}	-0.61^{***}	-0.61^{***}	-0.70^{***}
	(-4.46)	(-3.36)	(-3.36)	(-3.87)
$\text{YEnd}_{i,t}^{Report}$		-0.81^{***}		
		(-3.18)		
$\text{YEnd}_{i,t}^{Report} \times Regular$			-0.72^{**}	-0.63^{**}
			(-2.56)	(-2.15)
$\text{YEnd}_{i,t}^{Report} \times Irregular$			-1.18^{**}	
			(-2.09)	
$\text{YEnd}_{t}^{Cal} \times Irregular$				0.12
				(0.19)
Issuer × Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.59	0.59	0.59	0.59
Num. obs.	330,409	330,409	330,409	330,409

the calendar year. Column (4) suggests that the CP repayments at calendar-year ends for these firms are not significantly different from other quarter-end dates. Hence, the results in Table 3 are inconsistent with year-end supply frictions as main explanation.

3.3 Ruling Out Quarter-End Frictions

We next use the transact level of our dataset to test for quarter-end frictions during our sample period. Specifically, we compare the yield spreads of CPs maturing in the following

calendar quarter or calendar year to yield spreads of comparable CPs that do not cross a quarter-end or year-end date. If lending supply at these dates were an issue, we would expect CPs maturing in the following calendar quarter or year to have significantly higher yield spreads than comparable CPs that mature within the same calendar quarter or year. We compute the spread between yields of newly-issued CPs in our sample and the maturity-matched overnight-index swap (OIS) rates, interpolated between adjacent OIS maturities.[6] To focus on comparable CP issuance, we use transactions at the issuance date, control for the time to maturity and issuance volume of each issued CP, add issuer-fixed effects as well as issuance-week fixed effects, and split the sample into CPs with less than 90 days to maturity (which might not cross the end of a calendar quarter) and CPs with at least 90 days to maturity.

We test the link between CP yield spreads and dummy variables, $Cross_j^{QEnd}$, $Cross_j^{QEnd\backslash YEnd}$, and Cross_j^{YEnd}, which equal one if a CP crosses the end of a calendar quarter, the end of a calendar quarter which is not the end of a calendar year, or the end of a calendar year. Focusing first on CPs with less than 90 days to maturity, Column (1) of Table 4 suggests that there is virtually no quarter-end effect on CP yields. By separating quarter-end and year-end effects Column (2) confirms that there are no quarter-end effects during the calendar year and an economically small effect of 1.24 basis points at the end of the calendar year. Column (3) shows that this year-end effect is qualitatively similar, but not statistically significant for CPs with more than 90 days to maturity. Hence, Table 4 suggests that there are no lending supply frictions at the end of the calendar quarter and economically small costs at the end of the calendar year. However, given that substantial year-end repayments

[6]To avoid our results being affected by large outliers (yields of CPs with short maturities can be extremely volatile), we winsorize yields at the 99.5% and 0.5% percentiles. Table A1 in the appendix contains more details on our OIS interpolation and Figure IA.1 in the Internet Appendix compares monthly averages for 1-month and 3-month CP yields to monthly averages obtained from the New York FED.

Table 4: **CP yields over quarter-ends and year-ends.** This table shows regressions of non-financial CP yield spreads relative to OIS rates (in basis points) on three different indicator variables. $Cross_{i,j}^{QEnd}$ equals one if the issuance and maturity date of the CP are in different calendar quarters and zero otherwise. $Cross_{i,j}^{QEnd\backslash YEnd}$ equals one if the issuance and maturity date of the CP are in different calendar quarters but within the same caledar year. $Cross_{i,j}^{YEnd}$ equals one if the issuance and maturity date of the CP are in different calendar years and zero otherwise. $TTM_{i,j,t}$ is the time to maturity (in days) of the issued security. $\log(Volume)_{i,j,t}$ is the logarithm of the transaction volume of the traded CP. All specifications include issuer and time (week-year) fixed effects and we focus on yields of CPs transacted on the issuance date. The numbers in parantheses are heterskedasticity-robust t-statistics, clustered at the issuance date and issuer level. ***, **, and * indicate significance at a 1%, 5%, and 10% level, respectively. The sample includes all issuers in our matched sample for the December 2014 – December 2019 period.

	< 90 *days*		≥ 90 *days*
	(1)	(2)	(3)
$Cross_{i,j}^{QEnd}$	0.08		
	(0.24)		
$Cross_{i,j}^{QEnd\backslash YEnd}$		-0.29	
		(-0.83)	
$Cross_{i,j,t}^{YEnd}$		1.17^{**}	1.42
		(2.15)	(1.28)
$TTM_{i,j,t}$	0.26^{***}	0.26^{***}	0.10^{***}
	(22.65)	(22.56)	(6.96)
$\log(Volume)_{i,j}$	-0.60^{***}	-0.60^{***}	0.31^{*}
	(-4.88)	(-4.87)	(1.83)
Issuer FE	Yes	Yes	Yes
Week-Year FE	Yes	Yes	Yes
Adj. R^2	0.80	0.80	0.84
Num. obs.	232,167	232,167	17,615

are also observed for firms whose reporting year does not align with the calendar year, this finding gives us further reassurance that lending supply frictions are not the main driver of the observed CP debt repayments.

4 Strategic Short-Term Debt Disclosure

We now link the drops in outstanding CP volumes to strategic short-term debt disclosure by firms with a current surplus.

4.1 CP Repayments and Current Ratio Optimization

As a starting point, we modify our analysis of issuer-level CP volumes from Section 3.2 and examine the role of an indicator variable, $Surplus_{i,k}$, which equals one at the end of quarter k if company i discloses current assets in excess of current liabilities and zero otherwise. Column (1) of Table 5 reproduces the results from Section 3.2 and shows that the average issuer reduces its outstanding CP volumes at quarterly reporting dates. Turning to the role of $Surplus_{i,k}$, Column (2) reveals a strikingly clear picture: CP repayments are entirely driven by firms with a current surplus at the reporting date. Once we interact the end of the reporting quarter with $Surplus_{i,k}$, the quarter-end dummy for the remaining firms becomes insignificant and, compared to the full sample, the magnitude of CP repayments for firms with cash surplus almost doubles from -0.84 to -1.62 $(= -1.69 + 0.07)$.

Turning to the difference between reporting quarters and reporting years, Column (3) shows a modification of the analysis from Section 3.2, where we estimate the average quarter-end drops, which do not fall on the end of the reporting year, and the average year-end drops. This modification allows us to separate the year-end effects for firms with a disclosed current surplus and other firms. Corroborating our earlier results, Column (4) shows that there are no significant quarter-end or year-end effects for firms without a current surplus. By contrast, firms with a current surplus reduce their CP debt at quarter-end dates and the magnitude of these reductions increases to -2.44 $(= -2.16 - 0.28)$ on year-end reporting

Table 5: **CP repayments for firms with and without current surplus.** This table compares the reporting date effects on CP volumes for firms that report a current surplus (i.e., current assets > current liabilities) on their disclosure date and other firms. The indicator variables $\text{QEnd}_{i,t}^{Report}$ and $\text{YEnd}_{i,t}^{Report}$ equal one on the quarterly or annual reporting date of firm i and zero otherwise. $Surplus_{i,t}$ is a indicator variable that equal one if firm i discloses cash holdings that exceed its short-term debt on quarter-end. The sample includes CP volumes for all matched issuers, conditional on the issuer having a positive average CP volume in a given reporting year. The sample period is July 2015 to December 2019. The numbers in parantheses show heteroskedasticity-robust t-statistics which are clustered at the firm and date level. ***, **, and * indicate significance at a 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
$\text{QEnd}_{i,t}^{Report}$	-0.85^{***}	0.07	-0.62^{***}	
	(-4.53)	(0.31)	(-3.44)	
$\text{QEnd}_{i,t}^{Report} \times Surplus_{i,t}$		-1.69^{***}		
		(-5.70)		
$(\text{QEnd} \setminus \text{YEnd})_{i,t}^{Report}$				0.20
				(0.97)
$(\text{QEnd} \setminus \text{YEnd})_{i,t}^{Report} \times Surplus_{i,t}$				-1.52^{***}
				(-5.49)
$\text{YEnd}_{i,t}^{Report}$			-0.81^{***}	-0.28
			(-3.22)	(-0.73)
$\text{YEnd}_{i,t}^{Report} \times Surplus_{i,t}$				-2.16^{***}
				(-4.09)
Issuer × Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.59	0.59	0.59	0.59
Num. obs.	331,562	331,562	331,562	331,562

dates.

Timing of CP Repayments

To shed more light on the exact timing of these CP repayments, we define a of dummy variable $\text{QEnd}_{i,\tau}^{Report}$ that equals one if τ is within the last five business days of firm i's reporting quarter. We then split the sample into firm-quarters with current surplus at the quarterly reporting date and other firms, separately running the following regressions for the

two types of firms:

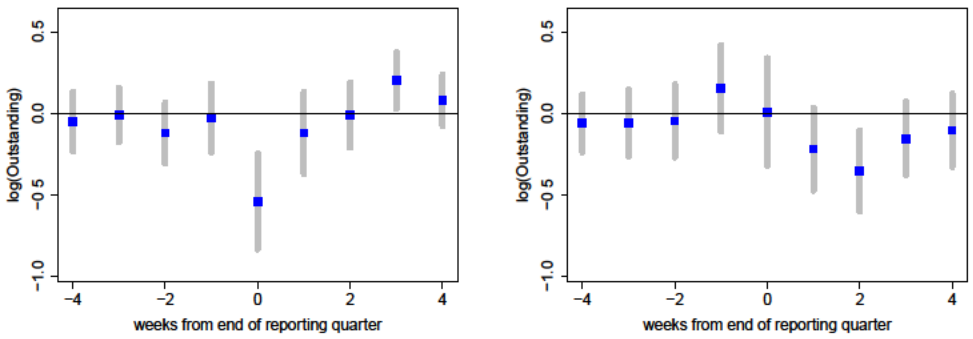
$$\log(Outst_{i,k}+1) = \sum_{j=-4}^{4} \beta_j \text{QEnd}_{i,\tau+j}^{Report} + FE_k \times FE_i + \varepsilon_{i,k}. \quad (2)$$

In these regressions, β_j captures the average outstanding volume j weeks from the last week of the reporting quarter. As before, we add issuer-year fixed effects to the specification and now effectively compare the outstanding volume j weeks from quarter-end to the average outstanding volume in the middle of the reporting quarter (5, 6, or 7 weeks before and after the end).

As mentioned above, to illustrate the issuance and repayment behavior of firms with or without current surplus, we split the sample of all CP issuers into two, based on their current ratio at the end of the reporting quarter. Figure 3 shows the coefficient estimates (blue dots) and 95% confidence bars (grey bars) for the two subsamples. As illustrated in Panel (a), the outstanding CP volumes for firms with current surplus drop significantly below the average volumes in the last week of the calendar quarter. By contrast, Panel (b) shows that there is no significant effect for firms without current surplus around the end of the reporting quarter.

4.2 Economic Magnitude of CP Repayments

Turning to the economic magnitude of these CP repayments, we focus on two alternative proxies. In the remainder of the paper, we keep our presentation of main results parsimonious by focusing on reductions in CP debt at the end of a firm's reporting year. Hence, we illustrate the most substantial repayments in the body of the paper and show in the appendix that, even though the economic magnitudes are smaller at quarter-end date, the role of

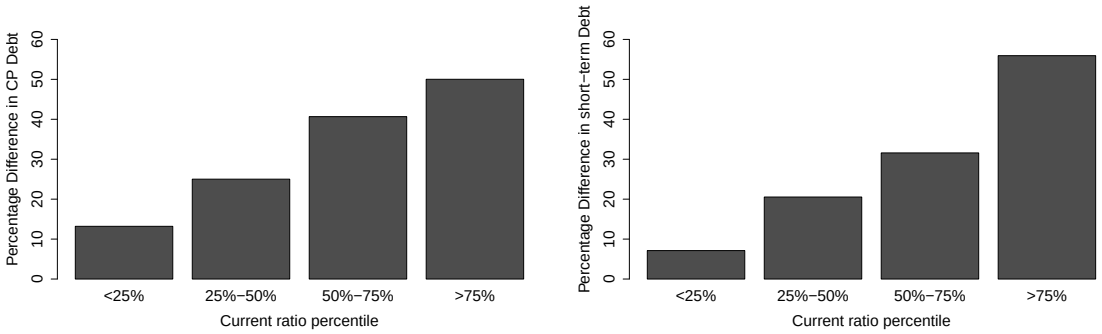


(a) *Current Ratio* > 1 at quarter-end (b) *Current Ratio* ≤ 1 at quarter-end

Figure 3: **Oustanding CP volumes around quarterly disclosure dates.** This figure visualizes the results of regressing the panel of $\log(Outst_{i,t} + 1)$ on a set of dummy variables that equal one on the last five business days of the reporting period ($t = 0$), as well as 1–4 weeks before ($t = -4, \ldots, -1$) or after ($t = 1, \ldots, 4$) the last five days of the reporting period. In these specifications, the reporting period is measured in firm-level reporting quarters. The sample is split based on the disclosed current assets and current liabilities on the reporting date. Panel (a) shows the results for the subsample of firms that report current assets in excess of their current liabilities. Panel (b) shows the results for all other firms. The regressions include firm-year fixed effects. The sample is March 2015 to December 2019 and the grey bars show heteroskedasticity-robust standard errors at a 95% confidence level, which are clustered at the firm and date level.

current surplus remains largely unchanged. To proxy the economic magnitudes, we focus on the difference between year-average and year-end volumes and divide this difference either by the sum of year-average and year-end volume (to obtain a proxy for the percentage repayment) or by the total amount of disclosed short-term debt. We then split the firm-years into quartiles based on their cash ratio in year k.

Figure 4 illustrates the results of these sample splits, where $> 75\%$ corresponds to the quartile with the highest current ratio and $< 25\%$ to the quartile with the lowest current ratio. Focusing first on our proxy of percentage repayments, Panel (a) illustrates that firms with the highest current ratio repay an average of approximately 50% of their CP debt at the end of the reporting year while firms with the lowest cash ratio conduct repayments of



(a) Percentage rapaid

(b) Percentage of short-term debt

Figure 4: **CP repayments for firms with different current ratios.** This figure illustrates average CP repayments for four different subsamples split by their *Current Ratio*. $< 25\%$ and $> 75\%$ correspond to the samples with *Current Ratios* below the 25% quartile and above the 75% quartile, respectively. Panel (a) shows the percentage difference between period-average and period-end CP debt (as percentage of the sum of period-average and period-end debt). Panel (b) shows the difference between period-average and period-end CP debt as percentage of disclosed short-term debt. In Panel (b), we wincorize the percentage difference at the 90% threshold to avoid large outliers due to low disclosed short-term debt.

approximately 10%. Focusing next on CP repayments relative to the disclosed short-term debt, Panel (b) shows that the disclosed short-term debt would increase by approximately 60% for firms with the highest current ratio if we considered year-average volumes instead of year-end volumes. As for the percentage proxy before, these repayments drop monotonically for firms with lower current ratios and firms with the lowest current ratios repay an average of around 5% of their short-term debt.

4.3 Alternative Explanations?

We now use regression analysis to examine if the link between CP repayments and current surplus is robust to additional controls and to test the additional supply-based explanations

discussed in Section 1. To that end, we run regressions of the following form:

$$\mathcal{D}_{i,k} = \beta^{CS} Current\ Ratio_{i,k} + \gamma Controls_{i,k} + FE_i + FE_k + \varepsilon_{i,k}, \tag{3}$$

where $\mathcal{D}_{i,k}$ is the difference between year-average and year-end CP debt, divided by the sum of the two variables and current ratio is defined as $\frac{CurrAt-CurrLiab}{CurrAt+CurrLiab}$ to avoid huge outliers for current liabilities close to zero. Compared to the non-parametric tests from the previous section, this approach has the advantage that we can control for other firm characteristics, test our alternative hypotheses, and examine the role of time, and industry, or issuer fixed effects. As before, we focus our analysis on annual reporting dates in the body of the paper and relegate additional tests with quarterly data (which give similar results) to the Internet Appendix.

As a starting point, we note that it is plausible that CP repayments are more common among smaller and younger firms, firms with more debt, or firms in riskier industries. To examine these possibilities, we control for the debt level relative to firm assets ($Debt_{i,k}$), total assets ($\log(Assets)_{i,k}$), firm age ($Age_{i,k}$), and industry fixed effects (measured with the first two digits of the SIC code) in our specifications. We also test later if CP repayments are simply driven by some unobservable firm characteristics as captured by issuer fixed effects.

To test the *spending hypothesis,* we add capital expenditures ($Capex_{i,k}$), research and development spending ($RnD_{i,k}$), and a dummy variable that equals one if a company pays dividends ($\mathbb{1}(Dividend)_{i,k}$) to the regression. We also test two extensions of this hypothesis. First, it is plausible that firms with better governance suffer less from this problem and we therefore examine if governance, which we measure as the fraction of stocks held by institutional investors ($IOR_{i,k}$) affects CP repayments. Second, firms with stronger growth

options might face additional investment pressure and we examine this hypothesis using the market-to-book ratio as proxy for growth options.

To test the *risk hypothesis*, we control for the standard deviation of firm earnings over the past five reporting years ($\sigma(Earnings)_{i,k}$) and the companies' stock market beta ($\beta_{i,k}^{Mkt}$). The standard deviation of firm earnings is a common proxy of companies' rollover risk (e.g., Calomiris et al., 1995, or Kahl et al., 2015) and using the stock-market beta as proxy for systematic risk exposure is motivated by Acharya et al. (2013) who show that accessing credit lines is more difficult for companies with higher stock market risk.

Regression Analysis

We conduct our analysis in four steps. First, because β^{Mkt}, IOR and M/B are only available for the subset of firm-years with available stock prices, we first run our analysis without these three controls. Second, we repeat the analysis with all controls. Third, while we incorporate industry fixed effects (measured by the first two digits of a company's SIC code) in the first two specifications, we control for unobserved firm characteristics by adding issuer fixed effects. Finally, instead of using ordinary least squares (OLS) regressions and $\mathcal{D}_{i,k}$ as measure of CP repayments, we focus on a dummy variable $\mathbb{1}(Repay)_{i,k}$ that equals one if company i reduces its outstanding CP debt to zero at the end of reporting year k and repeat the first three steps using logistic regressions.

Starting with the first step, Column (1) of Table 6 shows a statistically and economically significant link between CP repayments and $Current\ Ratio_{i,k}$. In particular, the current ratio is highly statistically significant and a one standard deviation increase in this variable ($sd = 22.88$) increases $\mathcal{D}_{i,k}$ by 12.1 percentage points.[7] This result remains virtually un-

[7]Throughout the paper, we cluster the standard errors in our regressions at the issuer level. An alternative approach would be using double-clustered standard errors at the time and issuer level. However, because our

changed when adding the three market-based controls in Column (2) and the coefficient on $Current\ Ratio_{i,k}$ increases even further in Column (3), when we add issuer fixed effects to our specification. Turning to the logistic regressions, Columns (4) to (6) corroborate our earlier results and show that firms with more cash surplus have a higher propensity to repay their entire CP debt.

Turning to the alternative explanations, Table 6 shows that controlling for proxies of the spending hypothesis and risk hypothesis does not affect the statistical and economic significance of cash surplus. While we find little evidence for the spending hypothesis—$Capex_{i,k}$, $RnD_{i,k}$, and $\mathbb{1}(Dividends)_{i,k}$ all enter the regression with a negative sign, but only one of the variables is significant once—we find some evidence in favor of the risk hypothesis. Firms with more volatile earnings reduce their CP debt more aggressively and the coefficient on $\sigma(Earnings)$ is statistically significant in five of the six regression specifications.

4.4 Alternative Surplus Measures

While the current ratio is a reasonable proxy for cash buffers, it is plausible that companies' strategic CP repayments target alternative liquidity ratios that are more closely related to their cash buffers. To test this possibility, we examine how our results change when we replace the current ratio with the *Cash Ratio* defined as cash minus short-term debt, divided by the sum of the two variables. While this ratio is a less common accounting variable, targeting it can be motivated by rating agencies' close focus on short-term debt and sufficient cash buffers against this short-term debt. As before, we run OLS regressions of $\mathcal{D}_{i,k}$ now replacing

panel has a relatively small time dimension, clustering at the time level is not crucial and could even inflate the resulting t-statistics. We follow the rule of thumb proposed by Angrist and Pischke (2008) and compare the t-statistics with and without clustering at the time level. In Column (1), the t-statistic with clustering at time level is 4.47 and almost identical to the reported t-statistic. Hence, we view standard errors clustered at the issuer level as sufficiently conservative and use them throughout the paper.

Table 6: **Link between CP repayments and current surplus.** The dependent variable in this table is either the difference between the year-average and year-end CP debt (in USD) for firm i, divided by the sum of these two variables (Columns (1) to (3)) or a dummy variable that equals one if a company repays its entire CP debt at year-end (Columns (4) to (6)). The independent variables are all measured for company i in year k. The main independent variable captures the difference between current assets and current liabilities of company i in year k ($Current\ Surplus_{i,k}$), which is divided by the sum of short-term debt and cash holdings for the same issuer-year. For a detaild description of the other variables see Table A1. All regressions include year-fixed effects; Columns (1), (2), (4), and (5) also include industry fixed effects, measured as the first two digits of a companies SIC code; Columns (3) and (6) also include issuer fixed effects. Columns (1)–(3) show the results of ordinary least squares (OLS) regressions while Columns (4)–(6) show the results of logistic regressions. In Columns (4)–(6), Adj. R^2 is the MacFadden pseudo R^2. The numbers in parantheses are heterskedasticity-robust t-statistics, clustered at the issuer level. ***, **, and * indicate significance at a 1%, 5%, and 10% level, respectively. The sample includes all issuers in our matched sample for the July 2015 – December 2019 period.

	OLS regressions of $\mathcal{D}_{i,k}$			Logit regressions of $\mathbb{1}(Repay)$		
	(1)	(2)	(3)	(4)	(5)	(6)
$Current\ Surplus_{i,k}$	0.53^{***}	0.51^{***}	1.26^{***}	0.03^{***}	0.03^{***}	0.11^{***}
	(5.09)	(4.69)	(7.04)	(6.92)	(6.17)	(6.19)
$Debt_{i,k}$	-0.13	-0.20	-0.40	-0.01^{**}	-0.02^{***}	-0.07^{*}
	(-0.68)	(-0.96)	(-1.02)	(-2.23)	(-2.60)	(-1.96)
$\log(Assets)_{i,k}$	-1.06	-1.66	7.02	-0.07	-0.06	1.53
	(-0.62)	(-0.87)	(0.53)	(-1.12)	(-0.75)	(1.23)
$Age_{i,k}$	-0.02	0.09	4.63	-0.00	0.00	-0.01
	(-0.15)	(0.64)	(0.68)	(-0.14)	(0.50)	(-0.01)
$Capex_{i,k}$	-0.36	-0.71	0.99	-0.00	-0.01	-0.15
	(-0.42)	(-0.74)	(0.68)	(-0.14)	(-0.29)	(-1.17)
$RnD_{i,k}$	-0.63	-0.48	-0.12	-0.01	-0.01	0.13
	(-0.76)	(-0.52)	(-0.03)	(-0.32)	(-0.32)	(0.34)
$\mathbb{1}(Dividend)_{i,k}$	-7.20	-10.73	-23.56^{**}	-0.21	-0.43	-33.07
	(-0.87)	(-1.05)	(-2.53)	(-0.65)	(-0.89)	
$\sigma(Earnings)_{i,k}$	1.75^{**}	2.01^{**}	2.56^{*}	0.07^{**}	0.09^{***}	0.25
	(2.27)	(2.55)	(1.88)	(2.27)	(2.61)	(1.58)
$\beta_{i,k}^{Mkt}$		4.20^{**}	1.25		0.04	-0.21
		(2.02)	(0.61)		(0.38)	(-1.09)
$IOR_{i,k}$		0.06	-0.13		0.01^{**}	-0.01
		(1.01)	(-1.39)		(2.31)	(-1.35)
$M/B_{i,k}$		-0.01	0.09		-0.00	0.01^{**}
		(-0.40)	(1.50)		(-0.30)	(2.40)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	Yes	Yes	No
Issuer FE	No	No	Yes	No	No	Yes
Adj. R^2	0.14	0.18	0.39	0.12	0.31	0.35
Num. obs.	1430	1133	1133	1430	1133	1133

the current ratio with the cash ratio. In all regression specifications, we include the same baseline controls as in Column (1) of Table 6. In addition, we include a variable capturing the remaining part of the current ratio:

$$Current\ Ratio^{Ex} = \frac{(Cur\ At - Cash) - (Cur\ Liab - Debt^{ST})}{(Cur\ At - Cash) + (Cur\ Liab - Debt^{ST})}.$$

We proceed in four steps. First, starting with the baseline regression, Column (1) of Table 7 shows that the cash buffer as proxied by the *Cash Ratio* is even more significant in explaining CP repayments than the current ratio. Strikingly, a one standard deviation ($sd = 65.1$) increase in the disclosed cash ratio increases the percentage CP repayments by 26 percentage points and the economic magnitude more than doubles compared to using the current ratio. Moreover, the adjusted R^2 of the regressions including cash ratios is 24% and 10 percentage points higher than the adjusted R^2 using current ratios in Column (1) of Table 6. Second, to test if it is simply the short-term in the cash ratio driving the results, we repeat our analysis controlling for the amount of short-term debt. As shown in Column (2), adding this control leads to a marginal decrease in statistical and economic significance of the cash ratio. Third, to further distinguish the effect of a cash surplus from the separate role of short-term or cash holdings, we define an indicator variable that equals one if company i has a cash surplus relative to its short-term debt in year k. We then repeat the analysis, replacing the cash ratio with the indicator variable and controlling for both cash holdings and outstanding short-term debt. As shown in Column (3), this variable is highly statistically significant, confirming that it is the balance between cash holdings and short-term debt that drives CP repayments. Finally, we repeat the first three tests adding issuer fixed effects to our specification. As shown in Columns (4) to (6), the results remain largely unchanged using this specification.

Table 7: **Link between CP repayments and different surplus measures.** The dependent variable in this table is the difference between the year-average and year-end CP debt (in USD) for firm i, divided by the sum of these two variables. The independent variables are all measured for company i in year k. $Cash\ Ratio_{i,k}$ is the difference between cash and liquid asset holdings and short-term debt, divided by the sum of the two variables. $\mathbb{1}(Cash\ Surplus)_{i,k}$ is an indicator variable that equals one if company i has more cash and liquid assets than short-term debt in period k. $Current\ Ratio^{Ex}_{i,k}$ captures the difference between current assets excluding cash and current liabilities excluding short-term debt, divided by the sum of the two variables. We include the same additional controls as in Columns (1) of Table 6 in all specifications. For a detaild description of the other variables see Table A1. All regressions include year-fixed effects; Columns (1) to (3) also include industry fixed effects, measured as the first two digits of a companies SIC code; Columns (4) to (6) also include issuer fixed effects. The numbers in parantheses are heterskedasticity-robust t-statistics, clustered at the issuer level. ***, **, and * indicate significance at a 1%, 5%, and 10% level, respectively. The sample includes all issuers in our matched sample for the July 2015 – December 2019 period.

	(1)	(2)	(3)	(4)	(5)	(6)
$Cash\ Ratio_{i,k}$	0.40^{***}	0.35^{***}		0.52^{***}	0.45^{***}	
	(13.49)	(10.09)		(11.60)	(8.48)	
$\mathbb{1}(Cash\ Surplus)_{i,k}$			28.01^{***}			21.82^{***}
			(6.07)			(3.87)
$Current\ Ratio^{Ex}_{i,k}$	-0.17	-0.16	-0.19	-0.17	-0.21	-0.32
	(-1.55)	(-1.38)	(-1.60)	(-0.78)	(-0.93)	(-1.28)
$Debt^{ST}_{i,k}$		-1.37^{**}	-2.48^{***}		-1.74^{**}	-4.15^{***}
		(-2.49)	(-4.60)		(-2.22)	(-5.16)
$Cash_{i,k}$			0.06			1.06^{***}
			(0.22)			(2.64)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	No	No	No
Issuer FE	No	No	No	Yes	Yes	Yes
Adj. R^2	0.24	0.24	0.21	0.41	0.41	0.38
Num. obs.	1,430	1,430	1,430	1,430	1,430	1,430

5 Implications of CP Repayments

To put our findings in a broader context, we now examine if companies with substantial CP repayments use this short-term debt differently from firms without substantial CP repayments. To that end, we first compare each CP issuer in our sample to a company of similar

size in the same industry that does not use CPs and show afterwards that CP repayments predict lower long-term debt issuance.

5.1 CP as Tool to Overcome Financial Slack

We first match each issuer-year in our sample to a comparable firm in Compustat that is not part of our CP sample. To ensure that we match comparable firms, we pick the company in the same industry (measured by the first two digits of the SIC code) that is closest in firm size to the CP issuer in the given year. We then take the difference between balance sheet items of the CP issuers and the control firms and analyze how these differences vary between firms that repay their CP debt compared to firms without full repayments.

Motivated by the common view that CP debt helps reducing the financial slack of holding more cash by allowing flexible financing (e.g., Calomiris et al., 1995, Kahl et al., 2015), we first analyze the differences in cash holdings and short-term debt. In line with this common view, the first columns of Table 8 show that firms without full repayments hold less cash than the control sample and have significantly more disclosed short-term debt. In stark contrast, firms that conduct CP repayments do not differ substantially to the control group in their cash holdings and have *less* short-term debt than the control sample. Hence, these firms succeed in disclosing lower short-term debt levels than their industry peers, but they do not succeed in reducing their cash holdings.

To shed more light on the CP usage of firms with full repayments, we construct simple counterfactual measures of short-term debt and cash holdings by adding the difference between year-average and year-end CP volumes to the cash holdings and short-term debt. These counterfactuals reflect the level of short-term debt based on year-average CP volumes and cash holdings assuming that the additional money from CP debt is held in cash. The last

Table 8: **Comparison to firms of similar size in the same industry.** This table compares the cash holdings, short-term debt, or capital expenditures (all as percentages of firm assets) of the CP issuers in our sample to firms of similar size in the same industry (based on first two digits of SIC code). Our sample of CP issuers is split into companies that do not repay their entire CP debt at year-end (no full repayments) and issuers who do repay their entire CP debt at year-end (full repayment). In addition, we report counterfactual measures of cash and short-term debt for firms with full repayments by adding the difference between year-average and year-end CP debt to the variables. The table reports mean and median differences and the numbers in parantheses are the t-statistics of a two-sample t test for differences in means or the p-values of a Wilcox test of differences in medians. ***, **, and * indicate significance at a 1%, 5%, and 10% level. .

	No full repayment			Full repayment			Full repayment (counterf)		
	Mean	Median	N	Mean	Median	N	Mean	Median	N
$Cash$	-2.51***	-2.38***	1005	-1.56**	-0.18	463	-0.15	1.22*	463
	(-6.61)	(0.00)		(-2.25)	(0.37)		(-0.21)	(0.06)	
$Debt^{ST}$	0.92***	1.11***	1005	-1.44***	-0.88***	463	-0.05	0.14**	463
	(3.98)	(0.00)		(-3.64)	(0.00)		(-0.12)	(0.02)	
$Capex$	0.36**	0.73***	999	-0.17	0.24	463			
	(2.43)	(0.00)		(-0.66)	(0.44)				

columns of Table 8 show that, if we considered year-average CP volumes instead of disclosed CP volumes, the median differences change sign. In this scenario, companies with full CP repayments hold more cash than their industry peers and have higher levels of short-term debt. Hence, these firms do not use CP to overcome financial slack.

5.2 CP as Bridge Financing

We next examine the role of CP debt as bridge financing. Motivated by the resutls of Kahl et al. (2015), we conduct two tests. First, we examine capital expenditures, which Kahl et al. (2015) find are higher for firms that issue CPs. In line with their results, the bottom rows of Table 8 show that issuers without full repayments have higher capital expenditures compared to their industry peers. However, this result does not hold for firms with full CP repayments. These firms do not have larger capital expenditures than their industry peers.

Second, the bridge financing hypothesis suggests that CP issuers tend to refinance their short-term debt with future long-term debt issuance. By contrast, if companies with full CP repayments use their short-term debt as "hidden liquidity buffers", we would not expect them to issue more long-term debt in the future and we therefore test if CP repayments in a given year predict changes in outstanding long-term debt in the following year.

As in Kisgen (2006), we measure changes in outstanding debt as the difference between debt issuance and debt maturities and explore the predictive power of $\mathcal{D}_{i,k}$ and $\mathbb{1}(Repay_{i,k})$ for $\Delta Debt^{LT}_{i,k+1}$ in OLS regressions. Columns (1) and (2) of Table 9 show that CP repayments at the end of a given reporting year predict lower changes in future outstanding long-term debt. If a company repays its entire CP debt at the end of a given reporting year, its change in long-term debt is 1.17 percentage points lower compared to other firms in our sample. As shown in Columns (3) and (4), this link remains virtually unchanged when we control for current changes in outstanding long-term debt, outstanding debt, and firm size. Moreover, Columns (5) and (6) show that, even after controlling for issuer fixed effects, firms that repay their entire CP debt at the end of a given reporting year have a 1.5 percentage point lower change in outstanding long-term debt in the following year.

6 Conclusion

We use new issuance-level data for non-financial CP debt to examine firms' short-term debt usage at a high frequency and find that firms systematically reduce their short-term debt around quarter-end and year-end disclosure dates. These debt repayments are not driven by lending supply frictions at the end of the calendar quarter or calendar year. Instead, we argue that investors and other stake holders, such as rating agencies, closely monitor a firm's

Table 9: **CP repayments predict less net long-term debt issuance.** The dependent variable in this table is net long-term debt issuance in period $k+1$, measured as the difference between new long-term debt issuance and long-term debt maturity. $\mathcal{D}_{i,k}$ is the difference between year-average and year-end CP debt for firm i, divided by the sum of these variables; $\mathbb{1}(Repay)_{i,k}$ is a dummy variable that equals one if a company repays its entire CP debt at year-end. $\Delta Debt^{LT}_{i,k}$ is the net long-term debt issuance in the current reporting period. For a description of the additional variables, see Table A1. All regressions include year-fixed effects; Columns (1) to (4) also include industry fixed effects, measured by the first two digits of the given SIC code; Columns (5) and (6) also include issuer fixed effects. The numbers in parantheses are heterskedasticity-robust t-statistics, clustered at the issuer level. ***, **, and * indicate significance at a 1%, 5%, and 10% level, respectively. The sample includes all matched issuers for the July 2015 – December 2019 period.

	(1)	(2)	(3)	(4)	(5)	(6)
$\mathcal{D}_{i,k}$	-0.97^{***}		-0.98^{***}		-1.03^{***}	
	(-3.76)		(-3.71)		(-3.47)	
$\mathbb{1}(Repay)_{i,k}$		-1.17^{***}		-1.24^{***}		-1.50^{***}
		(-3.63)		(-3.79)		(-3.98)
$\Delta Debt^{LT}_{i,k}$			-0.04	-0.04	-0.09^{*}	-0.09^{*}
			(-1.26)	(-1.28)	(-1.86)	(-1.87)
$Debt_{i,k}$			-0.00	-0.00	-0.29^{***}	-0.29^{***}
			(-0.10)	(-0.22)	(-5.25)	(-5.25)
$\log(Assets)_{i,k}$			-0.41^{***}	-0.42^{***}	-10.04^{***}	-10.02^{***}
			(-3.36)	(-3.46)	(-5.74)	(-5.79)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	No	No
Issuer FE	No	No	No	No	Yes	Yes
Adj. R^2	0.04	0.04	0.04	0.04	0.20	0.21
Num. obs.	1,389	1,389	1,369	1,369	1,369	1,369

short-term debt and cash buffers and that firms whose current assets exceed their current liabilities benefit from repaying their CP debt as these repayments improve their current ratio. These results add to our understanding of companies' usage of CP debt, illustrating their role as strategic liquidity buffers.

In a broader context, our findings illustrate that, even though cash is arguably the most liquid and transparent asset on a firm's balance sheet, cash is not king—at least on regula-

tory reporting dates. On these dates, firms prefer repaying short-term debt to strategically disclose low gross debt levels and better liquidity ratios instead of holding more cash. While cash would be equivalent to to negative debt in perfect capital markets, our findings suggest that investors and other stakeholders do not simply equate cash with negative debt and take a particularly critical role on outstanding short-term debt. Companies respond to this scrutiny by using CPs a hidden liquidity buffers.

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A Additional Details

Table A1: **Variable definitions.** This table defines the variables used in the empirical analysis. The logic behind indexing the variables is as follows: i indicates an issuer, j indicates one CP issue by a given issuer, t indicates a date, k indicates a time period, such as a quarter or year.

Variable	Definition	Source(s)
$Outst_{i,t}$	Outstanding CP debt for issuer i at date t	DTCC & own calc.
$YS_{i,j,t}$	Yield spread of CP j over the maturity-matched OIS rate at date t. The maturity-matched OIS rate is computed by linearly interpolating between the effective FED funds rate, the 7-day, 14-day, 21-day, 30-day, 60-day, 90-day, 120-day, 150-day, 180-day, 210-day, 240-day, 270-day, 300-day, 330-day, and 360-day OIS rate	DTCC, Bloomberg & own calc.
$\mathcal{D}_{i,k}$	Difference between $Outst_{i,k}^{Avg}$ and $Outst_{i,k}^{End}$, which measure the average or period-end outstanding CP debt for issuer i in period k. The period is measured from one annual (or quarterly in the Internet Appendix) reporting date in Compustat to the next and we standardize the measure by dividing by the sum of $Outst_{i,k}^{Avg}$ and $Outst_{i,k}^{End}$	DTCC & own calc.
$QEnd_t^{Cal}$	Indicator variable that equals one on the last business day of the calendar quarter	Compustat
$YEnd_t^{Cal}$	Indicator variable that equals one on the last business day of the calendar year	Compustat
$QEnd_{i,t}^{Report}$	Indicator variable that equals one on the last business day of firm i's reporting quarter and zero otherwise	Compustat
$YEnd_{i,t}^{Reprt}$	Indicator variable that equals one on the last business day of firm i's reporting year and zero otherwise	Compustat
$Cross_{i,j}^{QEnd}$	Dummy variable that equals one if CP j matures in the following calendar quarter and zero if CP j matures within the same calendar quarter	DTCC & own calc.
$Cross_{i,j}^{YEnd}$	Dummy variable that equals one if CP j matures in the following calendar year and zero if CP j matures within the same calendar year	DTCC & own calc.
$TTM_{i,j,t}$	Time to maturity of CP j at time t	DTCC & own calc.

$\log(Issued)_{i,j}$	log issuance amount of CP j	DTCC

Balance sheet variables:

$Surplus_{i,k}$	Indicator variable that equals one if company i's current assets (ticker: ACT) exceed their current liabilities (ticker: LCT) at the end of reporting period k	Compustat
$Current\ Ratio_{i,k}$	Ratio between current assets (ticker: ACT) and current liabilities (ticker: LCT). To mitigate the effect of large outliers we use $\frac{ACT-LCT}{ACT+LCT} \times 100$ in our regression analysis	Compustat
$Cash\ Ratio_{i,k}$	Ratio between cash and liquid assets (ticker: CHE) and current debt (ticker: DLC). To mitigate the effect of large outliers we use $\frac{CHE-DLC}{CHE+DLC} \times 100$ in our regression analysis	Compustat
$\log(Assets)_{i,k}$	log assets (ticker: AT) of firm i at the end of period k	Compustat
$Debt_{i,k}$	Total debt (tickers: DLTT + DLC) of firm i at the end of period k expressed as percentage of total firm assets	Compustat
$Cash_{i,k}$	Cash and liquid assets (ticker: CHE) of firm i at the end of period k expressed as percentage of total firm assets	Compustat
$Debt^{ST}_{i,k}$	Short-term debt (ticker: DLC) of firm i at the end of period k expressed as percentage of total firm assets	Compustat
$\sigma(Earnings)_{i,k}$	Standard deviation of the sum of "income before extraordinary items" (ticker: IB) and "depreciation and amortization" (ticker: DP), measured using the last five reports (including the current report)	Compustat
$\Delta Debt^{LT}_{i,k}$	Difference between long-term debt issuance (ticker: dltis) and long-term debt maturities (ticker: dltr) expressed as a percentage of firm assets	Compustat
$M/B_{i,k}$	Market-to-book ratio computed as the market-adjusted value of firm assets (tickers: AT - CEQ + CSHO×PRCC), divided by the book value of firm assets (ticker: AT)	Compustat
$\beta^{Mkt} i, k$	Regression coefficient from regressing monthly stock returns in excess of the risk-free rate on the returns of the excess returns of the stock market. Excess returns of the stock market are obtained from Kenneth French's website	Compustat

$IORi,t$	This variable captures the percentage of shares held by institutional investors as provided in 13F filings.

Table A2: **Anecdotal evidence of the importance of gross debt management.** This table shows quotes from various sources, documenting that gross debt is an important variable considered by firms' stakeholders. *Highlights* by the authors.

Source	Statement
Rating agencies:	
Standard & Poor's (2016)	"*For example, one large company faced a downgrade of its 'A-1' commercial paper rating because of growing component of short-term, floating rate debt.*"
	"Flexibility can be jeopardized when a firm is overly reliant on bank borrowings or commercial paper. *Reliance on commercial paper without adequate backup facilities is a big negative.*"
	"The standard for industrial and utility issuers has long been 100% coverage of confidence-sensitive paper for all but the strongest creditors. Backup is provided by excess liquid assets or bank facilities in an amount that equals all such paper outstanding."
	"Available cash or marketable securities are ideal to provide backup. (Of course, it may be necessary to 'haircut' their apparent value to account for potential fluctuations in value or tollgate taxes surrounding a sale. And it is critical that they be immediately saleable)."
	"The basic idea is that firms—if and when they lose access to commercial paper —should have sufficient liquidity to cover any paper coming due during the time they would require to arrange additional funding"
	"All issuers—even if they provide 100% backup—must always match the first few days of maturities with excess cash or funding facilities that provide for immediate availability."
Fitch (2016)	"Fitch reviews commercial paper issuers to determine if full (100%) liquidity back-up available exists for outstanding CP and other short-term obligations, regardless of the credit rating of the entity [...] When back-up liquidity coverage is less than 100% and Fitch assigns an investment-grade short-term rating to the CP or short-term debt obligation, Fitch's rating communications will note a variation, and Fitch will explain the issuer-specific rationale [...] a deficiency in an entity's liquidity profile will also be considered when evaluating its long-term rating."
	"Back-up liquidity may not only be in the form of bank commitments but may also include freely available cash and cash equivalents, expected operational cash flow sources, tangible parental support, or other alternative forms of liquidity support. "
	"The 'readily available' component of Fitch's definition of cash points to the *timely, unconditional availability of cash* to the rated entity and the reasonable certainty that the attributable value at par is available"

	"The *concept of cash being 'readily available'* to the rated entity [...] takes into account *where the cash is located within the corporate group* or jurisdiction, and if there are material costs [...] affecting its availability to the rated entity"
Moody's (2016)	"[Oracle's] vast majority of cash [...] is located in foreign entities [...]. As Oracle generates a significant portion of its cash flow overseas (more than half), the company has chosen to fund domestic cash needs with debt rather than incur the tax on repatriating capital. *Given the trajectory of debt issuance during the past two years, Moody's anticipates that Oracle will continue to raise debt as offshore cash builds*"
	"The negative outlook reflects Moody's concerns regarding elevated debt balances"
Articles on corporate cash holdings:	
J.P. Morgan (2015)	"To the extent cash on corporate balance sheets is valued at face value, having more of it increases the value of the firm dollar for dollar. *The issue, however, is that excess cash on a corporate balance sheet is often perceived to be valued at a discount to face value.*"
Agilent Technologies, 2014 10-K filing (borrowed from Harford et al. (2017))	"We have substantial cash requirements in the United States while most of our cash is generated outside of the United States."
	"Our business operating results, financial condition, and strategic initiatives could be adversely impacted if we were unable to address our U.S. cash requirements"
Harford et al. (2017)	"David Einhorn, the president of Greenlight capital that used to be a large shareholder of Dell, said on February 21, 2013 that he decided to sell Dell's shares after he was told Dell's foreign cash couldn't be repatriated and domestic cash was needed for acquisitions and other operational activities"

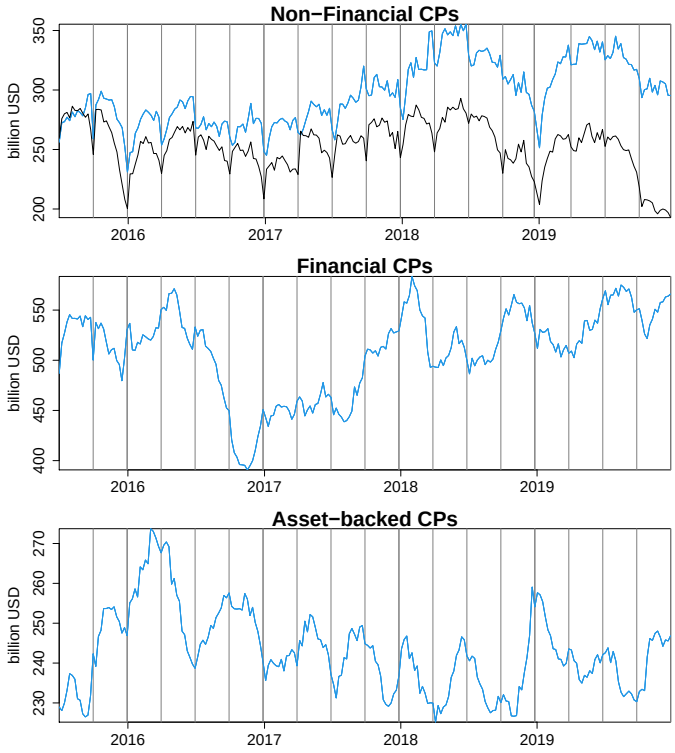


Figure A1: **Outstanding volume of different USD commercial paper.** Panel (a) shows the weekly outstanding volumes of dollar-denominated non-financial CPs, reported by the Federal Reserve Bank of New York (blue line) together with the total volumes in our sample (black line). Panel (b) shows the weekly outstanding volumes of all dollar-denominated financial CPs; Panel (c) shows the weekly outstanding volumes of all dollar-denominated asset-backed CPs. The data are obtained from the Federal Reserve Bank of New York. Vertical lines indicate quarter ends.

Internet Appendix

(Not for publication)

This internet appendix contains additional descriptive statistics and robustness checks that were omitted in the body of the paper. Figure IA.1 shows that our estimated CP yields are more volatile than the CP yields from the New York FED (which is likely because we include all issuers, not just AA), but qualitatively similar.

[Insert Figure IA.1 near here]

The two goals of this appendix are to confirm that all our results are robust to (i) using an alternative proxy of CP volumes only using the first-day volumes and (ii) using quarterly instead of annual data.

A Results for Alternative Volume Proxy

In this section, we estimate outstanding CP volumes using only transactions that occurred on the issuance day and repeat our main analysis.

Figures IA.2 and IA.3 plot outstanding non-financial CP volumes using only the transactions on the issuance day to estimate the outstanding volume. The figures suggest that the pattern of quarter-end and year-end repayments remains unchanged when focusing on this proxy instead.

[Insert Figure IA.2 near here]

[Insert Figure IA.3 near here]

Figure IA.4 shows the CP repayments in different current ratio quartiles using only initial issuance volumes.

[Insert Figure IA.4 near here]

Tables IA.1 and IA.2 repeat the analysis shown in Tables 3 and 5 using initial issuance volumes only.

[Insert Table IA.1 near here]

[Insert Table IA.2 near here]

Table IA.3 and IA.4 repeat our analysis from Sections 4.3 and **??** using the initial issuance volume, confirming the robust link between current ratio and CP debt repayments.

[Insert Table IA.3 near here]

[Insert Table IA.4 near here]

B Results for Quarterly Data

In this section, we repeat our analysis using quarterly instead of annual measures.

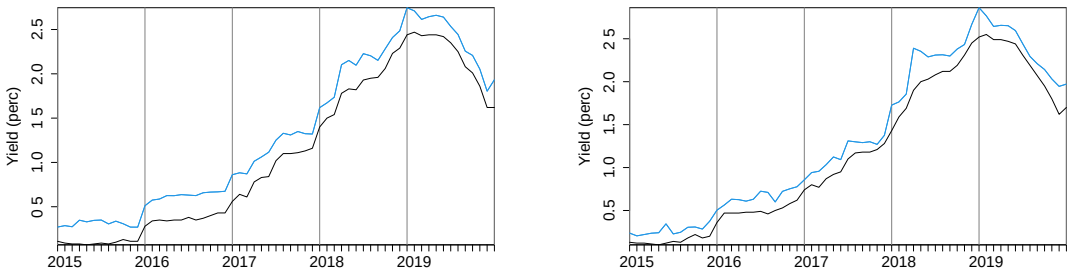
Figure IA.5 shows the CP repayments in different current ratio quartiles using quarterly data.

[Insert Figure IA.5 near here]

Tables IA.5 and IA.6 repeat our analysis from Sections 4.3 and **??** using quarterly data and confirms the robust link between cash surplus and CP debt repayments.

[Insert Table IA.5 near here]

[Insert Table IA.6 near here]



(a) 1-month yields

(b) 3-month yields

Figure IA.1: **Non-financial CP yields.** This figure compares the monthly average CP yield for non-financial CPs (issuers with AA rating) obtained from the Federal Reserve Bank of St. Louis with the average yields for our matched DTCC sample. Panel (a) shows the DTCC yields for issues with 20-40 days to maturity (including all issuers) and the FED estimate for 1-month CPs. Panel (b) shows the DTCC yields for issues with 80-100 days to maturity (including all issuers) and the FED estimate for 3-month CPs.

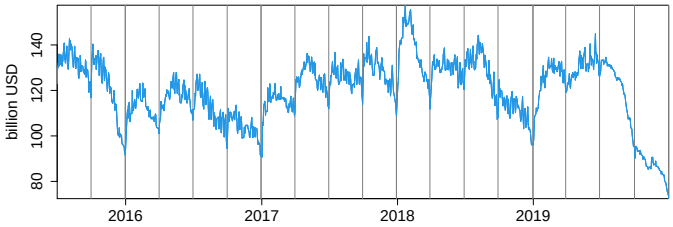
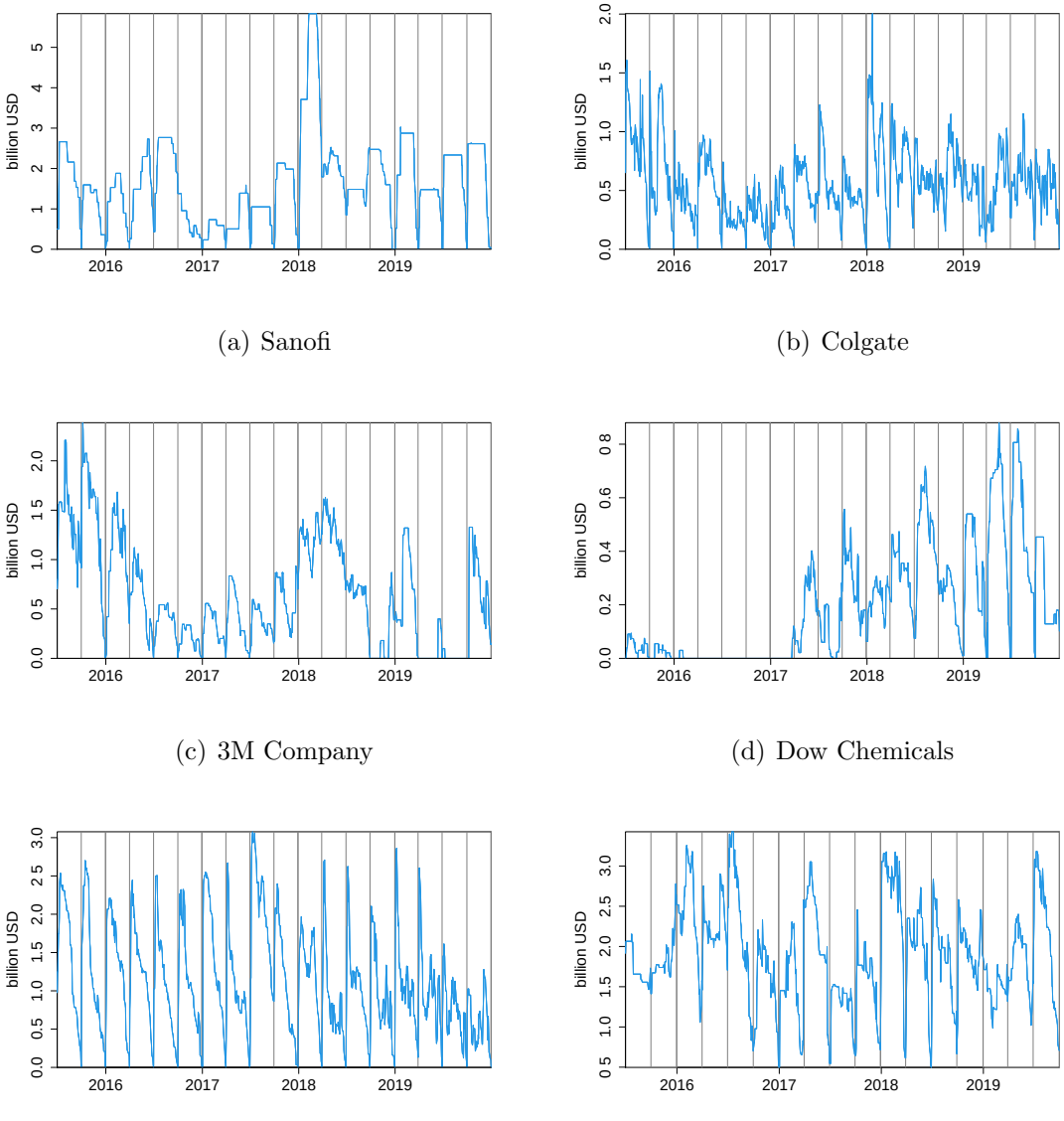


Figure IA.2: **Outstanding volume (initial issuance only) of USD non-financial commercial paper.** This figure shows aggregated daily outstanding volumes for all issuers in our matched DTCC sample, using only transactions on the issuance day to proxy outstanding volumes. Vertical lines mark the last observation in a calendar quarter.



(a) Sanofi

(b) Colgate

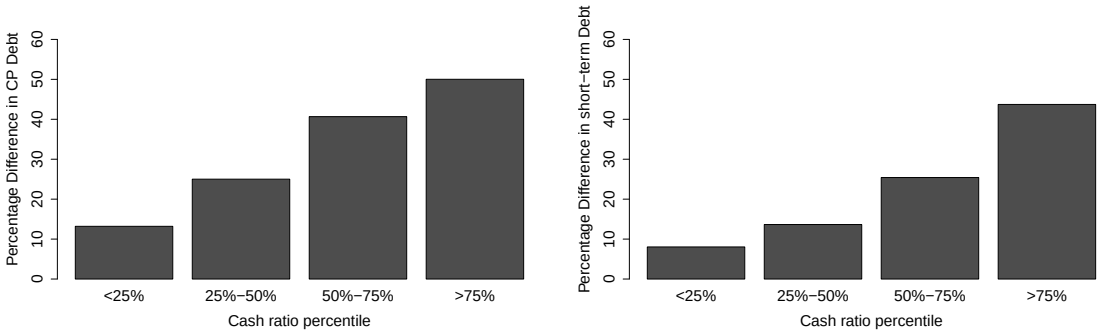
(c) 3M Company

(d) Dow Chemicals

(e) Philip Morris

(f) Siemens

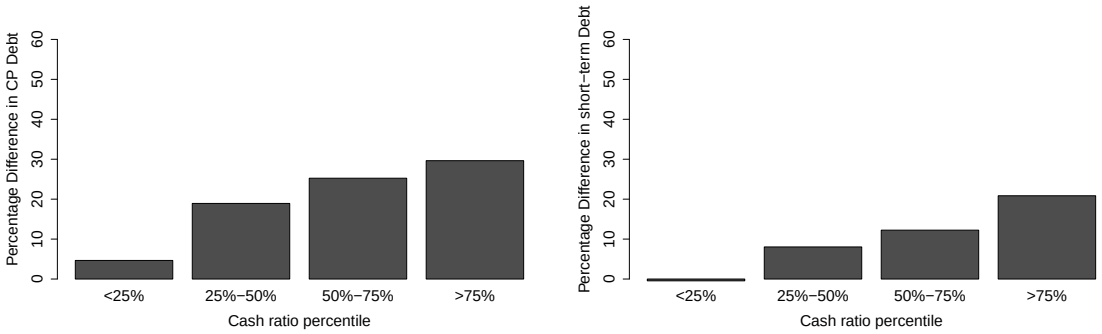
Figure IA.3: **Examples of strategic CP repayments (robustness check with inital issuance volume).** This figure gives six examples of non-financial CP issuers that systematically reduce their CP volumes on regulatory reporting dates. The quarter-end of all six sample firms aligns with the end of the calendar quarter and the year-end of Sanofi falls on the end of September while the year end of all other firms aligns with the end of the calendar year. Vertical lines indicate the last trading day of a quarter.



(a) Percentage rapaid

(b) Percentage of short-term debt

Figure IA.4: **CP repayments for firms with different cash ratios (quarterly data).** This figure repeats the analysis shown in Figure 4 using volumes based on initial observations.



(a) Percentage rapaid

(b) Percentage of short-term debt

Figure IA.5: **CP repayments for firms with different cash ratios (quarterly data).** This figure repeats the analysis shown in Figure 4 using quarterly data instead.

Table IA.1: **Calendar year-end and reporting year-end effects on CP volumes (initial volumes).** This table repeats the analysis shown in Table eftab:FactCS replacing our proxy for outstanding volumes with outstanding volumes commputed only at the issuance day.

	(1)	(2)	(3)	(4)
$\text{QEnd}_{i,t}^{Report}$	-0.82^{***}	-0.60^{***}	-0.60^{***}	-0.68^{***}
	(-4.54)	(-3.42)	(-3.42)	(-3.91)
$\text{YEnd}_{i,t}^{Report}$		-0.81^{***}		
		(-3.38)		
$\text{YEnd}_{i,t}^{Report} \times Regular$			-0.73^{***}	-0.65^{**}
			(-2.75)	(-2.34)
$\text{YEnd}_{i,t}^{Report} \times Irregular$			-1.15^{**}	
			(-2.12)	
$\text{YEnd}_{t}^{Cal} \times Irregular$				0.04
				(0.07)
Issuer × Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.59	0.59	0.59	0.59
Num. obs.	331,562	331,562	331,562	331,562

Table IA.2: **Reporting quarter and year effects for firms with and without current surplus (inital volumes only).** This table repeats the analysi from Table 5 using volumes estimated based on transactions on the first trading day.

	(1)	(2)	(3)	(4)
$\text{QEnd}_{i,t}^{Report}$	-0.82^{***}	0.06	-0.60^{***}	
	(-4.54)	(0.29)	(-3.42)	
$\text{QEnd}_{i,t}^{Report} \times Surplus_{i,t}$		-1.63^{***}		
		(-5.68)		
$(\text{QEnd} \setminus \text{YEnd})_{i,t}^{Report}$				0.21
				(1.03)
$(\text{QEnd} \setminus \text{YEnd})_{i,t}^{Report} \times Surplus_{i,t}$				-1.48^{***}
				(-5.49)
$\text{YEnd}_{i,t}^{Report}$			-0.81^{***}	-0.31
			(-3.38)	(-0.85)
$\text{YEnd}_{i,t}^{Report} \times Surplus_{i,t}$				-2.07^{***}
				(-4.04)
Issuer × Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.59	0.59	0.59	0.59
Num. obs.	331,562	331,562	331,562	331,562

Table IA.3: **Link between CP repayments and current surplus (initial volumes).** This table repeats the analysis shown in Table 6 using initial volumes.

	OLS regressions of $\mathcal{D}_{i,k}$			Logit regressions of $\mathbb{1}(Repay)$		
	(1)	(2)	(3)	(4)	(5)	(6)
$Current\ Surplus_{i,k}$	0.50^{***}	0.47^{***}	1.17^{***}	0.03^{***}	0.03^{***}	0.11^{***}
	(4.80)	(4.37)	(6.48)	(6.92)	(6.17)	(6.19)
$Debt_{i,k}$	-0.11	-0.18	-0.45	-0.01^{**}	-0.02^{***}	-0.07^{*}
	(-0.59)	(-0.86)	(-1.14)	(-2.23)	(-2.60)	(-1.96)
$\log(Assets)_{i,k}$	-1.00	-1.72	9.58	-0.07	-0.06	1.53
	(-0.60)	(-0.93)	(0.71)	(-1.12)	(-0.75)	(1.23)
$Age_{i,k}$	0.02	0.11	6.41	-0.00	0.00	-0.01
	(0.13)	(0.77)	(0.93)	(-0.14)	(0.50)	(-0.01)
$Capex_{i,k}$	-0.40	-0.61	0.91	-0.00	-0.01	-0.15
	(-0.48)	(-0.65)	(0.63)	(-0.14)	(-0.29)	(-1.17)
$RnD_{i,k}$	-0.62	-0.43	0.02	-0.01	-0.01	0.13
	(-0.75)	(-0.47)	(0.01)	(-0.32)	(-0.32)	(0.34)
$\mathbb{1}(Dividend)_{i,k}$	-6.09	-10.22	-29.51^{***}	-0.21	-0.43	-33.07
	(-0.73)	(-0.95)	(-4.17)	(-0.65)	(-0.89)	
$\sigma(Earnings)_{i,k}$	1.74^{**}	1.91^{**}	2.37^{*}	0.07^{**}	0.09^{***}	0.25
	(2.26)	(2.42)	(1.73)	(2.27)	(2.61)	(1.58)
$\beta_{i,k}^{Mkt}$		3.57^{*}	0.62		0.04	-0.21
		(1.71)	(0.30)		(0.38)	(-1.09)
$IOR_{i,k}$		0.07	-0.15		0.01^{**}	-0.01
		(1.11)	(-1.53)		(2.31)	(-1.35)
$M/B_{i,k}$		-0.02	0.08		-0.00	0.01^{**}
		(-0.64)	(1.38)		(-0.30)	(2.40)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	Yes	Yes	No
Issuer FE	No	No	Yes	No	No	Yes
Adj. R^2	0.13	0.17	0.36	0.12	0.31	0.35
Num. obs.	1430	1133	1133	1430	1133	1133

Table IA.4: **Link between CP repayments and different surplus measures (initial data).** This table repeats the analysis from Table 7 using volumes measured on the first isuance day only.

	(1)	(2)	(3)	(4)	(5)	(6)
$Cash\ Ratio_{i,k}$	0.39^{***}	0.34^{***}		0.52^{***}	0.46^{***}	
	(13.17)	(10.14)		(11.85)	(9.09)	
$\mathbb{1}(Cash\ Surplus)_{i,k}$			29.22^{***}			24.52^{***}
			(6.43)			(4.45)
$Current\ Ratio^{Ex}_{i,k}$	-0.13	-0.11	-0.14	-0.03	-0.07	-0.18
	(-1.16)	(-1.02)	(-1.28)	(-0.16)	(-0.30)	(-0.74)
$Debt^{ST}_{i,k}$		-1.17^{**}	-2.18^{***}		-1.34^{*}	-3.73^{***}
		(-2.12)	(-4.00)		(-1.76)	(-4.73)
$Cash_{i,k}$			-0.05			0.99^{**}
			(-0.20)			(2.37)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	No	No	No
Issuer FE	No	No	No	Yes	Yes	Yes
Adj. R^2	0.22	0.23	0.20	0.38	0.39	0.36
Num. obs.	1,430	1,430	1,430	1,430	1,430	1,430

Table IA.5: **Link between CP repayments and current surplus (quarterly data).** This table repeats the analysis shown in Table 6 using quarterly data.

	OLS regressions of $\mathcal{D}_{i,k}$			Logit regressions of $\mathbb{1}(Repay)$		
	(1)	(2)	(3)	(4)	(5)	(6)
$Current\ Surplus_{i,k}$	0.50^{***}	0.41^{***}	1.01^{***}	0.03^{***}	0.03^{***}	0.10^{***}
	(5.90)	(4.88)	(9.26)	(10.54)	(8.11)	(8.79)
$Debt_{i,k}$	-0.15	-0.18	-0.66^{***}	-0.02^{***}	-0.02^{***}	-0.08^{***}
	(-1.03)	(-1.22)	(-2.61)	(-3.17)	(-3.10)	(-3.72)
$\log(Assets)_{i,k}$	-0.16	-0.31	-5.45	-0.12^{**}	-0.07	0.49
	(-0.11)	(-0.18)	(-0.66)	(-2.21)	(-0.97)	(0.62)
$Age_{i,k}$	0.11	0.18	12.23	0.00	0.01^{**}	17.84
	(1.43)	(1.48)	(1.31)	(1.38)	(1.97)	
$Capex_{i,k}$	-0.16	-0.03	-0.25	0.04	0.03	-0.02
	(-0.27)	(-0.04)	(-0.39)	(1.46)	(1.04)	(-0.50)
$RnD_{i,k}$	5.15^{**}	4.80^{**}	10.62^{***}	0.16^{*}	0.19^{*}	0.75^{***}
	(2.05)	(2.01)	(4.46)	(1.72)	(1.89)	(4.11)
$\sigma(Earnings)_{i,k}$	0.02	0.03	0.07^{**}	0.00	0.00^{*}	0.01^{***}
	(1.29)	(1.35)	(2.31)	(1.41)	(1.81)	(2.58)
$\beta_{i,k}^{Mkt}$		3.25^{***}	1.15		0.21^{***}	0.01
		(2.66)	(1.11)		(2.72)	(0.06)
$IOR_{i,k}$		0.08^{*}	0.04		0.01^{***}	0.00
		(1.81)	(0.68)		(4.90)	(0.51)
$M/B_{i,k}$		-0.01	0.06		-0.00	0.01^{**}
		(-0.32)	(1.62)		(-1.27)	(2.25)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	Yes	Yes	No
Issuer FE	No	No	Yes	No	No	Yes
Adj. R^2	0.12	0.15	0.29	0.19	0.37	0.47
Num. obs.	4259	3373	3373	4259	3373	3373

Table IA.6: **Link between CP repayments and different surplus measures (quarterly data).** This table repeats the analysis from Table 7 using quarterly instead of annual data.

	(1)	(2)	(3)	(4)	(5)	(6)
$Cash\ Ratio_{i,k}$	0.74^{***}	0.35^{***}		1.38^{***}	1.20^{***}	
	(6.92)	(2.74)		(13.51)	(8.07)	
$\mathbb{1}(Cash\ Surplus)_{i,k}$			12.95^{***}			15.26^{***}
			(3.53)			(3.73)
$Current\ Ratio^{Ex}_{i,k}$	-0.55^{***}	-0.24^{*}	-0.18^{**}	-1.11^{***}	-0.97^{***}	-0.34^{**}
	(-4.38)	(-1.82)	(-2.06)	(-7.88)	(-6.01)	(-2.09)
$Debt^{ST}_{i,k}$		-2.81^{***}	-3.05^{***}		-1.04^{*}	-3.40^{***}
		(-6.58)	(-9.60)		(-1.93)	(-8.42)
$Cash_{i,k}$			-0.26			1.15^{***}
			(-1.13)			(3.08)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	No	No	No
Issuer FE	No	No	No	Yes	Yes	Yes
Adj. R^2	0.14	0.16	0.16	0.28	0.28	0.27
Num. obs.	4,259	4,259	4,259	4,259	4,259	4,259