Banks' Private Money Creation and Market Preferences: Evidence from Banks' Commercial Paper Issuance

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Abstract

Unsecured short-term creditors of banks face the risk of write-offs during bank runs. To prevent frequent failures, banks must maintain a certain level of equity. However, an agency problem arises when banks use short-term securities to artificially smooth their reported equity levels. Our study proposes an empirical framework and finds that money market funds (MMFs) monitor banks for this agency problem when purchasing banks' commercial papers in the primary market. During MMF regulatory reforms that led to a decline in demand for banks' commercial papers, we find MMFs prefer banks that separate their liquidity management from asset-liability management. In response banks that faced short-term debt restrictions signaled balance sheet quality through discretionary capital management. Lastly, during the COVID-19 pandemic, MMFs' preferences persist, and the banks' cross-sectional assignments during the regulatory reforms positively predict their placement during COVID-19.

Keywords: Bank runs; short-term debt; bank capital structure; commercial paper; money market funds; regulation.

JEL classification: G21, G23, G28, G32, D82

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1. Introduction

In March and April 2020, the European Commercial Paper (CP) market experienced a run-like break. This particular episode is marked by a pressing liquidity deficiency in the market rather than a decline in credit quality among the CP issuers. The Money Market Funds (MMFs) had to maintain their Weekly Liquid Asset (WLA) levels, forcing them to sell portions of their portfolio holdings in secondary markets. In response to the MMF's demand for liquidity, certain banks successfully bought back their Commercial Papers (CPs), while others indicated balance sheet constraints and were unable to bid back their CPs.[1] In this paper, we assess whether investors in the CP market had proactively evaluated banks before these events. Our primary focus lies in understanding the extent to which MMFs had engaged in preemptive monitoring of issuing banks for these eventualities when they buy securities in the primary market, i.e., monitoring the banks' tendency to link CP issuance with their balance sheet constraints and requirements. Furthermore, if MMFs were aware of the issuer's type, did they display discernible preferences when purchasing banks' CPs in the primary market?

The question of whether the short-term debt institutional investors monitor the CP issuing banks for the connection between their treasury management and asset-liability management is of importance in the bank's governance decisions. In particular, such a connection raises an agency problem between short-term creditors and shareholders. Our study focuses on the Negotiable European Commercial Paper (NEU CP) program that includes mainly unsecured CPs. As we will discuss this market have specific features that allow us to identify different aspects of our question. Similar to comparable unsecured CP programs these unsecured promissory notes have fixed maturities (<1 year), and there are no specific pledgeable assets backing them on the issuer's balance sheet. Investors in these securities believing the banks' pledge on liquidity and earning power; hence, if the banks use the proceeds from CP issuance to adjust their book value of equity it would be a misalignment of investment objectives. This is even more serious since these

[1] "[… in Europe, the most significant outflows were concentrated in USD LVNAV funds and in EUR Standard VNAV funds. EUR Standard VNAV MMF AUM was 15% lower at the end of March compared to mid-February. Whilst EUR LVNAV saw outflows of 16% over seven consecutive days in March, they finished the month with higher AUM than in February." For further details about this event, refer to, https://www.icmagroup.org/assets/documents/Regulatory/CP/ICMA-CPC-white-paper-The-European-Commercial-Paper-and-Certificates-of-Deposit-Market-September-2021-290921.pdf

securities are also included as part of the general bail-in tools of the issuing banks under the Bank Recovery and Resolution Directive (BRRD).[2] We will describe this agency problem in more detail later.

Our identification strategy to observe whether the short-term creditors monitor the banks is to investigate a regulatory shock that was part of the MMFs reform in Europe; during the second half of 2018, MMFs had to reauthorize and implement some significant structural changes such as committing to minimum WLA requirements. An important part of the literature points out the global shortage of supply of safe assets, for example as defined and characterized in Caballero, Farhi, and Gourinchas (2016, 2017). Despite these global shortages, the literature that evaluates the MMF's regulatory reforms in Europe and the US associates significant outflows to these reforms and as a result, reduced MMFs' participation in the market.[3] In our setting, this regulatory reform constitutes an exogenous shock to the aggregate demand for CP securities, we document a distinguishable decrease in average CP issuance in the primary market during the reform period; notably, 75% of the securities traded in the NEU CP market are in the primary market. During the MMFs reauthorization period, some banks were less successful in issuing new CPs in this market, while others were not affected or even increased their monthly issuance.

Our setting specifically allows us to merge the security issuance information with the issuing institution accurately using their Legal Entity Identifiers (LEI) for almost all of the banks in the NEU CP program. Given the inherent endogeneity between various accounts on banks' financial reports, we identify and analyze the banks' exact proceeds from CP issuance from the independent and exogenous reports of the supervisory authority, Banque de France. Banque de France publishes the shelf registration information and the details of monthly NEU CP issuances, i.e., the amounts and maturities of the issuers' monthly and outstanding CP issuances.

Using security-level issuance data and issuers' balance sheet information, we can observe to which extent banks use their security issuance to adjust their book value of equity. This may appeal to equity investors and appear to signal safety to less information-sensitive creditors. However, the information view of bank runs posits that banks should segregate cash flow information related to the underlying assets backing their money-like securities, i.e. CPs. This segregation helps the issuer to effectively preserve securities' constant face value and discourage security holders from generating private information (Dang, Gorton, Holmström, and Ordoñez (2017); Dang, Gorton, and Holmström (2020); Dang, Gorton, and Holmström (2013)). We examine this proposition by showing that the CP investors monitor whether the

[2] https://www.eba.europa.eu/regulation-and-policy/single-rulebook/interactive-single-rulebook/100546, and https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0059.

[3] For a more detailed description of the related regulation changes and the literature on the unintended reduction of supply of liquidity due to MMF reforms refer to section 4, institutional background.

issuers use CP proceedings to adjust their book value of equity; specifically, regarding the market preference our task is to show whether a bank faced restriction during the MMF reforms or not is not random and the bank's assignments are different in the mentioned aspect.

Kacperczyk, Pérignon, and Vuillemey (2021) argue that the desirability of market opacity only holds ex-ante, they suggest that once certain safe asset classes come under investor scrutiny, all securities within that asset class are prone to shifting to unsafe. We find that, in one class of securities, i.e., comparable credit banks' CPs, not all banks face similar market constraints during turmoil periods. We show that whether a bank has been in the successful or unsuccessful group is not random. The banks in the two groups are inherently different in governing the CP proceedings; in the second half of 2018, i.e., MMFs reform period, banks that have been less successful in issuing new CPs were the banks that had the mentioned agency problem when governing CP issuance proceedings, i.e., money-like securities of these issuers' did not have the necessary opacity. In the last part of our analysis, we extend this proposition by showing that even during the COVID-19, the assignment to the restrained bank group during MMF reforms significantly predicts banks' deciles assignment during this extreme crisis.

In addition, we use an alternative theory for classifying banks that face market limitations. In this alternative method, we rely on the implication of the theoretical results of Brunnermeier and Oehmke (2013). They describe that when a borrower, i.e., a bank, cannot commit to an aggregate maturity structure, they might have incentives to issue shorter maturity debt to a specific group of investors. However, upon observing this possible favorable treatment, the other investors would demand their securities to be issued with shorter maturity. Brunnermeier and Oehmke (2013) remark that the frequent funding requirements and the continuous activity in the CP market are significant barriers for banks to commit to a particular maturity structure. The agency problem we have described is similar to this inability or unwillingness to commit to a definite maturity structure. The discretionary adjustments that bank managers make to the reported equity level would artificially reduce the maturity mismatch in asset-liability management. This reach for the lower book value of equity variability is in effect equivalent to lowering the conceptual equity's duration, eventually decreasing the equity sensitivity to interest rate risks. We show that although not all the bank's creditors might be informed or capable of monitoring and coordinating actions, institutional investors that invest in the bank's CPs monitor the favorite duration treatment of equity and act as predicted by Brunnermeier and Oehmke (2013).

In this alternative analysis, we are complementing the previous demand shock analysis, we evaluate dispersed incidents in which some banks issued CPs that have drastically shorter maturity than their usual CP maturities. Effectively, in the first analysis, we were evaluating the market discipline exerted at the volume of securities that banks intended to sell, and in the second analysis, we are looking at another aspect

that the market could reveal disciplining action, i.e. maturity. We specifically look for banks' CP issuance instances that resulted in an abnormal maturity distortion of the issuer's outstanding CP portfolio. If a bank does not issue any CP in a particular month the average maturity of the outstanding CP portfolio would decline by 30 days, however, a similar CP issuance to the bank's previous routine would cause a maturity reduction by less than 30 days or even increase it. Our identification of the banks' CP issuances that face maturity restrictions relies on the observation that for some of the banks, the average maturities of the outstanding CP portfolio anomalously and drastically decrease after certain issuances. An observation of such issuances implies that investors imposed a shorter restraint on the maturity of the issuer's securities, we categorize these issuers in the urgent issuer group. Similarly, in this analysis, we find that whether a bank has an incident of a drastic decrease of maturity in any of its monthly CP issuances throughout our sample, i.e., belongs to the urgent issuer group, is not random and is determined by its behavior in governing the CP proceedings. In line with the previous results, we find that the banks in the urgent issuer group are those whose governance style had undermined short-term creditors' claims and passed CP issuance proceedings to adjust the book value of equity. The findings that CP investors moderate banks with maturity reduction complement and add another dimension through which the investors demonstrate their preferences.

Next, we assess the response of the banks to securing back market confidence following the imposition of constraints by MMFs during the reforms. We analyze the mechanisms by which banks signal their quality; specifically, we evaluate the accounting measurements that signal critical information regarding banks' assets. We know from the previous literature that bank managers could respond and signal to investors with discretionary accounting methods or with real asset quality modifications (Beatty and Liao (2014)). Our findings suggest that it is more likely the banks in the restricted group responded with discretional asset management, i.e., as an alternative to real asset quality improvement efforts such as writing off parts of the nonperforming loans or increasing the higher quality lending. We find that, although after the reforms there is a significantly lower proportional impaired loans on the complete sample of banks, for the subgroup of banks that were subjected to market restrictions this change is not significant. Additionally, although in general, we observe a decline in the book value equity for the whole sample, this is not the case for the restricted group of banks; the banks that had faced restrictions surprisingly report a slightly higher book value of equity. Notably, we observe a parallel increase in the loan loss provisions measured against impaired loans, a measure famously known to allow managers' discretion.

Finally, as we have briefly stated, we evaluate whether the identification of the banks during the MMF could have predicted their behavior toward the banks during the COVID-19 crisis and ensuing flight to liquidity in the money markets. We are interested in understanding whether the observed investors'

preferences could predict their actions during a crisis. Effectively, we evaluate the predictability of a bank facing market restrictions during this episode, given that it had faced a similar problem during the MMF reforms. Our results show MMFs' preferences persist, and the banks' cross-sectional assignments during the regulatory reforms positively and significantly predict their cross-sectional decile placement during COVID-19.

Overall, our evidence supports the conjecture that MMFs monitor how the banks use the proceeds from issuing unsecured CPs. We also confirm market dislike toward the issuers that are using the proceeds from CP issuances for smoothing their book value of equity. We confirm investors demonstrate discipline using two independent identification criteria, volume, and maturity. Specifically, our identification strategy allows us to confirm that they monitor and show discern between issuers when buying securities in the primary market in critical times. Furthermore, confirming our main conjecture by showing that the placement of an issuer in the cross-section of the identified restrained group during MMF reforms positively predicts the issuer's restraints during the COVID-19 crisis.

2. Agency Problem Description

Banks can raise liability because their creditors delegate investment monitoring. Banks' liabilities in a market economy are subject to market mediations through pricing, volume, or other features and optionalities. The banks' creditors invest in their liabilities because they have limited monitoring power over the profitable projects that receive banks' lending (Diamond and Dybvig (1983)); Diamond and Rajan (2000, 2001)). Recent literature underlines the similarity of short-term debt securities to demand deposits; e.g., Merton and Thakor (2019) offer a formal theory of the evolution of financial intermediaries' depositors and short-term investors. Short-term debt has the most exposure to market mediations and any short-term debt security could be susceptible to bank-run (Gorton (2020)), however, from a policy point of view, demand deposit claimants are the only group of short-term creditors protected by deposit insurance. They could also be considered the least informed in monitoring the banks efficiently (Gorton and Pennacchi (1990)). Hanson, Shleifer, Stein, and Vishny (2015) compare the business model of banks and shadow banks in creating money-like assets. Specifically in their model banks rely on *sleepy* depositors who lack monitoring, deposit insurance existence, and government safety nets are important for banks, however, for MMFs holding liquid assets is critical. Our paper asks whether more sophisticated institutional investors, MMFs, are also prone to monitoring deficiencies when they buy securities in the primary market.

A bank's security is considered safe by the investors if it is redeemable in bad times (Baghai, Giannetti, and Jäger (2022)). In addition, investors in banks' short-term debt securities have uncertain consumption immediacies; thus, they consider them to be money-like and preserve constant face value over short periods

(Gennaioli, Shleifer, and Vishny (2013)). Failures to preserve the constant face value of short-term securities expose the security holders to possible frictions in the market, such as information asymmetry. By isolating cash flow information of the assets backing the short-term securities, banks could preserve securities' constant face value and disincentivize the securities holders from producing private information about their associated payoffs (Dang, Gorton, Holmström, and Ordoñez (2017); Dang, Gorton, and Holmström (2020); Dang, Gorton, and Holmström (2013)).

A bank run could occur when banks undertake riskier projects, e.g., by making riskier loans or investing in riskier bonds, or when they cannot diversify appropriately (Diamond and Dybvig (1983); DeAngelo and Stulz (2015); among others). Banks must commit their own equity to insure the risk of their activities. However, an inherent agency problem arises between shareholders and creditors once equity is committed. While short-term securities holders consider equity to act as a safety buffer to prevent frequent failures due to the nonperformance of the banks' investments, the preservation and augmentation of the residual value of committed equity incentivize the shareholders and the bank's management through their compensation structures. Furthermore, through equity, managers have access to a capital buffer that includes discretionary items on the bank's balance sheet, e.g., managers could delay write-down, adjust loan loss provisions, or change the category of security holdings between trading, available for sale, or held to maturity within the allowed accounting and regulatory scopes for discretion. Previous literature points out several motives for the banks' managers to favorably adjust the discretionary items, e.g., to reflect better their outlooks and future strategies or to meet regulatory or market expectations.[4]

Accounting measurements are essential governance tools (Plantin and Tirole (2018). Banks' management could engage in risk transfer for the benefit of equity holders. In concept, if we consider a bank's balance sheet as a portfolio of long and short positions, as could be inferred from the bank's asset-liability management operations, it is possible to consider two ways in which banks could limit the equity

[4] Huizinga and Laeven (2012), examples of some of the most common discretionary asset level adjustment, delaying write-downs, loan loss provisions, and categorization of holding securities between possible options, i.e., trading to AFS to HTM. Beatty and Liao (2014) provides a survey of Banks' discretionary accounting literature. Shen and Chih (2005) compares the severity of earning management (EM) in banking industry in 48 countries. Gropp, Mosk, Ongena, Wix, and Simac (2020)find that banks exercise discretion in the calculation of their regulatory capital, leading to the reporting of higher regulatory capital without a corresponding increase in their book equity. Linda Allen and Saunders (1992) evidence of systematic upward window dressing adjustment in bank assets on the last day of each quarter. Cheng and Warfield (2005) outline signaling to equity investors as an incentive for EM, Cheng, Warfield, and Ye (2011) finds the same in banking industry. Balboa, López-Espinosa, and Rubia (2013) finds a nonlinear dynamics of discretionary accruals. Hutton, Marcus, and Tehranian (2009) finds the relationship between banks' EM and their stock return predictability and crashes. Huizinga and Laeven (2019) find procyclicality and discretion of banks accounting practices in Euro area, and BIS (2021) WP 39, provides a thorough literature review on the procyclicality of loan loss provisions and practices, including incurred loss recognition and discretionary accounting, https://www.bis.org/bcbs/publ/wp39.pdf. Moreover, the literature highlights that banks with better corporate governance practices are associated with less discretionary accounting, e.g., Fan, Jiang, Zhang, and Zhou (2019) finds less EM associated with the presence of women on the banks' board of directors.

variations in response to the effect of systemic interest and credit risk variations. Effectively to maintain a stable level of equity, first, banks could reduce the maturity mismatch between the two sides of their balance sheet. Although, reducing maturity mismatch is theoretically ideal but has limitations, and it is costly because one of the banks' main functions –and one of the primary sources of profitability of banks– is to transfer maturity. Second, adjust the equity buffer levels. This agency problem is more critical for the banks' short-term creditors. The elevated significance attached to this matter by short-term creditors can be attributed to the fact that the cash proceeds from the issuance of short-term debt instruments are likewise reflected as the average netted sum on the bank's balance sheet. Given that the average netted liquid assets and committed capital, namely, equity, are subject to management's discretionary reporting, there exists a fluid boundary between items classified as short-term debt and reported equity.

The management's incentives or other eventualities could sometimes tilt the mentioned fluid boundary toward preserving the residual value and artificial reporting of a stable level of equity. Such a treatment of short-term debt could reduce the reliability of the constant face value of short-term securities, i.e., they become information sensitive. Consequently, short-term market participants, if they observe such a treatment of the cash flows associated with their holding securities, value the bank's securities according to private information they could gather about the severity of the issuing bank's underlying investment deficiencies and particularly the expected incentives and actions of the bank's management. This private information results in the securities' failure to hold constant value, making them uninvestable for short-term investors. In the extreme scenario, the uncertainty about the securities' value could lead short-term investors to run on their investments.

3. Literature Review

We contribute to the literature that explains the relationship between banks' assets and liabilities and their essential role in liquidity creation, and in specific the literature that explains this relationship in terms of interest rate variations and the maturity transform (Friedman (1960); Diamond and Dybvig (1983); Holmström and Tirole (1998); Diamond and Rajan (2000, 2001); Berger and Bouwman (2009); Kashyap, Rajan, and Stein (2002); Cochrane (2014); Brunnermeier, Gorton, and Krishnamurthy (2014); Jiménez, Ongena, Peydró, and Saurina (2014); Nagel (2016); Bai, Krishnamurthy, and Weymuller (2018); Drechsler, Savov, and Schnabl (2021); Gissler, Macchiavelli, and Narajabad (2020)). Our paper empirically aims to connect this literature with the mostly theoretical literature that points out the information sensitivity of the financial intermediaries' securities during banking crises (Dang, Gorton, Holmström, and Ordoñez (2017); Dang, Gorton, and Holmström (2020); Dang, Gorton, and Holmström (2013)).

We exploit the agency problem that arises when banks use CP proceeds to strategically adjust their book value of equity, this effectively means that these securities are not optimally information insensitive. Gorton (2017) provides an extensive literature review on the economics of safe assets. We contribute to this literature by providing well-identified evidence by combining both exogenous events and observations to tease out the importance of opacity on banks' ability to create safe assets. This aspect of safe asset creation is widely postulated and argued in the literature. We show that indeed the banks that appear to be more successful in the isolation of information regarding CP proceeds have better success in the private creation of money-like safe assets. We evaluate this specifically during two events during which the market faced liquidity restraints.

We also contribute to the recovery aspect of the information view of the financial crises literature. An externality of MMF reforms was the heightened existing market frictions due to concern about other investors' actions (Chen, Goldstein, and Jiang (2010); Kacperczyk and Schnabl (2013); Chernenko and Sunderam (2014); Schmidt, Timmermann, and Wermers (2016); Goldstein, Jiang, and Ng (2017)). Schmidt, Timmermann, and Wermers (2016) provide the theoretical background that the reduction of information barriers between market participants could result in externalities such as coordinated runs. Malherbe (2014) explains intensified friction due to the revealed information about the cash holding and preferences of the market participants; although the aftermath of the MMF reforms did not correspond to a widespread liquidity dry-up; nevertheless, it is conceivable that MMFs, unwantedly hoarded cash. Gary Gorton (2015) reviews a historical account of the policy responses to banking crises and characterizes them as alleviating heightened frictions, removing incentives to generate information, and managing market expectations. However, after the MMF reforms, being a policymaker-initiated event, there was no or minimal incentive for the central authorities, up to our knowledge, to coordinate actions to alleviate the externalities.[5]

In the absence of coordinated actions, it had been up to individual banks to manage expectations by regaining market confidence. Our results show that the banks that have faced limitations during this period mainly chose to signal their quality through their balance sheet capacity for discretionary accounting. Diamond and Rajan (2000) describe that when the bank's capital structure is financed optimally by equity, it trades off three effects, first, the information rents about financed projects, second, buffer against shocks, and third, the ability and willingness to sustain loans portfolio. In their model, higher relative equity serves the purpose of renegotiation in bad times.

[5] e.g., Gorton and Tallman (2016) provide the detail of a pre-fed era coordinated action of the clearinghouses to suppress demand for specific bank information and divert it to demand for systematic risk information.

Although, the MMF reform period did not coincide with *bad times*; nevertheless, individual banks arguably needed to exert efforts to regain the market's confidence. One way to signal would be to show the existence of sufficient provisions to ensure the safe recovery of short-term creditors. Previous literature[6] points out several motives for the banks' managers to favorably adjust the discretionary items. We contribute to this literature by evaluating whether banks respond to the lack of confidence in the short-term debt market with discretionary accounting. We postulate that to signal quality to the CP investors, banks adjust the values of insurance-like items on their balance sheet –although these items, too, eventually would be measured as constituents of equity.

Our paper contributes to recent empirical findings suggesting the persistent outflow across consistent assets during the stress episode. Sushko and Turner (2018) find this persistence of outflows in mutual funds and ETFs', i.e., they find that mutual funds and ETFs run on the same assets when faced with stress. We add MMFs to this possible persistence of preference. We find that whether a bank has been subject to reduced CP issuance during the regulatory changes of 2018 significantly predicts the bank's position during the COVID-19 period. Given the efforts of the banks to signal quality after the regulatory reforms, the explaining channel could be the diminished signaling power of their actions. Securities' prices are better understood by their liquidity rather than the expected distant cash flow when markets face liquidity crises (Allen and Carletti (2008), Nagel (2016)). By considering the illiquid nature of a large portion of banks' assets Allen and Carletti (2008) and Plantin, Sapra, and Shin (2008) argue mark-to-market accounting might not be a proper method for measuring the assets of financial institutions when the financial markets are illiquid. In an information economics framework, Plantin and Tirole (2018) argue that more mark-to-market accounting reduces the informativeness of the price signals and dries up liquidity. Eventually, it will become more costly for banks with deteriorated signaling power to overcome agency problems.

Furthermore, our paper revisits the banks' wholesale funding market in Europe. Pérignon, Thesmar, and Vuillemey (2018), and Kacperczyk, Pérignon, and Vuillemey (2021) studied other aspects of this market during the previous certificate of deposit (CD) program that preceded the 2016 reforms in this market.[7] Kacperczyk, Pérignon, and Vuillemey (2021) describe the relationship between short-term securities' issuance and safe asset demand variations during stable and stress periods. Our findings contrast with the argument of Kacperczyk, Pérignon, and Vuillemey (2021) about the policy implication of limited ex-ante benefits of opacity (Gorton (2017); Dang, Gorton, Holmström, and Ordoñez (2017)). We align with Pérignon, Thesmar, and Vuillemey (2018) that have found there was no market-wide freeze in the French

[6] This subject is mainly studied in accounting literature, we outlined some part of this literature in Footnote 4.

[7] https://www.banque-france.fr/en/monetary-policy/market-financing/commercial-paper-and-medium-term-note-market-neu-cp-neu-mtn.

certificates of deposit market during the 2008 to 2014 period. In addition to Pérignon, Thesmar, and Vuillemey (2018), we benefit from the exogenous distortion of the demand for safe assets during MMF reforms and we confirm that the partial resilience of this market can be attributed to the banks that more successfully dissociate assets backing money-like securities. Furthermore, complementing Moreira and Savov (2017), we find that the results are not just attributed to the credit quality, i.e., since the participating banks in the NEU CP program[8] have the highest investment ratings or are legally guaranteed under French law. We show that agency reasons could describe the assignment to one group of banks or the other when the issuers' credit qualities are almost differentiable.

4. Institutional Background

In terms of institutional setting our work connects with the literature that studies the relationship between the shadow banking system and its role in the financial crisis (Coval, Jurek, and Stafford (2009); Shleifer and Vishny (2010a, 2010b); Gorton and Metrick (2010); Diamond and Rajan (2011); Stein (2012); Gennaioli, Shleifer, and Vishny (2012, 2013)); Krishnamurthy, Nagel, and Orlov (2014); Sunderam (2015); Hanson, Shleifer, Stein, and Vishny (2015); Gissler, Machiavelli, and Narajabad (2020)). Money Market Funds are among the primary consumers of commercial papers; they hold CPs along with other short-term debt securities, e.g., treasury bills and certificates of deposit, to produce MMF unit shares, a liquid, transferable, and cash-like instrument.

MMFs are one of the essential parts of the shadow banking system, mainly because they buy short-term money market instruments issued by financial intermediaries (Gennaioli, Shleifer, and Vishny (2013); Schmidt, Timmermann, and Wermers (2016)). The fragility of the shadow banking system during the great financial crisis sparked concerns about regulating these lightly regulated institutions (Gorton and Metrick (2010)). In 2013, European Commission (EC) proposed the rules for Undertakings for Collective Investment in Transferable Securities (UCITS) MMFs[9]. The EU parliament eventually signed off the initial proposal as MMF Regulation (EU) 2017/1131[10], which became applicable in July 2018. Similarly, the US

[8] NEU CPs (ex-French CP) are registered on accounts with authorized intermediaries per the French legislation and regulations in force. The Monetary and Financial Code, under the authority of the Banque de France, governs this financial instrument. The NEU CP program only includes short-term securities with the highest ratings from competent agencies (A1+/P1/F1+) or a first demand guarantee (under French law).

[9] For more details on implementation instructions and timeline, https://eur-lex.europa.eu/procedure/EN/2013_306

[10] https://eur-lex.europa.eu/eli/reg/2017/1131/oj, In addition, to reduce part of the load on the banks and non-banks trading outside of the central bank's standing facilities in 2019 ECB also introduced a tiering system. The purpose mainly was to reduce the side effects of negative interest rate policies and promote excess reserve trading between banks. Baldo, Heider, Hoffmann, Sigaux, and Vergote (2022) and Altavilla, Boucinha, Burlon, Giannetti, and Schumacher (2023) document the positive effects of the implementation of this policy on the reduced cost of capital, positive equity market reaction, and improved bank lending. Although in terms of transactions of outside of the ECB's standing facilities, Altavilla, Boucinha, Burlon, Giannetti, and Schumacher (2022), inline with the collateral requirements to access liquidity, finds that this policy only affects banks' domestic government bond holdings significantly.

Securities and Exchange Commission (SEC) announced the new MMF regulations in 2014 and started implementing them in 2016.

These regulations, motivated by the run on funds backed by Lehman Brothers CPs and the consequent turmoil, aimed to reform the markets to reduce the probability of future MMF runs. The reforms in the EU and the US regulations have important shared features. These are minimum weekly liquid assets, the liquidity-triggered redemptions gates and fees, and limitations on the MMFs that could operate under the Constant Net Asset Value (CNAV MMFs) feature, i.e., a general preference toward Variable Net Asset Value (VNAV MMFs). Hence, eventually, these reforms resulted in MMF units becoming less money-like. However, the outcome of these regulations might not be as were in purview. Baghai, Giannetti, and Jäger (2022) find that the MMF reforms in the US unintentionally reduced the supply of safe liquid assets for investors and increased the sensitivity of the prime MMFs flows to performance. Li, Li, Macchiavelli, and Zhou (2021), contrary to the desired goal of these sets of regulations in mitigating the run risk, argue that applying gates and fees and liquidity restrictions caused the investors in MMFs to run preemptively when faced with a crisis. They find evidence that the proximity to liquidity restrictions, i.e., the weekly liquid asset measures that were the hard target for regulators, was associated with increased outflows during the COVID-19 crisis. Cipriani and La Spada (2021) estimate a premium of 20 to 30 basis points for the money-likeness and show an outflow of more than one trillion USD from Prime to government MMFs after similar reforms were implemented in the US in 2016. Fricke, Greppmair, and Paludkiewicz (2022) find significant crossflows from US investors into European prime MMFs, after the reform regulations in the US during the almost two years regulatory gap, i.e., until similar regulations were implemented in the EU.

We find that the NEU CP issuance volume declined during the second half of 2018 when MMF reforms were implemented, and they had to reauthorize and comply with the new regulation. A decline in MMFs' ability to issue MMF units and to keep within the required WLA meant that they had to reduce their less liquid securities holdings, e.g., CPs with limited secondary markets. We find that market participants for banks' CPs have shown a specific preference during this period. Our results complement Moreira and Savov (2017) and Baghai, Giannetti, and Jäger (2022) findings. However, it is doubtful that the NEU CP market participants targeted a certain credit quality of the issuers or reached for higher yields because, in our setting, the issuers in the NEU CP program are relatively homogeneous in their credit quality, i.e., the NEU CP program targets only the highest credit quality issuers. We find another channel, regardless of the credit quality homogeneity, there are two groups of banks, a first group that had diminished CP issuance in the primary market during this period; and a second group that had no change or increased CP issuance. We find that assignments to these groups appear not to be random. The latter are the banks that were more successful in keeping their liabilities more opaque (Gorton and Pennacchi (1990); Dang, Gorton,

Holmström, and Ordoñez (2017)) by keeping the cash flow information of their CP issuances isolated from the insurance-like items which are constituents of the reported equity. Furthermore, we show that these preferences persist when faced with a crisis. We find that whether a bank had been subject to a decrease in CP issuance during the MMF reform implementation period significantly predicts its situation during the COVID-19 MMFs "flight to liquidity" period.

4.1. Policy Implications

Our findings support the policy implication of the arguments of Gorton (2017) and Dang, Gorton, Holmström, and Ordoñez (2017) that banks are better off in short-term safe debt production when they can equitably disincentivize investors from generating private information. Banks that pass the information of their short-term debt proceedings to equity, which is suboptimally opaque, are less successful when the markets face turmoil and ought to show preference. Equity, unlike loans, generates no cash flow with certainty and, with the latest regulation, could result in unforeseen complications during restructuring negotiations and proceedings.[11] Our findings also support the policy suggestion of Kacperczyk, Pérignon, and Vuillemey (2021) and their conclusions about the shortage of private safe assets during the market turmoil. We analyze monthly CP issuance of banks in the primary market during two major and successive events, first, during the MMF reforms, when markets faced a shock to the demand for safe assets, and second, during the COVID-19 crisis when market participants made a flight to liquidity. However, we differ from Kacperczyk, Pérignon, and Vuillemey (2021) regarding the consequences of banks' short-term operations opacity; we find that the apparent collapse was not market-wide for all securities in the class. Although the asset class faced a drastic market-wide decline in volume in both instances, liquidity did not dry up for all banks. Some banks suffered more, and others did not change or even increase their CP issuances. Our results suggest that the determinant of the success of one group and the failure of the other could be described by the opaqueness of short-term debt issuance operations and avoiding the agency problem between short-term and equity investors.

Another policy implication of our paper concerns the regulations that increase the propensity of market participants to generate information about other short-term debt market participants, e.g., removing the information veil between the MMFs. These regulations appear to result in complementarities, such as the investors' coordination suggested by Schmidt, Timmermann, and Wermers (2016). Although, due to the limitation of our data, unlike Li, Li, Macchiavelli, and Zhou (2021), we cannot identify the characteristics of the funds which were more prone to run; nevertheless, our results suggest that the markets restricted –or

[11] Directive 2012/30/EUCOM/2016/0723 final - 2016/0359 (COD), article 12 and definition of "Equity holders' legitimate interest", and article 5 "debtor in possession".

favored– issuance of the securities of the same identified groups of banks during these two events, i.e., the market in aggregate seems to have persistence and coordinated preference toward one group of banks.

Moreover, finally, our findings support the policies that suggest reconsidering the efficacy of an overwhelming focus on banks' equity during bank runs; e.g., Diamond (2018)[12] alludes to the inefficiency of the bail-in as a solution for short-term debt creditors. Considering the agency problem that we have described, some bank managers could tilt toward smoothing reported equity levels. We find that short-term creditors monitor banks' balance sheets and reporting styles. The contributed equity combined with fair value accounting could incentivize and enable some banks' managers to report to favor shareholders. Our findings show that this governance style faces short-term creditors' disciplines when they show their preferences. A short-term debt due to negotiable rollovers would provide a more potent governance control tool, and its constraints could be adjusted appropriately through inherent debt features, e.g., maturity (Brunnermeier and Oehmke (2013)).

5. Hypotheses

Market participants trade short-term debt with minimum friction as long as the traded securities equitably disincentivize the buyers to generate private information about their payoffs. If the issuer of short-term debt fails to disconnect the short-term securities proceeding from the banks' observable cash flows, then informed investors are likely to generate private information and form preferences beyond the publicly available characteristics of the issuers and securities. We suggest that one such private information could be the identification of the agency problem between the buyers of short-term debts and equity beneficiaries when the banks pass the information of the proceedings from short-term debt issuances to equity. Indeed, equity is deemed the insurance buffer for the risks of the bank's asset portfolio; however, from a short-term security investor's point of view, first, equity does not generate any cash flow, and second, it represents contingent uncertainties during a possible restructuring proceeding.

Hypothesis 1. *Banks which are not optimally opaque are less successful in generating money-like short-term debt.*

In this hypothesis, we analyze a possible empirical implication of Dang, Gorton, Holmström, and Ordoñez (2017) and Dang, Gorton, and Holmström (2013). Banks that pass the information of CP issuance proceedings to equity accounts are not optimally opaque and hence are less successful in the money-like

[12] In his noble symposium lecture, https://www.hhs.se/globalassets/swedish-house-of-finance/conferences-2018/nobel-symposium-on-money-and-banking-2018/bilder-people--dokument/documents/financial-intermediaries-and-liquidity-creation/diamond2.pdf, and the recording on Swedish House of Finance, https://www.youtube.com/watch?v=cfZdRZTzkiQ.

short-term debt production. Informed short-term debt investors, i.e., MMFs, monitor the banks for the possible agency problem. When investors face a selection, they show preference toward the banks that appear to have not treated equity more favorably. Investors would demonstrate their preference by limiting the issuance amount and shortening the issues' maturity.

Hypothesis 2. *Banks that face investors' limitations on their short-term securities issuances respond by adjusting the balance sheet items that show asset quality.*

Banks that face market discipline due to their asset composition choices toward equity accounts would need to signal the quality of their portfolios by increasing the contingent reserves in their accrual accounting items.

Hypothesis 3. *Investors in the banks' short-term securities have persistent preferences.*

Market participants in the CP market, i.e., MMFs, are aware of possible faux quality signaling and have a persistent preference to avoid the banks that have not kept optimally opaque accounts. MMFs kept persistent preferences during the height of the COVID-19 crisis, i.e., they accepted less CP issuance from the same banks that had previously faced limitations. When investors in the short-term debt market generate information about other counterparties, it will generate externalities such as complementarities in their actions and coordination. This coordination has also been observed empirically in other pooled investment vehicles, e.g., mutual funds and ETFs.

6. Data

We use the granular data of the CP issuance by banks participating in the Negotiable European Commercial Paper (NEU CP) program. Banque de France publishes this data monthly. The NEU CP program has replaced the previous market securities in France with comparable structures. The program, in addition to giving a new legal name to French commercial papers, i.e., NEU CP, merged the formerly certificates of deposits issued by credit institutions and commercial papers issued by non-financial corporations. The new securities comply with the latest European regulations, and they started replacing the older securities on 31 May 2016. The participating issuers and investors needed to adapt to new regulations and operational requirements, especially to move to a new digital multilateral platform for primary and secondary placement and trading provided by NowCP.[13] The CP market in the EU consists of several domestic markets. During the period of our studies, the NEU CP Market is the second-largest CP

[13] https://publications.banque-france.fr/sites/default/files/media/2021/01/07/payments_market.pdf, "The bulk of NEU CP activity takes place on the primary market. Transactions on the secondary market correspond to around 25% of primary market transactions", according to the 2018 report by Banque de France.

program in the EU.[14] The maximum maturity of the NEU CP is one year with a minimum amount of EUR 150,000 or the equivalent amount in other currencies. As it is characterized in the French market, the bulk of the short-term unsecured debts issued by banks are bought by money market funds (MMFs) (Pérignon, Thesmar, and Vuillemey (2018); Kacperczyk, Pérignon, and Vuillemey (2021)).

The sample covers 139 banks that have participated in the program; this is almost an exhaustive sample of issuing banks in the program and only excludes a few small banks that we could not match with their Legal Entity Identifiers (LEI). For each issuer, we observe the amount and average maturity of the CPs issued during the month and, in addition, aggregate outstanding CPs' amount and average residual maturity at the beginning and end of the month. We use the LEI to match the security issuance characteristics with the banks' balance sheet information from Fitch Connect. We provide details on the issue characteristics in Panel A of Table 1. The average outstanding amount of banks' CPs is 3.23% of their total assets, while the average monthly issuance is approximately 0.74% of their total assets. In Panel B, we provide information on the balance sheet of issuing banks. The NEU CP program only includes the issuers with the highest rating from competent agencies (A1+/P1/F1+) or a first demand guarantee under French law. In Figure 1, we present the six-month rolling average of the aggregate NEU CP issuances during the whole period of our study. There was a distinguishable decline during the second half of 2018 when the new regulation for the MMFs was implemented. The second period of turmoil is associated with the COVID-19 health crisis, during which the MMF ran for liquidity.

Our data permits our identification strategies. Fair value accounting, i.e., marking to market, is one of the significant characteristics of the bank's accounting. The possibility to report several items on the bank's balance sheet as determined by internal models permits the managers to apply their discretion to the extent that the regulator and accounting standards allow. Furthermore, reporting cash according to the accounting methods nets liquid assets, e.g., pooling customer deposits and proceeds from short-term debt securities issued. Banks could use internal models to analyze the maturity of their financial instruments and report the financial assets with expected cash inflows that net the outflows on liabilities. The endogenous observation of equity, short-term liabilities, and cash makes identification for outside observers impossible, even for the institutions that report details of their assets and liabilities with minimum discretion. One key element in our identification strategy is the exogenous observation of banks' CP issuances from the Banque

[14] After the Euro Commercial Paper (ECP) market that has been historically the largest CP market centered in London and governed by English Law, https://www.icmagroup.org/assets/documents/Regulatory/CP/ICMA-CPC-white-paper-The-European-Commercial-Paper-and-Certificates-of-Deposit-Market-September-2021-290921.pdf

de France reports; therefore, our data structure allows observations that are not subject to the discretion of banks' managers.

7. Results

7.1. Short-term Debt Amount and Investor's Preference

In this section, we evaluate hypothesis 1; the MMF regulation reforms provide us with an event during which the MMFs, as the main customers of the commercial papers, have revealed their preferences and the characteristics of the banks that have faced limitations. This setting, in particular, enables us to test whether the assignment of the banks to the group that faced market limitations during MMFs regulation reform is statistically different from the other group for our hypothesis. The group of banks that faced market limitations had a reduced amount of CP issuance during this specific period, while the other group of banks did not face the market limitations, i.e., the average amount of monthly CP issuance did not change or, for some of them, even increased. In hypothesis 1, we propose that banks in the former group positively pass the CP issues proceedings to the equity accounts. Effectively these banks appear to finance some part of their asset-liability management with short-term debt; they report less interest-sensitive balance sheets by adjusting their equity levels.

Additionally, our identification strategy relies on the exogenous observation of banks' monthly CP issuance amount. This exogenous observation allows us to observe the relation of the actual amount of cash that enters the bank from CP issuance independent of the management discretions in the balance sheet reporting. The bank's management decides to invest the proceeding for the current treasury management and costs related to maintaining the loan portfolios. Alternatively, they could use the available cash to adjust the items sought for the assurance of the residual value of the balance sheet, e.g., the bank's equity level adjustments to appeal to the equity market or to avoid regulators' scrutiny. In the latter case, the management discretion would be classified as part of the equity in the manager's report. Thus we expect that when a bank uses CP proceedings to adjust the discretionary equity items, the exogenous CP amount observation to be positively correlated with the reported equity. The logic behind the identification methods that we use to evaluate hypothesis 1 is that if the two groups of banks are not different in this respect, then the assignment of the banks should be random, or at least the statistical difference between the two groups should be insignificant.

We select the second half of 2018, during which MMFs revealed their preferences due to participation limitations during the implementation of the new reforms. To select the disadvantaged banks' group due to MMFs monitoring for the explained agency problem, we compute the average six-month monthly issuance amount in the second half of 2018, and compare it to the prior one-year average. We assign a bank to the

"Decreased Average" group, i.e., the group that has faced market limitations during MMF reforms if they have less average monthly issuance during this period. We use two specification methods for identification. First, we use the conventional selection model suggested by Heckman (1976),

$$y_{it} = X_{it}\beta_1 + u_{it}, \tag{1}$$

$$I_i^* = Z_i\gamma + \epsilon_i, \tag{2}$$

$$I_i = 1 \Rightarrow y_{it} = y_i \quad if \;\; I_i^* > 0, otherwise \; y_{it} = 0. \tag{3}$$

We report the result of the basic Heckman selection specification in Panel A of Table 2. We use the Heckman model on two selected subsets of the whole sample. Importantly, our sample is almost representative of the entire population, missing only very small banks that we could not match their LEI number. The identification logic behind this specification is that the observer–we– selects a subset of the population with a biased outcome, e.g., the banks that had faced market limitations when the demand for short-term debt was reduced due to an exogenous regulation—knowing that the representative subsample is biased a priori. After the Heckman selection correction, the outcome could be interpreted such that if the econometrician's selected sample represented the entire population, then what would be the unbiased estimation of the coefficients of the interested variables for the population? An economic interpretation of this set of results would be if all the banks were similar to one group, bad or good, and our sample was representative, what relation would we expect between the specific variable of interest and the outcome?

In column 2 of Table 1, the positive and significant coefficient of equity shows that the banks that face market limitations are positively using the CP issuance proceedings to adjust their equity levels, i.e., showing the specific agency problem we have explained. The same coefficients for the banks in the group that did not face market limitations are negative and less significant. When we limit our sample to exclude COVID-19, i.e., the period before 2020, the results for the first group, in column 4 of Table 1, become more prominent and with similar statistical significance, and the results for the second group slightly decrease and with no statistical significance. These results also follow the interpretation of theories for successful banks in short-term safe asset generation[15], i.e., that the banks are less successful in generating short-term debt when they are unable or unwilling to withhold the information about assets that are backing their short-term debt.

In our second analysis, we use the switching simultaneous equation model described by Maddala (1986) and Song (2004). This model specification allows analyzing the exogenous event and bank balance sheet

[15] An empirical implication of Dang, Gorton, Holmström, and Ordoñez (2017)

affecting MMF decisions as reflected in the changes in CP issuance. One benefit of using the switching simultaneous equation model is that it permits empirically analyzing endogenous and exogenous variables that affect the assignment to a group. The formal representation of the model is as follows,

$y_{Rit} = X_{Rit}\beta_1 + \zeta_i + u_{Rit}$, estimated using GLS, and ζ_i is Bank fixed effect, (4)

$y_{Uit} = X_{Uit}\beta_2 + \zeta_i + u_{Uit}$, estimated using GLS, and ζ_i is Bank fixed effect, (5)

$I_i^* = Z_i\gamma + \epsilon_i$, (6)

$I_i = 1 \Rightarrow y_{Ri} = y_i \quad if \;\; I_i^* > 0$, (7)

$I_i = 0 \Rightarrow y_{Ui} = y_i \quad if \;\; I_i^* \leq 0$, (8)

where, y_i is the ratio of CP issuance amount of bank i over total assets, and X_{it} is a vector of endogenous and exogenous variables relating to the bank and the issuing characteristics. The subscript group $\{R\}$, in Equation 7 indicates the conditional assignment of the bank to the group that has faced market limitation, i.e., "restricted," while the subscript group $\{U\}$, in Equation 8 indicates the conditional assignment to the other group, i.e., "unrestricted." Equation 4 describes the conditional distribution of the monthly issuance amount of the bank i conditioned on whether this bank is in group $\{R\}$ and shows the relation with endogenous and exogenously observed banks and issues' characteristics. The variable I_i^* determines the underlying selection equation that determines the assignment group for bank i.

We report the result of the switching simultaneous equation model specification in Panel B of Table 2. The interpretation of this specification is that the assignment of a bank to one group or another is not random, and the coefficients of the variable of interest describe the relation of the conditional distribution of banks in one group with the exogenous and endogenous variables of interest. The coefficients in columns 2 and 4 confirm the results described in the previous basic Heckman model. The banks that have faced market limitations are the banks that have a positive and significant relation between their CP issuance amount and equity levels. In columns 3 and 5, we have limited the interval to exclude the COVID-19 period. The results are the same and slightly better in the direction that more strongly confirms our first hypothesis.

In Panel C of Table 2, we slightly modify the model specification to evaluate whether the difference between the coefficients of interest for the two groups is significant. We create a dummy variable that takes the value of one if the bank has faced a reduction of average CP issuance during the MMF regulatory reforms and zero for the other group. In the first specification, in column 2, we include the interaction of this dummy variable with the equity ratio. The positive and significant coefficient of the interaction term in column 2 indicates that, indeed, the difference between the two groups is positive and statistically

significant. In column 3, we present a model specification without a first stage, i.e., no correction for the assignment. This specification is inherently equivalent to a fixed effect model to estimate the difference in the coefficient of a continuous variable between the two groups. The results from this more parsimonious model replicate exactly the interaction term' coefficient in magnitude and statistical significance. Columns 4 and 5 show similar results when we remove the COVID-19 period from our sample.

7.2. Short-term Debt Maturity and Investor's Preference

In this section, we present an alternative method to classify the banks that have faced market limitations. The selection of bank groups follows the theory[16] that when banks are unable or unwilling to keep a maturity structure and offer one group of investors a lower maturity, other investors also request their securities to be issued with shorter maturities. The agency problem we evaluate in Hypothesis 1 is equivalent to shortening the conceptual duration of equity. When banks adjust the level of equity to report a smoother level, in effect, the apparent sensitivity of equity to the interest rate variations appears to be lower, or equivalently the apparent conceptual duration of equity appears to be lower.

We use a set of alternative events staggered in our study interval in which the market participants have revealed their preferences by reducing the maturity of the CP securities of banks. We exploit the staggered anomalies observed in the banks' average residual maturity of outstanding issues. When an issuer does not offer a new CP issue in a specific month, the residual maturity of the outstanding issues reduces by approximately 30 days. However, if a bank issues CPs in any month according to its usual schedule, the expectation would be that the residual maturity as weighted average increases, or we expect it to reduce by less than 30 days depending on the new issues' size and maturity, noting that average original maturity of issues is around 130 days. If a bank faces market limitations, the CP would be issued in urgent conditions and with shorter maturity than its usual schedule.

We use the anomalies in which a new issue causes a severe decrease in the average maturity of the residual outstanding issues. Effectively, for our identification purpose, we define these events when the new issue not only does not increase the average maturity but even causes the average residual maturity to shorten by more than 30 days, i.e., we use a reduction threshold beyond 45 days. In such events, the bank has faced significant limitations from the market for issuing CPs. In the specific event month, the issued CPs have drastically distorted the maturity of the existing portfolio of outstanding CP issues detrimentally. We mark banks who issued any of their CPs in urgent conditions as "Urgent Issuers." We restrict the time

[16] Brunnermeier and Oehmke (2013)

interval for identifying urgent issuers to before COVID-19 and identify banks with at least one urgent issue during this period.

In Panels A and B of Table 3, we present the comparison results of the two groups of urgent and non-urgent issuers banks using the Heckman selection and the switching simultaneous equation model specification. The identification strategy follows the same logic as in 7.1, however, the distributions of banks between the two groups are slightly unbalanced compared to the previous section. In Panel A, columns 2 and 4 the positive and significant coefficients confirm the result of the previous section for banks that have faced market discipline by shortening the maturity of their securities. The comparable coefficients in columns 6 and 8 are considerably less significant and negative, again in line with our findings in section 7.1. Similarly, in column 2 of Panel B, the positive and significant coefficient indicates that urgent issuer banks are the banks that have been more prone to the specific agency problem we have discussed. The same coefficient for non-urgent issuers is statistically insignificant. The results are more robust when we limit the period of our analyses to exclude the COVID-19 period; we present these results in columns 3 and 5.

Furthermore, similar to the previous section, in panel C of Table 3, we present the result of analyses of whether the difference between the two groups is significant. We define a dummy variable that takes the value of one if the bank is an urgent issuer and zero for non-urgent issuers. Similar to the specification described in section 4.1, we present these results with adjustment for the selection bias and without correction, i.e., equivalent to a fixed effect model. In both specifications, we confirm that the difference between the urgent and non-urgent issuers indicated by the interaction term is positive and significant. This pattern is consistent with the result of the similar analyses we have presented in section 4.1: the banks that have faced an anomalous reduction of their issued CPs' maturity are the banks that have not successfully isolated the specific information of their CP issuance proceedings from the details of their balance sheets.

The results in sections 4.1 and 4.2 show that the expert investors observe that the bank is using the proceedings from short-term debt to adjust the equity levels; equity is not the optimal investment asset to back the securities offered as safe assets to the CP investors with unforeseen immediate liquidity needs. Hence, investors show preference by limiting the maturity of the securities that banks offer. The results confirm that the investors show preference through maturity and volume of securities. To further expound on the concept, in retrospect, a creative way for the banks to facilitate CP issuance and keep the CP isolated from their balance sheets and regulatory capital requirements have been to resort to asset-backed commercial papers. Ignoring the insatiable exuberances that had led to the notoriety of these instruments – especially at the height of the financial crisis of 2007-2008– one could interpret the widespread popularity of ABCPs as the investors' interest in over-collateralized pure-loan balance sheets; i.e., backed by CMBSs,

RMBSs, CDOs, and other ABSs characterized by having no equity and the SPV entities being bankruptcy remote from the banks' balance sheets and equity operations.

7.3. Bank's Response to the Short-Term Debt Market Limitations

In this section, we test our second hypothesis. Here we set up a diff-in-diff specification. Here, the identification strategy is that the application of MMF reforms affected the banks' CP differently depending on how the market perceived them. The specific period that we test this hypothesis is after the period of the MMFs reforms. By the beginning of 2019, all the MMFs underwent reauthorization and adaption of the new regulations. During this period, some banks issued lower CP amounts. Once the markets recovered, the prior information asymmetry between the banks and investors and between investors had altered. Some investors have shown preferences for certain banks and limited their purchases from other banks. It was up to the banks that faced the market restrictions to recover the market confidence about the quality of their assets. We test whether the banks signaled their asset quality by adjusting the items that ensure the quality of their loan portfolio.

For identification, we define a dummy variable that takes the value of one for the banks that, during the MMF reforms, faced a reduction of their CP issuance amount, i.e., the treated group. We create an interaction term with the time-domain dummy variable equal to one after 2019. The time-domain dummy defines the market's recovery from the regulatory slowdown and the time that treated banks needed to signal

$$Bank\ Signaling_{it} = \beta_0 + \delta_1 Bank\ Type_i + \delta_2 After\ MMF\ Reform$$
$$\delta_3 Bank\ Type_i \times After\ MMF\ Reform + \beta_1 X_{it} + \iota_i + \tau_t + \epsilon_{it} \qquad (9)$$

where $Bank\ Signaling_{it}$ are the outcome variables that the banks in the signaling group use to show quality. We capture the bank and month fixed effects in the model specification, respectively, by ι_i and τ_t. We evaluate the variables banks could use to signal different aspects of their operations.

In columns 1 and 2, we test the two basic ratios. Any abnormal adjustment to the discretionary items on the balance sheet would eventually appear on the equity ratio of the bank. In column 1 of Table 4, we test whether there is a general increase in the equity ratio; an increase in the equity ratio would confirm that some constituent items of the equity have increased. The estimated δ_3 is positive and significant, consistent with the signaling through equity.

Next, in column 2 of Table 4, we evaluate whether the banks' loaning activity has changed. If the banks reach for higher constant cash flows through more loaning activity, the risk of higher regulatory capital

requirements increases, possibly while lacking an essential financing source, i.e., reduced average CP amounts. There is a distinction between real capital management, i.e., timing the investment of the excess resources under management discretion, and accrual-based capital management. The estimated δ_3 is insignificant, confirming the often cited in the literature "trade-off" between real and accrual-based discretionary capital management. In contrast to our finding to signal through real capital management operations, some parts of the retained reserves could be used to initiate new loans. In such a case, signs of estimated δ_3 would have been expected to be negative and significant in column 1 and positive and significant in column 2.

In column 3 of Table 4, we evaluate the provision for non-performing loans net of loan loss provisions as a portion of equity. The banks that have faced CP market restrictions have reported a lower provision for the net non-performing loans as a portion of the equity. The estimated negative and significant δ_1 indicate that they have reported a better quality of loans portfolio by reporting better loan loss coverage by equity, i.e., a critical ratio for bank capital adequacy evaluation is common equity tier 1 (CET1). However, a lower value of this ratio could signify that equity's residual value is higher, in line with our findings in sections 4.1 and 4.2, possibly indicating the existence of the underlying agency problem we have discussed. This ratio has not significantly changed after this group of banks faced short-term market restrictions. In fact, in column 4 of Table 4, the estimated insignificant δ_1 and δ_3 indicates no change of the equity capital assigned to insure the loan losses as a ratio of the gross loans, i.e., the loan loss provisions over gross loans difference and changes are both insignificant.

One critical fact is that the classification of non-performing loans on banks' balance sheets is not progressive and straightforward. When an obligor fails to pay the bank, the specific obligation would be classified as non-performing. However, it is possible to classify the rest of the obligations of a customer as a performing loan until 20% of the debt is more than 90 days past due. Furthermore, after the banks have exposure to a non-performing loan, there is still the possibility that exposure to exit the non-performing classification and be reclassified as performing after an analysis of the financial condition and payment patterns of the non-performing consumer[17]. Again similar to the ratios in columns 1 and 2, signaling consistent with the removal of the mentioned agency problem through real capital management would have resulted in a positive and significant change in estimated δ_3 in column 3, i.e., banks could write off more non-performing loans resulting in operationally safer remaining assets but inevitably less equity.

[17] For a detail guide on treatment of non-performing loans under EU regulation 575/2013 refer to ECB, https://www.bankingsupervision.europa.eu/ecb/pub/pdf/guidance_on_npl.en.pdf, and the legislation body, https://eur-lex.europa.eu/legal-content/en/TXT/?uri=celex%3A32013R0575

Finally, in column 5 of Table 4, we evaluate how the banks that had faced market restrictions reacted to non-performing loans through accrual accounting practices. The estimated positive and significant δ_3 combined with the insignificant results in columns 1 and 4, indicates that although the promised equity against the gross loaning operation had not changed significantly in those accounts, the loan loss provisions against the impaired loan have increased significantly both statistically and in magnitude. These results align with the well-known accounting practices recognized in accounting literature and for policymakers[18].

Our results from the difference in differences analyses by comparing the difference between various accounts on the bank's balance sheets provide a holistic view of the behavior of banks; we find it more plausible that banks select to signal through discretionary capital management and not real capital management. Specifically, our observations contradict that banks write off a considerable portion of their non-performing loans or initiate significant new loans. The difference between the net impaired loans to equity ratio between the two bank groups and their response after MMF reforms is more closely a signal to the quality of loans and insurance-like characteristic of equity, a lower value of which shows lower non-performing loans against available equity. We also assess the changes of other highly anticipated ratios of the loan loss provision over gross and impaired loans. These values are also abnormally changed when compared between the whole sample and the group of banks that have faced market constraints. While for the whole sample, this ratio changes insignificantly for the restrained group it is highly positive and significant.

7.4. Investor's Persistent Preference

In this section, we test hypothesis 3. To do so, we investigate the predictability of a bank's reduction of CP issuance, knowing the prior assignment of the banks during the MMF regulation reforms. Effectively to show that the preferences persist more accurately, we define deciles of CP issuance reduction amount during the MMF reforms period. The banks with the highest CP reduction are in the first decile, i.e., faced the worst market limitations. The banks face progressively less restriction toward the tenth deciles, the banks with the least reduction of CP issuance amount. For the COVID-19 period, like the previous method, we identify the banks that have reduced CP issuance in the first half of 2020, compared to the average of one year during 2019. Furthermore, we similarly define deciles of CP issuance reductions.

In panel A of Table 5, we present the result of a quantile regression where the outcome variable is the decile of the bank during the COVID-19 period. The implication of our hypothesis that the preferences persist would be that the observed decile of the bank during the MMF reforms could predict the observed

[18] https://www.bis.org/bcbs/publ/wp39.pdf

decile of a bank during this period. For brevity, the results are presented for the second, fourth, Median, sixth, and eighth deciles. All the coefficients are positive and significant. In figure 2, the coefficients are presented graphically; although predictability is statistically significant for all deciles, the best predictive region is between the fourth and eighth decile.

In panel B of Table 6, in an alternative specification, we use the continuous reduction of the average issuance amount during COVID-19. Effectively, this specification is a quantile regression where the outcome variable is the continuous variable of the banks' reduction in average CP issuance amount. We have defined the decile of the independent variable such that the first decile indicates the banks with the most reduction of CP issuance during the MMF reforms. We expect the progressive increase of estimation decile of the coefficients of the dependent variable to be relatively more negative, indicating less reduction moving from the most reduction decile group to the groups that were in the least reduction quantiles during MMF reforms. Effectively, we confirm this relation by the coefficients for the fourth, Median, sixth, and eighth deciles. Our observation in the second decile, which is the group with the worst outcomes during MMF reforms, is an exception. One reason for this exceptional observation might be that some of the banks in the worst decile did not fully recover from the reduced CP issuance after the CP reform period. Furthermore, complementing our explanation, the observation for the same decile in Panel A confirms that if a bank was in the worst decile during MMF reforms, it is highly predictive to be in the worst reduction decile group during COVID-19. Like our previous finding in panel A of Table 5, the best predictivity is observed between the fourth and eighth deciles. The coefficients decrease uniformly from the lowest decile to the highest decile. Noticeably, the coefficients keep their significance, indicating high predictability, and their magnitudes uniformly decrease.

8. Conclusion

In this paper, we use a unique setting in the French CP market to understand and evaluate the success of banks in producing short-term private debt. Benefiting from the similarity of the banks' credit ratings in this setting allows us to examine the distinction between the banks in their governance style. Accounting measurements could be an essential tool to reveal the governance style of the banks. The bank's balance sheet's discretionary accounts measurements render the boundary between equity and short-term claimants liquid. Banks could select to favor shareholders through discretionary accounting measurements by smoothing residual value. We show that the market participants monitor banks for this agency problem, and when they face limitations, reveal their preferences and select to restrict the CP issuance of banks whose governance suffers from the proposed agency problem. Furthermore, we show that disciplined banks, in response to short-term creditors, select to signal the quality of their assets through accrual asset management techniques; in contrast, we find no evidence to support real capital management. Finally, we show that the

short-term debt market participants have persistent preferences and limit the issuance of the same banks when the market liquidity suffered due to the COVID-19 crisis.

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Figure 1

Moving Average Aggregate Monthly Commercial Paper Issuance Amount

Each month, the aggregate amount of commercial papers (NEU CP) issued by banks is computed. The graph presents a six-month rolling average of the aggregated monthly CP amounts. The moving average method is only used for the smoothing and graphical presentation of the main market-wide events. We have used the monthly data for all the computations related to the individual banks.-The graph clearly shows the decline in the moving average starting the second half of 2018 until the beginning of 2019. During these six months, the MMFs reforms were implemented. An externality of reforms was the limitation of the MMFs' participation in the market and a decline in the aggregate amount of CPs issued by banks. Furthermore, the second episode of gradual decline in aggregate CP amount started in 2019 when the initial news about COVID-19 started to spread. The reflection instance in 2020 corresponds to the assurances the French government provided to support the economy unconditionally.

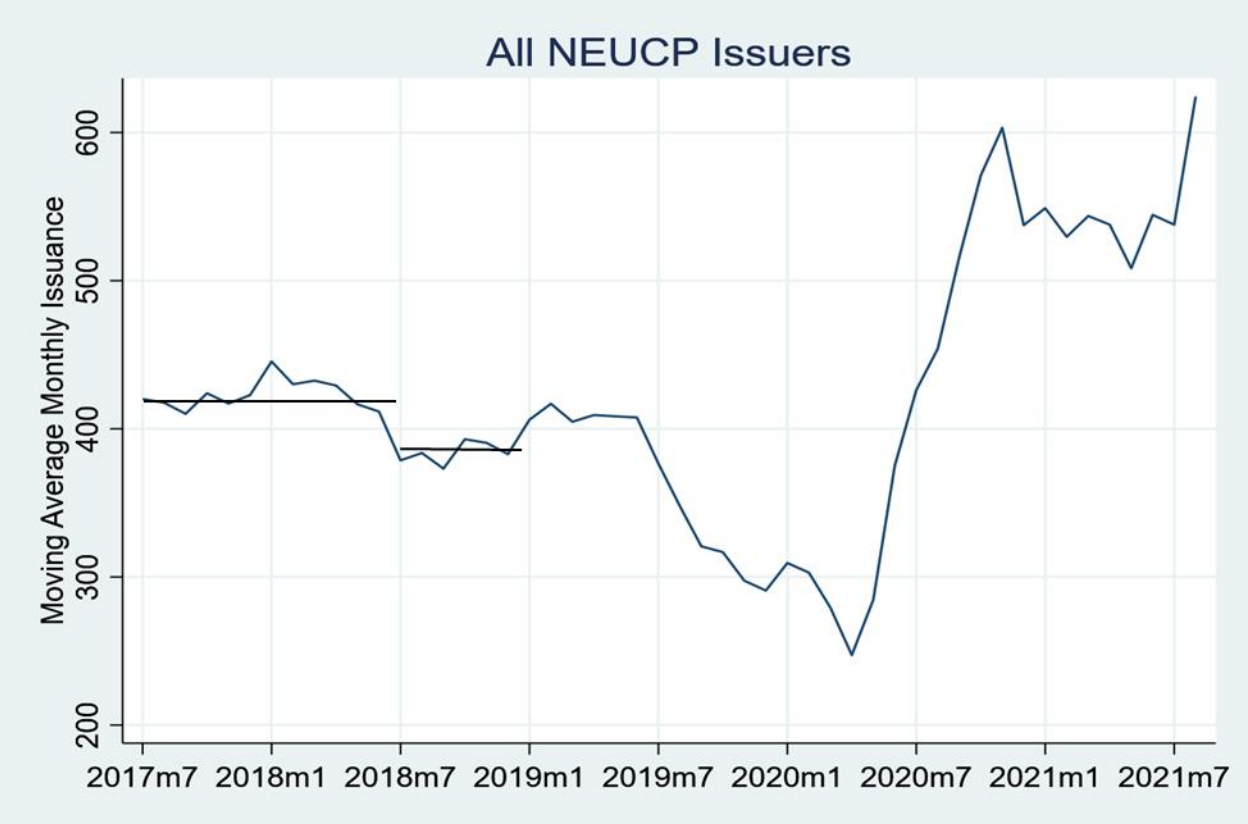
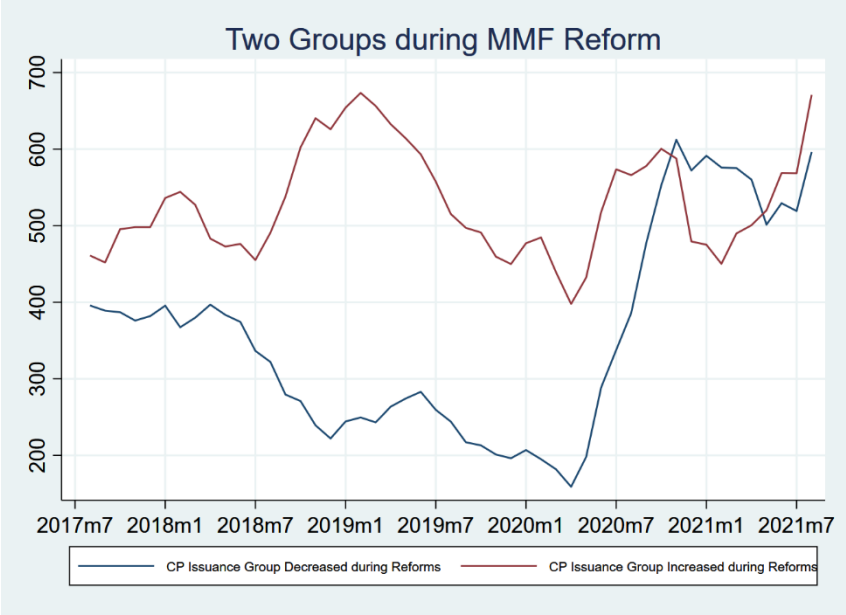


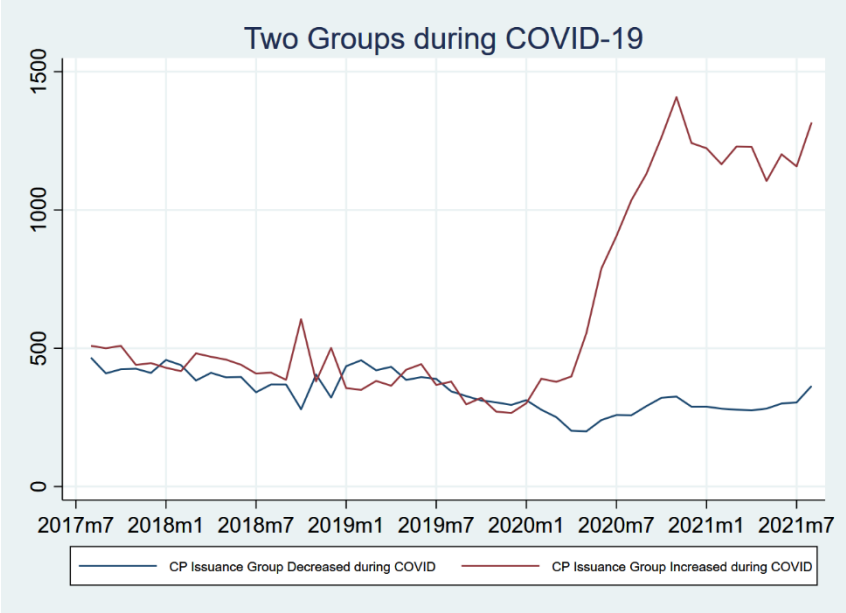
Figure 2

Moving Average Aggregate Monthly Commercial Paper Issuance Amount

Every month, we calculate the total amount of commercial papers (NEU CP) issued by banks. The graph shows a six-month rolling average of these monthly totals, broken down by whether the bank's average issuance has increased or decreased. Graph (A) shows that the MMF reforms are used to conditionally identify two bank groups based on their average monthly issuance changes in the second half of 2018. In Graph (B), the COVID-19 crisis is used to conditionally identify two bank groups based on their average monthly issuance changes during the period of increased liquidity demand, also commonly known as the "dash for cash episode."



(A)



(B)

Figure 3

Investors' Persistent Preference and Predictability

This figure is a graphical presentation of the coefficients of quartile regression of the decile on decile reduction of CP amount during the MMF reform and the COVID-19 period. The positive coefficients indicate that if a bank has faced market restriction during the MMF reforms could significantly predict its situation regarding the outcome of issuing CPs during the COVID-19 period. The belonging to the best decile, i.e., the tenth decile, during MMF reforms, has been slightly predictive.

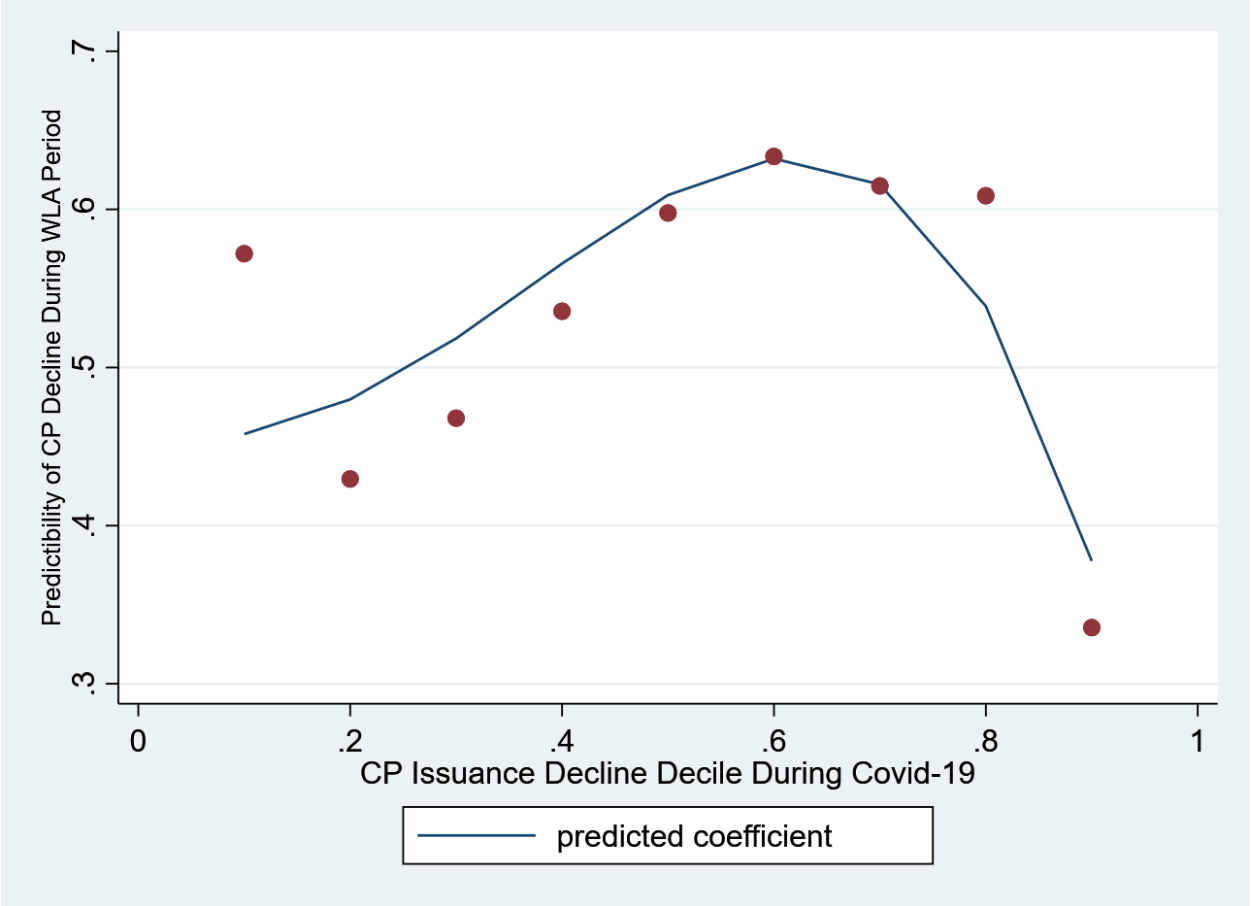


Table 1

Summary Statistics

The sample covers the NEU CP program from April 2016 until August 2021. Panel A describes the summary statistics of the details of the NEU CP issuance characteristics information, the source of these data is the monthly report from Banque de France. The ratios are reported over the last reported bank's total assets. Panel B is the financial data of all the banks that have participated in the program, and we only excluded a few small banks whose Legal Entity Identifiers (LEI) were unverifiable. Panel C presents the average change of the CP Issuance compared to the one-year average before the two events, i.e., MMF reforms and the COVID-19 crisis conditional on the bank being in the increased or decreased average CP issuance group. The banks are assigned to different deciles conditional on a decrease or increase in average CP issuance. The averages of changes in each decile are reported for both events. Panel D presents the average changes of the CP Issuance compared to the one-year average before the two events, i.e., MMF reforms and the COVID-19 crisis by the country of the bank.

Panel A: NEUCP Issuance Characteristics

Variable Name	Median	Mean	Max	SD	Number of Banks	Number of Observation
Issue Size in Month / Total (%)	0.04	0.73	31.56	2.35	139	6149
Outstanding Amount in Month / TA (%)	1.02	3.24	76.14	6.64	139	6149
Average Original Maturity of Issue (Days)	90	127.01	365	138.42	141	5895
Average Original Maturity of Outstanding (Days)	332	290.25	397.06	94.77	142	6068
Average Residual Maturity of Outstanding (Days)	142	140.80	363	74.46	142	6068

Panel B: Banks Balance Sheet Characteristics

Variable Name	Median	Mean	Max	SD	Number of Banks	Number of Observation
Equity / TA (%)	7.92	8.65	18.59	4.81	139	6743
Net Loans / TA (%)	69.19	60.38	98.32	24.37	139	6743
Liquid Assets / TA (%)	15.34	20.50	64.72	16.85	139	6743
Growth of Gross Loans (%)	2.65	2.59	21.11	8.75	138	6702
Loan Impairment Charges / Gross Loans (%)	0.12	0.263	1.47	0.39	135	6567
Interest Income / Avg. Earning Assets (%)	2.32	4.0789	18.62	4.64	138	6685

Panel C: Bank's Average CP Issuance Changes During the MMF Reforms and COVID-19

Deciles	1	2	3	4	5	6	7	8	9	10	Aggregate
Changes During MMF Reform											
Average Reduction (EUR M)	-1744	-214.5	-76.47	-39.07	-23.75	-10.95	-5.48	-3.3	-1.42	-0.48	-236.8
Average Reduction / Equity (%)	-22.8	-17.51	-2.01	-3.94	-5.99	-5.19	-1.13	-1.3	-1.14	-0.2	-6.35
Average Increase (EUR M)	0.079	0.635	3.18	8.04	23.48	43.26	82.97	193.35	321.25	1301.5	167.1
Average Increase / Equity (%)	0.08	0.15	0.66	1.7	1.89	1.97	30.35	9.61	2.01	3.15	7.07
Changes During COVID-19											
Average Reduction (EUR M)	-1402.4	-241.3	-121.5	-64.87	-40.01	-26.19	-15.66	-4.57	-1.41	-0.4	-194.5
Average Reduction / Equity (%)	-5.26	-14.48	-11.51	-4.4	-9.81	-3.05	-5.3	-0.5	-0.94	-0.11	-5.56
Average Increase (EUR M)	0.44	0.92	1.5	2.39	5.22	8.45	23.34	156.94	418.19	1873.5	207.95
Average Increase / Equity (%)	0.38	0.86	0.43	0.58	0.26	5.43	8.52	5.48	7.09	19.99	4.47

Panel D: Average CP Issuance Changes During the MMF Reforms and COVID-19 by Country

	France	Austria	Switzerland	Germany	Denmark	Finland	UK	Italy	Luxembourg	Netherland	Sweden
Changes During MMF Reform											
Average Change (EUR M)	-79.51	.	-400.83	-65.07	-10.00	-310.91	-131.48	145.15	-39.50	32.27	-315.38
Average Change / Equity (%)	-0.01	.	-0.01	0.00	0.00	-0.01	0.00	0.00	-0.12	0.01	-0.02
Changes During COVID-19											
Average Change (EUR M)	-86.56	88.41	5.48	-106.69	469.30	.	-64.06	-365.70	-57.05	-71.97	-350.62
Average Change / Equity (%)	-0.03	0.11	0.00	-0.01	0.11	.	0.00	-0.01	-0.17	-0.01	-0.03

Table 2

Short-term Debt Amount Reduction and Investor's Preference During MMF Reforms

Table 2 reports the results of a comparison between the two groups of banks during the MMF reforms. Group 1 consists of all the banks that, on average, have issued less commercial papers during this period. Group 0 consists of banks that have not changed the amount of commercial papers issued during this period. The MMF reforms have resulted in a general reduction of MMFs' participation in the market. With a lower demand for the banks' short-term securities, the MMFs have shown preferences for the securities they selected to purchase in the primary market. Panel A reports the results of the split sample Heckman correction analyses. The complete data is almost representative of the population with negligible missing, and by intentionally selecting a biased subsample and applying Heckman correction, we estimate the coefficient as if the subsamples were representative. Panel B presents the results of an endogenous switching model. This model specification permits empirical analyses of endogenous and exogenous variables that affect the assignment to a group. The results are reported for the second stage estimation using GLS and Bank fixed effect. Panel C presents analyses of the significance of the difference between the estimated coefficients. We define a dummy variable equal to one for Group 1 and zero for Group 0. The interaction term with the estimated coefficient is presented for two specifications, a model with selection correction and a second model equivalent to a fixed effect model without first-stage correction.

Statistics are reported in parentheses, and significance is indicated by * p < 0.05, ** p < 0.01, *** p < 0.001.

Panel A: split Sample Heckman Correction Analyses

	Group 1: Decreased average CP during MMF reforms				**Group 0: Increased average CP during MMF reforms**			
	Banks' CP Issuance				**Banks' CP Issuance**			
	Complete Interval		**Excluding COVID-19**		**Complete Interval**		**Excluding COVID-19**	
	Selection	**Main**	**Selection**	**Main**	**Selection**	**Main**	**Selection**	**Main**
Equity / TA	**-2.406*****	**0.0479*****	**-2.797*****	**0.0829*****	**1.634*****	**-0.191***	**1.672*****	**-0.0174**
	(-6.74)	(3.66)	(-6.47)	(6.64)	(4.47)	(-1.66)	(3.8)	(-0.56)
Net Loan / TA	**-2.624*****	**-0.0174****	**-2.675*****	**0.0204*****	**2.909*****	**-0.351****	**2.600*****	**-0.0747****
	(-17.59)	(-2.13)	(-14.44)	(2.62)	(17.94)	(-2.38)	(13.27)	(-2.33)
Average Residual Maturity of Outstanding	**0.000562****	**-0.0000122****	**0.000387**	**-0.0000194*****	**0.000272**	**-0.0000928****	**0.000885*****	**-0.000110*****
	(2.54)	(-2.01)	(1.46)	(-3.73)	(1.2)	(-2.19)	(3.26)	(-6.59)
Liquid Assets / Total Assets (%)	**-0.0313*****	**0.000294*****	**-0.0318*****	**0.000812*****	**0.0359*****	**-0.00418****	**0.0321*****	**-0.000679***
	(-14.36)	(2.7)	(-11.77)	(8.24)	(15.4)	(-2.24)	(11.41)	(-1.67)
Growth of Gross Loans (%)	**-0.00529*****		**-0.0113*****		**0.00231**		**0.00903*****	
	(-2.70)		(-4.44)		(1.14)		(3.46)	
Loan Imp. Charges / Avg. Gross Loans (%)	**-0.228*****		**-0.0837**		**0.133*****		**0.156*****	
	(-5.32)		(-1.49)		(3.04)		(2.76)	
Interest Income / Avg. Earning Assets (%)	**0.0169*****		**0.0132*****		**-0.00771****		**-0.00771**	
	(4.38)		(2.8)		(-1.98)		(-1.61)	
Mill's lambda		**0.0275*****		**0.00123**		**-0.174****		**-0.0468*****
		(4.74)		(0.22)		(-2.45)		(-2.87)
Constant	**2.516*****	**-0.00947****	**2.613*****	**-0.0260*****	**-3.039*****	**0.518****	**-2.894*****	**0.135*****
	(17.25)	(-2.24)	(14.42)	(-6.58)	(-19.26)	(2.46)	(-15.12)	(2.82)
Observations	6361	6361	4449	4449	6361	6361	4449	4449

Table 2 (Continued)

Panel B: Analyzing endogenous and exogenous variables that affect the assignment to a group using endogenous switching model specification

		Group 1: Decreased average CP during MMF reforms		Group 0: Increased average CP during MMF reforms	
		Banks' CP Issuance		Banks' CP Issuance	
		Complete Interval	Excluding COVID-19	Complete Interval	Excluding COVID-19
	Selection	Main	Main	Main	Main
Equity / TA	**-1.077*** **	**0.0529*** **	**0.0951** **	**-0.0672** **	**-0.129*** **
	(-2.82)	(2.61)	-2.29	(-2.36)	(-2.94)
Net Loan / TA	**-2.749*** **	**-0.00957**	**-0.00509**	**-0.0450** **	**-0.162*** **
	(-16.65)	(-0.92)	(-0.37)	(-2.27)	(-5.68)
Average Residual Maturity of Outstanding	**-0.000201**	**0.00000592***	**0.00000724***	**0.00000719**	**0.00000285**
	(-0.84)	(1.78)	(1.66)	(1.45)	(0.43)
Liquid Assets / Total Assets (%)	**-0.0344*** **	**0.000175**	**0.000543*** **	**-0.0000515**	**-0.000398**
	(-14.53)	(1.24)	(2.74)	(-0.22)	(-1.31)
Growth of Gross Loans (%)	**-0.000576**				
	(-0.28)				
Loan Imp. Charges / Avg. Gross Loans (%)	**0.0597**				
	(1.3)				
Interest Income / Avg. Earning Assets (%)	**0.0164*** **				
	(4.09)				
Mill's lambda		**0.00506**	**0.00629**	**-0.0129**	**-0.00929**
		(0.58)	(0.57)	(-1.44)	(-0.81)
Constant	**2.707*** **	**0.0772*** **	**0.0570*** **	**0.0565** **	**0.112*** **
	(16.99)	(14.2)	(7.16)	(2.17)	(3.49)
Bank FE		Yes	Yes	Yes	Yes
Observations	5893	3537	2116	2295	1369

Table 2 (Continued)

Panel C: Analyzing the significance of the difference between the estimated coefficients for two bank groups

		Banks' CP Issuance		Banks' CP Issuance	
		Complete Interval		Excluding COVID-19	
	Selection	Main	FE Model	Main	FE Model
Equity / TA	**-1.077*** **	**-0.0596** **	**-0.0595** **	**-0.101** **	**-0.0967** **
	(-2.82)	(-2.13)	(-2.13)	(-2.43)	(-2.32)
Dummy Decreased Issuance During Reforms		**0.0654*** **	**0.0637*** **	**0.0615*** **	**0.0586*** **
		(21.33)	(20.21)	(13.64)	(12.6)
Equity Ratio × Decreased Issuance During Reforms		**0.116*** **	**0.116*** **	**0.175*** **	**0.161*** **
		(3.56)	(3.54)	(3.05)	(2.79)
Net Loan / TA	**-2.749*** **	**-0.00751** **	**-0.00881** **	**-0.0257*** **	**-0.0117** **
	(-16.65)	(-2.03)	(-2.52)	(-4.40)	(-2.34)
Average Residual Maturity of Outstanding	**-0.000201**	**0.00000727*** **	**0.00000712*** **	**0.00000696** **	**0.00000805** **
	(-0.84)	(2.77)	(2.71)	(1.99)	(2.3)
Liquid Assets / Total Assets (%)	**-0.0344*** **	**0.000253*** **	**0.000263*** **	**0.000379*** **	**0.000505*** **
	(-14.53)	(4.88)	(5.33)	(4.82)	(6.54)
Growth of Gross Loans (%)	**-0.000576**		**0.0000705*** **		**0.000164*** **
	(-0.28)		(2.61)		(4.31)
Loan Imp. Charges / Avg. Gross Loans (%)	**0.0597**		**-0.000858**		**-0.000456**
	(1.3)		(-0.94)		(-0.30)
Interest Income / Avg. Earning Assets (%)	**0.0164*** **		**-0.000021**		**-0.0000708**
	(4.09)		(-0.29)		(-0.80)
Mill's lambda		**0.00156**		**0.0200*** **	
		(0.66)		(5.41)	
Constant	**2.707*** **	**0.00979*** **	**0.0117*** **	**0.00249**	**0.00513**
	(16.99)	(2.64)	(3.11)	(0.47)	(0.94)
Bank FE		Yes	Yes	Yes	Yes
Observations	5893	5893	5893	3521	3521

Table 3

Short-term Debt Maturity Reduction and Investor's Preference

Table 3 reports the results of a comparison between banks with at least one urgent CP issuance and other banks. If a bank does not issue any CP in a month, the average residual maturity of outstanding CPs will decrease by approximately 30 days. The average maturity of CP issues is 127 days, and the median is 90 days; if a bank issues a CP in a month in a routine schedule, we expect the average residual maturity of outstanding CPs to reduce by less than 30 days or increase. We define an urgent issue when a CP is issued in a month, and it reduces the average residual maturity of outstanding CPs by more than 45 days; this is considerably different from the expectation and could indicate an urgent issuing behavior by the bank that faced market restriction through maturity reduction. The identification strategy is similar to the results presented in Table 2. Panel A reports the results of the split sample Heckman correction analyses. Panel B presents the results of an endogenous switching model. This model specification permits empirical analyses of endogenous and exogenous variables that affect the assignment to a group. The results are reported for the second stage estimation using GLS and bank fixed effect. Panel B presents analyses of the significance of the difference between the estimated coefficients. We define a dummy variable as one for Urgent Issuers and zero for Non-urgent Issuers. The interaction term with the estimated coefficient is presented for two specifications, a model with selection correction and a second model equivalent to a fixed effect model without first-stage correction.

Statistics are reported in parentheses, and significance is indicated by * p < 0.05, ** p < 0.01, *** p < 0.001.

Panel A: split Sample Heckman Correction Analyses

	Urgent Issuers				**Non-urgent Issuer**			
	Banks' CP Issuance				**Banks' CP Issuance**			
	Complete Interval		**Excluding Covid-19**		**Complete Interval**		**Excluding Covid-19**	
	Selection	**Main**	**Selection**	**Main**	**Selection**	**Main**	**Selection**	**Main**
Equity / TA	**2.558*** **	**0.118*** **	**3.712*** **	**0.0916*** **	**-2.558*** **	**-0.00649**	**-3.712*** **	**-0.0112** **
	(5.68)	(13.42)	(6.97)	(8.99)	(-5.68)	(-1.56)	(-6.97)	(-2.12)
Net Loan / TA	**-1.063*** **	**0.0143*** **	**-1.142*** **	**0.0277*** **	**1.063*** **	**0.00115**	**1.142*** **	**-0.000229**
	(-6.29)	(4.43)	(-5.66)	(7.2)	-6.29	(0.75)	-5.66	(-0.12)
Average Residual Maturity of Outstanding	**0.00116*** **	**-0.00007*** **	**0.00131*** **	**-0.00007*** **	**-0.00116*** **	**0.00000284**	**-0.00131*** **	**0.00000334**
	(4.52)	(-11.80)	(4.3)	(-9.44)	(-4.52)	(1.41)	(-4.36)	(1.29)
Liquid Assets / Total Assets (%)	**0.0326*** **	**0.000591*** **	**0.0280*** **	**0.000770*** **	**-0.0326*** **	**0.000307*** **	**-0.0280*** **	**0.000336*** **
	(10.63)	(12.82)	(7.95)	(14.32)	(-10.63)	(8.12)	(-7.95)	(7.86)
Growth of Gross Loans (%)	**0.0224*** **		**0.0240*** **		**-0.0224*** **		**-0.0240*** **	
	(9.03)		(7.69)		(-9.03)		(-7.69)	
Loan Imp. Charges / Avg. Gross Loans (%)	**0.239*** **		**0.152** **		**-0.239*** **		**-0.152** **	
	(4.43)		(2.28)		(-4.43)		(-2.28)	
Interest Income / Avg. Earning Assets (%)	**-0.0786*** **		**-0.0843*** **		**0.0786*** **		**0.0843*** **	
	(-18.98)		(-16.50)		-18.98		-16.5	
Mill's lambda		**-0.00108**		**0.000143**		**-0.00137** **		**-0.00187** **
		(-0.49)		-0.05		(-2.20)		(-2.52)
Constant	**0.717*** **	**-0.0120*** **	**0.729*** **	**-0.0222*** **	**-0.717*** **	**-0.00105**	**-0.729*** **	**0.00062**
	(4.09)	(-4.03)	(3.52)	(-6.20)	(-4.09)	(-0.65)	(-3.52)	-0.32
Observations	6361	6361	4449	4449	6361	6361	4449	4449

Table 3 (Continued)

Panel B: Analyzing the significance of the difference between the estimated coefficients for urgent issuers and non-urgent issuers

		Urgent Issuers		Non-urgent Issuer	
		Banks' CP Issuance		Banks' CP Issuance	
		Complete Interval	Excluding COVID-19 (after 2019H2)	Complete Interval	Excluding COVID-19
	Selection	Main	Main	Main	Main
Equity / TA	**3.210*** **	**0.0333*** **	**0.0432** **	**-0.00293**	**0.00102**
	(7.83)	(3.55)	(2.16)	(-0.13)	(0.05)
Net Loan / TA	**-1.276*** **	**-0.00867** **	**-0.0240** **	**-0.00411**	**-0.00780** **
	(-9.04)	(-2.31)	(-2.41)	(-1.00)	(-2.39)
Average Residual Maturity of Outstanding	**-0.000939*** **	**0.00000304**	**0.00000195**	**0.00000984*** **	**0.00000667*** **
	(-3.79)	(1.57)	(0.78)	(2.96)	(2.73)
Liquid Assets / Total Assets (%)	**-0.0199*** **	**0.0000622***	**0.000101** **	**0.000385*** **	**0.000247*** **
	(-9.19)	(1.88)	(2)	(5.57)	(5.26)
Growth of Gross Loans (%)	**0.0233*** **				
	(10.61)				
Loan Imp. Charges / Avg. Gross Loans (%)	**-0.309*** **				
	(-5.90)				
Interest Income / Avg. Earning Assets (%)	**-0.0711*** **				
	(-12.86)				
Mill's lambda		**0.000414**	**0.000139**	**0.00526** **	**0.00769*** **
		(0.43)	(0.1)	(2.43)	(2.66)
Constant	**0.636*** **	**0.0021**	**0.0114**	**0.0704*** **	**0.0588*** **
	(4.52)	(0.7)	(1.54)	(16.2)	(9.29)
Bank FE		Yes	Yes	Yes	Yes
Observations	6361	1699	1104	4662	3815

Table 3 (Continued)

Panel C: Analyzing the significance of the difference between the estimated coefficients for urgent issuers and non-urgent issuers

		Banks' CP Issuance		Banks' CP Issuance	
		Complete Interval		Excluding COVID-19	
	Selection	Main	FE Model	Main	FE Model
Equity / TA	**3.210*** **	**0.00102**	**0.000887**	**-0.0395**	**-0.0389**
	(7.83)	(0.05)	(0.05)	(-1.22)	(-1.21)
Dummy Urgent Issuer.1		**-0.0865*** **	**-0.0842*** **	**-0.0852*** **	**-0.0793*** **
		(-25.03)	(-25.65)	(-16.43)	(-16.38)
Equity Ratio × Urgent Issuer.1		**0.0575***	**0.0581** **	**0.123** **	**0.0915**
		(1.93)	(1.99)	(2.08)	(1.6)
Net Loan / TA	**-1.276*** **	**-0.00780** **	**-0.0100*** **	**-0.0110** **	**-0.0148*** **
	(-9.04)	(-2.39)	(-2.98)	(-2.47)	(-3.19)
Average Residual Maturity of Outstanding	**-0.000939*** **	**0.00000667*** **	**0.00000617** **	**0.00000813*** **	**0.00000789** **
	(-3.79)	(2.73)	(2.53)	(2.59)	(2.52)
Liquid Assets / Total Assets (%)	**-0.0199*** **	**0.000247*** **	**0.000249*** **	**0.000455*** **	**0.000478*** **
	(-9.19)	(5.26)	(5.29)	(6.57)	(6.83)
Growth of Gross Loans (%)	**0.0233*** **		**0.0000753*** **		**0.000162*** **
	(10.61)		(2.88)		(4.5)
Loan Imp. Charges / Avg. Gross Loans (%)	**-0.309*** **		**-0.000997**		**-0.000209**
	(-5.90)		(-1.16)		(-0.14)
Interest Income / Avg. Earning Assets (%)	**-0.0711*** **		**-0.0000325**		**-0.0000561**
	(-12.86)		(-0.46)		(-0.67)
Mill's lambda		**0.0017**		**0.00221**	
		(1.2)		(1.17)	
Constant	**0.636*** **	**0.0786*** **	**0.0798*** **	**0.0721*** **	**0.0720*** **
	(4.52)	(25.43)	(25.83)	(15.52)	(15.46)
Bank FE		Yes	Yes	Yes	Yes
Observations	6361	6361	6361	3815	3815

Table 4

Banks' Response to the Short-Term Debt Market Limitations

This table presents the results of analyzing the banks' response to the limitation imposed by CP market participants after the MMF reforms. We evaluate different accounts on banks' balance sheets to observe the signaling and the signaling method. The model specification for all the evaluated outcome variables is the same. We define two dummy variables. In all the models, we compare the changes in the accounts of banks that had a decreased average amount of CP issuance during the MMf period. The time dummy variable is one after the reform period deadline, i.e., the beginning of 2019. In all the estimations of differences, we excluded the COVID-19 period to prevent the related distortions. The t-statistics are computed with two robust methods, without clustering and clustered at the bank level; for brevity, only the former is presented.

Statistics are reported in parentheses, and significance is indicated by * p < 0.05, ** p < 0.01, *** p < 0.001.

	Equity Ratio	Net Loan Ratio	Impaired Loans less Loan Loss Allowances / Equity(%)	Loan Loss Provisions / Gross Loans (%)	Loan Loss Provisions / Imp. Loans (%)
After MMF Reform Implementation Dummy: 1	**-0.00301***	**0.00383**	**-2.010****	**-0.202**	**-1.729**
	(-1.68)	(0.89)	(-2.27)	(-1.47)	(-0.63)
Issuance Decreased During MMF Reform: 1	**.**	**.**	**.**	**.**	**.**
	(.)	(.)	(.)	(.)	(.)
1. After Reform × 1. Decreased During Reform	**0.00437****	**-0.00708**	**0.212**	**0.169**	**7.486****
	(2.15)	(-0.97)	(0.18)	(0.75)	(2.19)
Liquid Assets / Total Assets (%)	**-0.000199**	**-0.00428*****	**-0.0597**	**-0.00715**	**0.151**
	(-0.98)	(-4.38)	(-0.53)	(-0.49)	(0.37)
Growth of Gross Loans (%)	**-0.0000135**	**0.00143*****	**-0.0599**	**-0.0202****	**0.0156**
	(-0.18)	(3.13)	(-1.44)	(-2.37)	(0.09)
Loan Imp. Charges / Avg. Gross Loans (%)	**-0.000815**	**0.0121**	**2.976***	**0.282**	**0.116**
	(-0.16)	(1.04)	(1.86)	(0.93)	(0.02)
Interest Income / Avg. Earning Assets (%)	**0.0000666**	**-0.004**	**-0.329**	**0.0414**	**0.308**
	(0.15)	(-1.23)	(-1.61)	(0.99)	(0.74)
Constant	**0.0915*****	**0.713*****	**14.16*****	**2.371*****	**63.85*****
	(19.55)	(34.95)	(5.93)	(8.08)	(7.85)
Bank FE	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes
Observations	4652	4652	4218	4433	4218
Adjusted R^2	0.021	0.16	0.067	0.038	0.03

Table 5

Investors' persistent preference and predictability of CP reduction of banks during COVID-19

This table presents the results for the persistence of preferences of the CP investors. Our analyses of the two events during which the market preferences are revealed. Due to the sparsity of the time domain repeatedly revealed preferences, in the identification strategy, we utilize the cross-section of the CP issuance reduction. The banks that have faced a reduction of CP issuance amount during MMF reform are classified in deciles, the first decile indicating the banks that had the most reduction during the MMF reforms period, and the tenth decile had the least reduction in CP issuance. In Panel A, a similar classification of the banks that have reduced CP issuance amount during COVID-19 is done. The quantile regression results indicate the banks' quantile predictability during the COVID-19 reduction, given the quantile of the bank during the MMF reforms. All coefficients are positive and significant, indicating high predictability. The relationship is presented graphically in Figure 2. In Panel B, the CP issuance reduction is a continuous variable. A move from the first decile to the tenth decile during the MMF reform is negatively related to the reduction during COVID-19. As the first decile is the worst, the coefficients decrease progressively to better deciles. This relation is observed from the fourth decile onward.

Statistics are reported in parentheses, and significance is indicated by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Panel A: Analyzing the predictability of the COVID-19 CP reduction

	Quantile regression on Quantile of CP Issuance Decline during WLA implementation Period				
	20th	**40th**	**Median**	**60th**	**80th**
Decile of CP Decrease WLA Period	**0.430*** **	**0.536*** **	**0.598*** **	**0.633*** **	**0.609*** **
	-31.23	-59.75	-66.23	-83.95	-54
Equity / TA	**-12.78*** **	**-4.621*** **	**-4.338*** **	**-0.0682**	**-4.108*** **
	(-13.03)	(-8.17)	(-7.55)	(-0.14)	(-5.32)
Net Loan / TA	**-1.780*** **	**1.955*** **	**2.177*** **	**2.190*** **	**2.182*** **
	(-5.06)	-9.55	-10.48	-12.34	-7.7
Average Residual Maturity of Outstanding	**-0.00210*** **	**0.000895*** **	**0.00139*** **	**0.000918*** **	**0.000677**
	(-4.21)	-2.61	-3.82	-2.84	-1.22
Liquid Assets / Total Assets (%)	**-0.0448*** **	**-0.0137*** **	**-0.0138*** **	**-0.0178*** **	**-0.00726***
	(-10.26)	(-4.83)	(-4.73)	(-7.26)	(-1.83)
Growth of Gross Loans (%)	**0.0597*** **	**0.0463*** **	**0.0448*** **	**0.0401*** **	**0.0566*** **
	-12.58	-18.05	-16.85	-16.72	-12.43
Loan Imp. Charges / Avg. Gross Loans (%)	**1.781*** **	**0.789*** **	**0.934*** **	**0.597*** **	**0.243*** **
	-20.68	-13.72	-15.06	-10.91	-2.71
Interest Income / Avg. Earning Assets (%)	**0.107*** **	**0.0535*** **	**0.0228*** **	**0.0163*** **	**-0.0218****
	-9.45	-8.53	-3.65	-3.14	(-2.45)
Constant	**3.510*** **	**1.514*** **	**1.391*** **	**1.561*** **	**2.925*** **
	-10.41	-6.93	-6.28	-8.39	-9.68
Observations	2041	2041	2041	2041	2041
Pseudo R^2	0.271	0.311	0.314	0.318	0.248

Table 5 (Continued)

Panel B: Quartile regression of the average CP issuance amount during COVID-19

	CP Issuance of Banks with Decreased Issuance during COVID-19				
	20th	**40th**	**Median**	**60th**	**80th**
Decile of CP Decrease WLA Period	**-0.0134*** **	**-0.00361*** **	**-0.00574*** **	**-0.00645*** **	**-0.00852*** **
	(-5.99)	(-2.79)	(-7.60)	(-9.78)	(-4.90)
Equity / TA	**-1.990*** **	**-2.041*** **	**-1.563*** **	**-0.936*** **	**0.939*** **
	(-7.07)	(-11.88)	(-15.02)	(-10.10)	(3.82)
Net Loan / TA	**-0.275** **	**-0.116***	**-0.0968** **	**0.0251**	**0.227** **
	(-2.37)	(-1.76)	(-2.45)	(0.71)	(2.28)
Average Residual Maturity of Outstanding	**0.000268***	**0.000272** **	**0.000196*** **	**0.000138** **	**0.000605*** **
	(1.77)	(2.57)	(2.88)	(2.2)	(4.01)
Liquid Assets / Total Assets (%)	**-0.0179*** **	**-0.00769*** **	**-0.00703*** **	**-0.00363*** **	**0.00283** **
	(-11.27)	(-8.35)	(-12.92)	(-7.62)	(2.16)
Growth of Gross Loans (%)	**0.00680*** **	**0.00169** **	**0.00168*** **	**0.000904** **	**-0.00301*** **
	(5.33)	(2.15)	(3.59)	(2.22)	(-2.88)
Loan Imp. Charges / Avg. Gross Loans (%)	**-0.117*** **	**0.0147**	**0.0531*** **	**0.0461*** **	**0.0903*** **
	(-4.63)	(0.83)	(4.93)	(4.87)	(4.02)
Interest Income / Avg. Earning Assets (%)	**-0.0036**	**-0.00187**	**-0.00105**	**0.000477**	**0.00276**
	(-1.40)	(-1.21)	(-1.12)	(0.56)	(1.28)
Constant	**0.417*** **	**0.218*** **	**0.226*** **	**0.0913*** **	**-0.218** **
	(3.93)	(3.51)	(6.03)	(2.73)	(-2.40)
Observations	1282	1282	1282	1282	1282
Pseudo R^2	0.076	0.038	0.028	0.013	0.014