Finance and Economics Discussion Series
Divisions of Research & Statistics and Monetary Affairs
Federal Reserve Board, Washington, D.C.

Liquidity Regulation and Financial Intermediaries

Marco Macchiavelli and Luke Pettit

2018-084

Please cite this paper as:
Macchiavelli, Marco, and Luke Pettit (2018). "Liquidity Regulation and Financial Intermediaries," Finance and Economics Discussion Series 2018-084. Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/FEDS.2018.084.

Liquidity Regulation and Financial Intermediaries

Marco Macchiavelli* Luke Pettit†

July 6, 2018

Abstract

We document several effects of the Liquidity Coverage Ratio (LCR) rule on dealers' financing and intermediation of securities. For identification, we exploit the fact that the US implementation is more stringent than that in foreign jurisdictions. In line with LCR incentives, US dealers reduce their reliance on repos as a way to finance inventories of high-quality assets and increase the maturity of lower-quality repos relative to foreign dealers; additionally, US dealers cut back on trades that downgrade their own collateral. Dealers are nevertheless still providing significant maturity transformation. We also show that significant de-risking occurs immediately after the 2007-09 crisis, before post-crisis regulations.

JEL classification: G24, G28, E58.

Keywords: Broker-dealers, Repos, Liquidity coverage ratio, Basel III.

We are particularly grateful to Laurence Ball for his support at the early stages. For their comments, we thank Hendrik Bessembinder, Darrell Duffie, Patrick McCabe, Kumar Venkataraman, and seminar participants at the Federal Reserve Board. **The views expressed in this paper are those of the authors and do not necessarily reflect those of the Board of Governors or the Federal Reserve System.**

*Federal Reserve Board. Email: marco.macchiavelli@frb.gov
†Federal Reserve Board. Email: luke.pettit@frb.gov

1 Introduction

In the aftermath of the 2007-09 financial crisis, steps were taken by regulators and policymakers worldwide to address vulnerabilities throughout the financial system. The most notable effort was led by the Basel Committee, which introduced a set of rules collectively referred to as the Basel III framework.[1] This new regulatory regime included tighter capital and leverage requirements, as well as new rules aimed at improving the funding stability of the banking system. After its finalization, each constituent country was tasked with implementing their own versions of the rules proposed by the Basel Committee, with the US implementation ending up as one of the most stringent.

Several questions remain unanswered about the effects of these rules, and more generally how financial institutions respond to regulatory incentives.[2] Moreover, another crucial question lingers: did financial institutions learn from the crisis, reducing their vulnerabilities before any new regulation forced them to? or do they wait for new regulations to tackle vulnerabilities? This paper addresses all these questions, focusing on the effect of the Liquidity Coverage Ratio (LCR) rule on financial intermediation by foreign and domestic Primary Dealers, which are at the core of US financial markets.[3] We estimate various LCR effects using a Diff-in-Diff approach, by comparing the behavior of US dealers with that of foreign dealers – US dealers face a more stringent implementation – around LCR announcement, implementation and compliance dates.

Using confidential data on dealers' financing and positions, together with detailed triparty repo transactions, we uncover several new findings. First, the LCR induces dealers to

[1] See the BIS webpage.

[2] Among others, Bao et al. (2016) and Bessembinder et al. (2017) discuss corporate bond liquidity around the implementation of the Volcker rule; Anbil and Senyuz (2016) and Allahrakha et al. (2016) study the effects of the Basel III supplementary leverage ratio on repos.

[3] For the list of Primary Dealers and other information about them, see the FRBNY website. When studying the effects of the LCR, we exclude domestic and foreign Primary Dealers that are not subject to the LCR.

increase the maturity of repos backed by lower quality collateral, while leaving the maturity structure of repos backed by high-quality collateral unchanged. Second, the LCR leads dealers to reduce their reliance on repos as a way to finance inventories of high-quality assets, resulting in more of these inventories counting towards HQLA, thereby increasing their LCR.[4] Third, the LCR causes dealers to cut back on some trades that effectively downgrade their own available collateral (from the client's perspective a collateral upgrade), and are thus penalized by the LCR rule.[5] Each of these changes appear to de-risk dealers' operations to various degrees.

First, the terming out of repos backed by lower-quality collateral seems to enhance stability; repos are used by a dealer for mainly two purposes (Iyer and Macchiavelli (2017)): to finance its own inventories of securities, and to finance an associated reverse repo (margin loan extended to a client, or the borrowing of a security). Since a non-negligible portion of lower-quality securities are still financed in the repo market, access to longer-term repos backed by such collateral may reduce rollover risk and possible fire-sale losses in a stress event. Moreover, to the extent that such longer-term repos are used to finance reverse repos of equally long maturity, the dealer passes more and more of these benefits (reduction of rollover risk) to its clients. We find some evidence that repo financing of corporate debt inventories relies primarily on overnight and open repos; most of the longer-term corporate debt repos seem to be passed through to clients via longer-term collateralized loans.

Second, reliance on repos to finance inventories is not by itself problematic; it becomes a possible source of fire-sale losses to the extent that repos do not roll as their collateral becomes illiquid. As discussed in more detail later, a significant reduction in the reliance

[4]Securities count towards HQLA – High Quality Liquid Assets – only if unencumbered; by repoing out a securitiy, it becomes encumbered since a third party now has a right on it.

[5]The LCR requires entities to hold enough High Quality Liquid Assets (HQLA) ready to be monetized during a hypothetical 30-day stress scenario. In a nutshell, the rule incentivizes accumulation of HQLA (especially Treasuries), and penalizes, among other things, excessive maturity mismatch and collateral upgrade services to clients.

on repos to finance riskier and less liquid collateral occurred right after the 2007-09 crisis and before the LCR was even announced, consistent with the endogenous de-risking view: cash lenders and dealers identified this pre-crisis practice as too risky and scaled it back autonomously.[6] In particular, US dealers significantly relied on repos to finance inventories of corporate debt pre-crisis: about 40% of their corporate debt inventories were repoed out overnight.[7] In the aftermath of the crisis (but before the LCR was even announced) their reliance on repos to finance corporate debt inventories decreased to roughly 10%.

The third result – reduction in collateral trades that downgrade dealers' collateral – has uncertain financial stability implications during a stress scenario, but reduces the everyday liquidity enhancement services provided by dealers to their clients.[8] Although dealers reduce collateral transformation trades, they still provide significant maturity transformation post-LCR. Using richer post-2013 data, at the expense of a shorter time dimension that does not allow for a full Diff-in-Diff analysis, we document in finer detail the degree of maturity transformation within each collateral type.

In the Treasury and Agency MBS space, all dealers provide significant maturity transformation: between 45% and 60% of more-than-30-day reverse repos are financed with overnight repos. Regarding the intermediation of lower-quality collateral, foreign dealers provide significant maturity transformation in the corporate debt space, and US dealers in the equity and private-label space. This type of maturity transformation that crosses the 30-day threshold is severely penalized for lower-quality collateral, less so for Agency MBS, and not at all for Treasuries. It is possible that dealers maintain a significant degree of maturity transformation, even if penalized by the LCR, by charging higher rates and haircuts on their reverse

[6] It is worth noting that the LCR rule nevertheless penalizes the financing of lower-quality collateral with short-term repos, namely repos with less-than-30-day maturity.

[7] In th

[8] Decreased collateral downgrade activity likely leads to a safer regulated banking system, however this could imply increased risk borne by non-regulated segments of the financial system as other entities such as hedge funds assume the risk.

repos than on their repos.

To the best of our knowledge, this paper is the first to study how dealers' business models – the joint management of assets and liabilities – has been affected by the LCR rule. We contribute to the literature that studies changes in dealers' behavior after the 2007-09 crisis, whether or not due to new regulations. Anbil and Senyuz (2016) and Munyan (2017) use tri-party repos to show the window dressing behavior (deleveraging at month-end) of some foreign dealers in response to the Basel III leverage ratio implementation. Some papers use the TRACE database to focus on a very specific aspect of dealers' activities, namely providing liquidity in the corporate bond market. In particular, Adrian et al. (2017), Anderson and Stulz (2017), Bao et al. (2016), Bessembinder et al. (2017), Dick-Nielsen et al. (2012), Goldstein and Hotchkiss (2017), Schultz (2017), and Trebbi and Xiao (2017) study corporate bond liquidity either after the 2007-09 crisis or after the implementation of post-crisis regulation (Basel III and Volcker rule). Compared to these papers, we study a much broader set of dealers' activities across most collateral types, including Treasuries, Agencies and equities. In addition, we study the joint management of dealers' assets and liabilities, and point to the evolution of key vulnerabilities associated with the way dealers conduct their business: reliance on repo financing of less liquid assets, repo rollover risk, and maturity mismatch between assets and liabilities.

Another strand of the literature focuses on different aspects of intermediaries' behavior during the 2007-09 crisis: Copeland et al. (2014), Gorton and Metrick (2012), Krishnamurthy et al. (2014), and Iyer and Macchiavelli (2017) study repo runs, while Acharya et al. (2017), Gorton et al. (2017), and Carlson and Macchiavelli (2018) document how dealers use emergency liquidity provided by the Federal Reserve.

2 Liquidity Coverage Ratio

In this section we review the LCR rule and the incentives it creates for broker-dealers. We also discuss how the US implementation is more stringent than foreign ones (earlier implementation, use of daily averages, and a maturity mismatch add-on). As part of the global response to the financial crisis, a suite of regulatory requirements were introduced, addressing distinct risks to the global banking system and by extension the broader economy. The LCR was created to ensure that banks had sufficient available liquidity to withstand temporary disruptions to funding markets.

2.1 Timelines and Regional Implementations

The LCR was introduced by the Basel Committee on Banking Supervision as part of its broader regulatory response to the financial crisis. The Basel Committee introduced the LCR rule in December 2010 and finalized it in January 2013; effective rule implementations were delegated to the 28 jurisdictions that comprise the Basel Committee.[9] The main jurisdictions had similar implementation timelines, the US implementing earlier than most others: for instance, the EU finalized their LCR in January 2015, and it took effect in October of that year, while the US finalized their LCR in September 2014, taking effect in January 2015.[10]

While the rules were finalized around more or less the same time across jurisditions, a notable feature differentiated the US implementation from that of other countries. Most non-US jurisdictions followed the initial Basel directive of computing the LCR using averages of *month-end* snapshots over the quarter; instead, since at least December 2011, US regulators issued a proposed rule that would rely on *daily averages* over the quarter.[11] Therefore, US

[9]The initial rule of December 2010 is available here. The final rule of January 2013 can be found here.

[10]Other jurisdictions that are relevant to our analysis are Japan, Switzerland, and the UK. The Japanese LCR was finalized in 2014 and effective in March 2015, the Swiss LCR was finalized in July 2014, effective in January 2015, and the UK implementation was finalized in June of 2015, effective in October 2015. Regional assessments by the Basel Committee are available here, under the "Liquidity Risk" topic.

[11]For the US proposed LCR rule of December 2011, see the Federal Register. The US final LCR rule of

banks need to satisfy the LCR rule on average each day, while most foreign banks have to satisfy the LCR only at month-end, leaving significant room for regulatory arbitrage (window dressing). Month-end reporting also applies to most foreign implementations of the Basel leverage ratio and, as Anbil and Senyuz (2016) and Keating and Macchiavelli (2017) indeed document, foreign banks take advantage of the month-end reporting by deleveraging at month-end, only to releverage the day after.

The Basel final rule also proposes a timeline for a phasing-in of the LCR: the proposed gradual implementation would begin in 2015 with a minimum requirement set at 60%, increasing by 10% each subsequent year until it reached 100% in 2019. As jurisdictions implemented their own LCR rules, they also tailored their compliance timelines. Japan followed the Basel final rule timeline. The EU phase-in followed the dates set out in the Basel final rule, but with a jump to a 100% requirement in 2018. The US Implementation was more accelerated, beginning in January 2015 at 80% with 10 percentage point increases over the following two years, reaching 100% in January 2017.[12] Being subject to a quicker transition, US banks faced a higher LCR at each point in time in our sample.[13] Therefore, even from the phase-in timeline viewpoint alone, the US faced a more stringent LCR. As noted above, in addition to quicker transition, the US rule requires US banks to comply with the LCR rule on a daily basis, while foreign banks need to comply just at month-ends.

Although these timelines were intended to ease the transition, many banks appear to have pre-positioned significantly. As John Gerspach, Citigroup's CFO noted, "*it's not that dissimilar from how we've really reacted to almost every regulatory rule that's been put out there over the course of the last six, seven years. We make sure that we get into compliance*

September 2014 is available here.

[12]Switzerland followed the Basel final rule timeline; however the Swiss systemically important banks were required to be at full compliance starting in 2016. There are two such banks in our sample, not driving our results.

[13]In most of the analysis, we end our sample in July 2016, when foreign banks operating in the US started to be required to form an Intermediate Holding Company (IHC) that would comply with US regulations.

with that rule as quickly as possible. And then we approach optimization."[14] Since there was likely a significant anticipation effect between the announcement of the US proposed rule in December 2011 and its 80% phase-in date in January 2015, we estimate dynamic adjustments to the LCR rule. In particular, we allow for anticipation effects (Dec 2011 to Jan 2015) as well as re-optimization effects (Jan 2015 onwards).

2.2 LCR Calculation

Quantifying liquidity resilience requires an assumed stress horizon over which outflows occur. As such, the scope of the LCR is confined to a 30-day window and is intended to capture risks on both the asset and liability sides of a bank's balance sheet within this horizon. At its core, the LCR requires a sufficient stock of High Quality Liquid Assets (HQLA) to cover net cash outflows over a 30-day stressed period. More formally the following ratio is expected to remain above 100%:[15]

$$\text{Liquidity Coverage Ratio} = \frac{\text{HQLA}}{\text{Total 30-Day Net Cash Outflow}} \tag{1}$$

HQLA is comprised of three categories of eligible assets: Level 1 assets (0% haircut) count for 100% of their value, and consist of cash, reserves and securities fully guaranteed by a top-tier sovereign; Level 2A assets (15% haircut) count for 85% of their value, and consist of corporate bonds, lower-graded sovereigns and agency MBS; Level 2B assets (25-50% haircuts) count for 50-75% of their value, and include select equities and corporate bonds.

Total level 2 assets can make up no more than 40% of HQLA, and 2B assets specifically cannot comprise more than 15%, insuring that there is not a concentration of lower-quality

[14] See the transcripts of Citi 2017Q2 fixed income investor review.

[15] Note that for the US LCR, there is a sub-category of depository institutions that are only subject to the "modified LCR" which is a simpler implementation, and has a .7 factor applied to the denominator. These institutions typically exist within the $50-250bn in assets range (as anything over $250 in total consolidated assets is subject to the full LCR.

assets. Net cash outflows is derived from a set of calculations that are intended to simulate a market stress, resulting in the estimated net cash outflow over a 30-day period. The components within the denominator of the LCR cover a wide range of potential outflows, from deposits to assumed draws on lines of credit. For example, if a firm were to rely solely on very short-term and unstable funding (say one-week commercial paper), this would be reflected in a significant net cash outflow value. There are a few important caveats. The first is that a bank cannot have a net cash outflow of zero (a complete offset by inflows) as total inflows cannot exceed 75% of total outflows. Additionally there is a maturity mismatch add-on, defined as:

$$max\left(0, \text{peak daily outflow in 30-day window}\right) - max\left(0, \text{cumulative net outflow on day 30}\right)$$

This was introduced in the US implementation with the intent of addressing the potential weakness in the LCR that would allow a major outflow that is offset by subsequent inflows. The required reporting frequency also differs notably between the two regimes. The Basel III LCR is reported to supervisors monthly, with the implicit requirement of capacity to report daily during stressed situations. Under the US LCR, banks must calculate the LCR daily beginning January 1st of the year after the firm is subject to the rule. The LCR applies to the holding companies of these institutions, as well as any top-tier depository institutions subsidiaries that have more than $10 billion in assets.

2.3 Regulatory Incentives for Dealers

The LCR's impact on dealer repo activity stems from the importance placed on both the tenor and collateral of a bank's repo books. In the LCR, repurchase agreements expiring within 30 days are assumed to not roll at rates (called run-off rates) largely in line with their collateral's HQLA haircut. For example, 15% of repos secured by Agency MBS (Level 2A)

and residual maturity of less than 30 days are assumed not to roll, leading to a cash outflow when the repo matures. As a portion of these repos are assumed not to roll at maturity, cash will be returned to the lender and collateral to the borrower. For the sake of simplicity, it can be boiled down to the distinction between repos that mature before and after the 30 day threshold:[16] only the former are assigned an outflow, as the latter remain open for the entire 30-day stress horizon. This translates to highly asymmetric LCR treatments of 29- and 31-day repos, as only the former are assumed to unwind in proportion to the assigned run-off rate. However, a 31-day repo that is not evergreen[17] becomes a 29-day repo in two days; for virtually all of its lifetime, the 31-day repo has a residual maturity of less than 30 days, therefore eventually contributing to the 30-day outflows measure.

Incentive to term out lower-quality repos. Everything else equal, the LCR incentivizes dealers to lengthen the maturity structure of their repos significantly beyond the 30-day threshold. This incentive is stronger for repos collateralized by lower quality assets, since these repos are attached higher run-off rates once their residual maturity crosses the 30-day threshold.

Matched-book is mostly LCR neutral. It is not necessarily the case that an overnight repo secured by level 2 assets will deteriorate the LCR at the margin. Whether or not this is the case depends on how the collateral underlying the repo was obtained. If it is sourced through a overnight reverse repo the symmetric application of run-off rates to both inflows and outflows renders this "matched-book" trade LCR neutral: both outflows and inflows increase by the same amount, namely the run-off rate multiplied by the cash exchanged at maturity, leaving the LCR denominator unchanged.[18] This is only true for a marginal trade;

[16]The Net Stable Funding Ratio is the applicable complement, and looks at a 1 year scenario, however has yet to be implemented.

[17]A 31-day evergreen repo is a repo contract that is renewed everyday as a 31-day repo.

[18]In case the dealer charges a significantly larger haircut on the reverse repo than on the associated repo, the additional collateral obtained counts towards HQLA; alternatively, the extra collateral can be repoed

indeed, if outflows are fully matched by inflows the rule still requires the dealer to have HQLA worth at least 25% of gross 30-day outflows. At the margin though, "matched-book" trades are generally LCR neutral; they can improve the LCR to the extent that reverse repo haircuts are significantly larger than the associated repo haircuts, thus generating extra HQLA.

Excessive maturity transformation is penalized. On the other hand, if the same overnight repo secured by level 2 assets serves the purpose of funding a more-than-30-day reverse repo the LCR denominator would increase: the assumed outflow would equal 15% of the repo amount while the inflow would be zero, because the reverse repo returns cash only after the 30-day threshold that matters for the LCR calculation. Therefore, intermediation of credit is penalized by the LCR to the extent that cash is raised via less-than-30-day repos and extended via more-than-30-day reverse repos. This penalty does not apply if the collateral is question consists of Treasuries. Significant maturity transformation in lower-quality assets is therefore costly under the LCR.

Repo financing of lower-quality assets is penalized. From the LCR perspective, funding the purchase of a security via repos (buying an asset with the cash raised by repoing out the same asset) is equivalent to entering a more-than-30-day reverse repo funded by repos. For simplicity, assume that repo haircuts are negligible. The security purchased does not count towards HQLA because it is pledged to a third party, hence encumbered. In the same way, a more-than-30-day reverse repo funded via repos generates no HQLA gains (the collateral is encumbered), but not even a cash inflow since the reverse repo maturity is beyond the 30-day threshold. Utimately, the LCR effect depends on the outflow generated by the repo: any Treasury purchase funded by repos of any tenor does not affect the LCR; however, for lower-quality assets with non-zero run-off rates, there is a negative LCR effect

out to raise additional cash, which also counts towards HQLA. This would be LCR improving.

only to the extent that less-than-30-day repos are used to fund the purchase.

Collateral downgrades are penalized. Part of a dealers' business model involves upgrading collateral for their clients, for instance, receiving low quality collateral in exchange for Treasuries. Some clients use upgrades to obtain eligible (high quality) collateral for margining of derivative trades at clearinghouses. If the collateral upgrade involves an exchange of clients' securities for the dealer's own securities, the dealer ends up lowering the quality of the securities in its possession. From the dealer's perspective it amounts to a collateral downgrade. Alternatively, dealers can engage in such trades for arbitrage purposes. For example, suppose that Agency repos are trading at a considerable spread above Treasury repos. A dealer may take advantage of the spread by entering into an Agency reverse repo funded by the cash raised through a Treasury repo. In this case, the dealer ends up taking possession of Agency MBS in exchange for Treasuries, effectively downgrading its own collateral. Since the data does not allow to differentiate between these two types of trades, we view them from the dealer's perspective and refer to both of them as collateral downgrades.

From the dealer's perspective, a collateral downgrade trade is penalized by the LCR rule: a trade at more-than-30-day maturity is especially penalized under the LCR because it considers the lower quality collateral as permanently locked in, and the better quality collateral locked out. The LCR incentive to cut back on these trades is also present, though to a lesser extent, for trades at less than 30-day maturity. For example, consider an overnight trade where the dealer obtains Agency MBS (level 2A) in exchange for Treasuries (level 1). The LCR rule assumes a zero runoff rate on the Treasury repo (100% expected to roll), and a 15% runoff rate for the Agency MBS reverse repo (85% is assumed to roll). As a result, 100% of the Treasury collateral (level 1) stays out while on the other side, 85% of the Agency MBS (level 2A) stays in and 15% of it comes back as cash (level 1). In practice, the HQLA pool deteriorates by 13% (85% times 15%) of the value of the Treasuries provided. Were

this a 31-day swap, the deterioration would be equal to 15% of the value.

Funding Treasuries internally to build HQLA. Finally, the LCR incentivizes banks to rely less on repos to finance their inventories of high-quality assets. For an asset to count towards HQLA, it needs to be unencumbered, namely not pledged as collateral to a third party. Therefore, to the extent that a dealer needs to build up HQLA, it is incentivized to finance its inventories of the highest quality assets (Treasuries) less via the repo market, and more using internal sources of cash. Suppose that a dealer needs to increase its HQLA by $1 million; the simplest way to do it is to use $1 million of internal cash to buy Treasuries (or Ginnies), which fully count towards HQLA; purchasing any other asset would increase the stock of HQLA less than proportionally.

Our results are unlikely to be driven by other post-crisis regulations. As it relates to repo activity, the primary impact of the Supplementary Leverage Ratio (SLR) is via a broad based downward pressure in the volume of repos backed by the safest collateral (Duffie and Krishnamurthy (2016)). This is because it applies the cost of capital directly to all repurchase agreements, regardless of collateral type, making the lower-margin repo transactions the most eligible for reduction. The secondary effect of SLR has been quarter-end window dressing (see Anbil and Senyuz (2016)), due in large part to the differences in jurisdictional implementations, with some non-US implementations only requiring quarter-end reporting. As a result, aggregate repo activity displays considerable declines just prior to the reporting periods. Additionally, the Volcker rule could have an impact on dealer inventories (see Bao et al. (2016)), but not on banks' repo activity. This is due to the exemption for repo and reverse repo from consideration as proprietary trading, and therefore is unlikely to have a material impact on dealer repo activity.[19] Moreover, the Volcker rule applies to the vast

[19]The Volcker Rule was presented for public comment in October 2011, and implemented with several exemptions in July 2015.

majority of the Primary Dealers in our sample, in particular to both domestic and foreign.[20] Therefore, the US-specific effects we estimate cannot be attributed to the Volcker rule, since such rule applies also to the foreign dealers in our sample.

3 Data

We use two confidential datasets: the first one contains daily outstanding tri-party repurchase agreements (repo) for each dealer, tenor, and collateral type; the second contains weekly positions and financing for each dealer, tenor and collateral type.

The first dataset contains tri-party repo information that is sent daily by the two tri-party clearing banks to the Federal Reserve Bank of New York (FRBNY). For each day and each repo borrower (including both dealers and non-dealers), we know the outstanding repo volumes broken down by residual maturity in days, and collateral type. The types of collateral available are Treasuries, Agency Debt, Agency MBS, Corporate Debt, Equities, and Private Label CMO. This specific dataset becomes available in July 2011. Figure 1 displays, for domestic and foreign dealers separately, the time series evolution of the percentage of outstanding Treasury by residual maturity buckets (Overnight, Open, 2-5, 6-14, 15-30, 31-60, 61-90, more than 90 days). Figures 2, 3 and 4 provide similar information for Agency MBS, Corporate Debt, and Equity repos respectively. We do not show the maturity structure of Agency Debt and Private Label CMO repos because they represent a very small fraction of the daily volumes.

Our second dataset is the FR2004 Primary Government Securities Dealers Reports, from which we use primary dealers' positions and financing data (forms A and C).[21] Form A collects dealers long and short positions in different types of securities including Treasuries,

[20] Bao et al. (2016) lists in Table 7 the Primary Dealers affected and not affected by the Volcker rule. Two of the non-affected are domestic, and two are foreign. The seventeen affected dealers are split between foreign and domestic.

[21] See the Federal Reserve website.

Agency Debt, Agency MBS and Corporate Debt. The latter category consists of dollar denominated debt securities issued by companies incorporated in the US including bonds, notes, commercial paper, privately placed securities and private label MBS. We refer to the inventories that a dealer has of a certain asset as the difference between its long and short positions in that asset class. Next, Form C collects financing transactions, where financing refers to the actual funds delivered or received and is divided in "Securities In" (funds are delivered and collateral comes in) and "Securities Out" (funds are received and collateral goes out). "Securities In" refers to agreements where securities are received, including reverse repos (dealer lends cash and receives a security as collateral), securities borrowed (reports the cash that is lent or the fair value of the securities if securities are exchanged or pledged as collateral), and securities received from a counterparty as collateral for margin calls or for other derivatives. "Securities Out" similarly refers to agreements to deliver securities to counterparties, including repos (dealer borrows cash and deliver securities as collateral), securities lent (reports the cash that is borrowed or the fair value of the securities if securities are exchanged or pledged as collateral), securities delivered to a counterparty as collateral for margin calls or for other derivatives.

The granularity of this dataset evolves significantly over time along three dimensions. First, financing transactions that are collected as securities out prior to April 2013, are then divided into repurchase and security lending transactions. To keep the dataset comparable over time, after April 2013 we add repos and sec lending together into securities out; in doing so we exclude securities delivered as collateral for margins from Securities Out, which are not separately available. Similarly, by adding reverse repos and sec borrowing together into securities in, as of April 2013 we stop including securities received as collateral for margins in securities in (which are not separately available). Second, up until April 2013 dealers had to distinguish between overnight and term financing only, while afterwards they are asked to separately report financing transactions with overnight, 2-to-30, and more-than-30 day

maturities. The last shift in data collection occurs in January 2015, and has to do with the definition of certain collateral types: private label MBS are removed from Corporate Debt collateral and added to a new category called "Other Debt"; however, at the same time, Other Debt also includes State and Municipal Securities, which were not reported before. In order to keep the Corporate Debt collateral comparable over time, we can either exclude private label MBS or include State and Municipal beginning in January 2015. Results are unchanged regardless of which definition is chosen.

4 Empirical Strategy and Results

4.1 LCR Effects on the Term Structure of Tri-party Repos

In order to identify the effects of the LCR rule on the term structure of repos, we exploit the fact that the US implementation of the LCR is stricter than any other foreign implementation of the LCR. Primarily, the US implementation assesses the LCR on a daily-average basis throughout the quarter, while the foreign implementations relies on month-end snapshots over the quarter. We therefore have three groups: US LCR refers to the US dealers subject to the US implementation of LCR; Basel LCR refers to all dealers, foreign and domestic, that are subject to the LCR; the omitted group refers to non-Bank Holding Company affiliated dealers that are therefore not subject to the LCR rule. We are then interested in the effect of the US LCR relative to the less stringent Basel LCR on the maturity structure of tri-party repos, β_4.

The time variation is offered by the announcement of the US implementation of the LCR (Dec 01, 2011); we also look at variation around the adoption of the final US rule (Sep 01, 2014), and the 80% LCR phase-in date (Jan 01, 2015). The sample ends in July 2016, a month before the G-SIBs affiliated foreign dealers become subject to the US implementation,

in order not to bias our results towards zero. We run the following panel regression:

$$Share(ON)_{i,t} = \beta_0 PostLCR + \beta_1 Basel + \beta_2 US + \beta_3 Basel \cdot PostLCR + \beta_4 US \cdot PostLCR + \varepsilon_{i,t} \quad (2)$$

We study the effect of the LCR on the maturity structure of the repo books. The dependent variables are the share of repos at certain maturities (overnight, open, less than 30 days, more than 30 days, and more than 90 days), separately for each collateral type (Treasuries, Agency Debt, Agency MBS, Corporate Debt, Equities, Private Label CMO). For brevity, we show the effects on Treasury, Agency MBS, Corporate Debt and Equity collateral, which represent most of the tri-party repo volumes.

Our results (Table 1) show that Treasury repos are not affected by the LCR, consistent with the fact that LCR treats Treasuries as equal to cash. The only noticeable change is a reshuffling among domestic dealers from 1-to-30 day repos into open repos (Figure 1). Open repos have an embedded put option, so that the cash lender can terminate them on demand; therefore, the LCR treats them as having an effective overnight maturity.

We also find some terming out of Agency MBS repos among domestic dealers (Table 2 and Figure 2); specifically, once the final rule is adopted, US dealers reduce the share of shorter-term Agency MBS repos (with maturities less than 30 days) by 14% and increase the share of more-than-30 day repos by 8%, relative to foreign dealers. The remainder goes to open repos (6%). The terming out of Agency MBS beyond the 30 day threshold is consistent with the incentives laid out by the LCR.

Furthermore, US dealers significantly increase the share of corporate debt repos with more than 30 day maturity by 15%, and the share of more-than-90-day repos by 11% relative to foreign dealers, in line with the strong incentives to term out lower quality assets (corporate debt carries either 50% haircuts if Level 2B or 100% if non-HQLA) beyond the 30 day maturity threshold imposed by the LCR rule (Table 3 and Figure 3). Foreign dealers on the

other hand seem to reshuffle part of their repos from 1-to-30 day maturity to open.

Finally, we analyze changes to the maturity structure of Equity repos (Table 4 and Figure 4). Similar to Corporate Debt, Equities carry either 50% or 100% haircuts, providing an incentive for dealers to term out Equity repos beyond the 30 day threshold. US dealers initially responded to the announcement of the US implementation by reducing 1-to-30 day repos by 25% more than foreign dealers, while at the same time increasing the share of more-than-30 day repos by 20% more than foreign dealers. It seems that US dealers overshot their LCR internal target early on, because they then proceed to reverse most of the initial adjustment by dropping the share of more-than-30 day repos by 29% relative to foreign dealers, while increasing the overnight share by 21% relative to foreign dealers.

4.2 LCR Effects on Financing and Intermediation of Securities

To determine the impact of the LCR on dealers' financing and intermediation, we estimate a set of panel regressions, where each one estimates what the securities going out are used for, namely financing inventories, matched-book trades, and collateral swaps.

$$\begin{aligned}\Delta SO_{i,c,t} = \alpha_0 \Delta INV_{i,c,t} + \alpha_1 US \cdot \Delta INV_{i,c,t} + \alpha_2 LCR \cdot \Delta INV_{i,c,t} + \alpha_3 US \cdot LCR \cdot \Delta INV_{i,c,t} \\ + \beta_0 \Delta SI_{i,t} + \beta_1 US \cdot \Delta SI_{i,t} + \beta_2 LCR \cdot \Delta SI_{i,t} + \beta_3 US \cdot LCR \cdot \Delta SI_{i,t} + \mu_{c,t} + \varepsilon_{i,c,t}\end{aligned} \tag{3}$$

$\Delta SO_{i,c,t}$ is the weekly dollar change in collateral of type c (Treasuries, Agency MBS, or Corporate Debt) repoed out by dealer i during week t. $\Delta INV_{i,c,t}$ is the weekly change in the dollar value of inventories (or net positions) of type c securities. The collateral type of inventories matched the collateral type of the securities going out, since one way to finance inventories is by repoing them out. $\Delta SI_{i,c,t}$ is a 3x1 vector, whose three elements are the

weekly dollar change in Treasuries, Agency MBS and Corporate securities coming in. We allow for different collateral types coming in and going out to capture the extent to which dealers engage in collateral upgrades or downgrades for their clients. When dealers repo out the same security coming in, we refer to such as a "matched-book" trade instead.

The coefficients α_4 and β_4 represent how the LCR implementation has affected the business model of US dealers relative to foreign ones; recall that US dealers are subject to a more stringent Basel III implementation than foreign ones (see above). The sample contains both domestic and foreign dealers subject to Basel regulations; a few domestic and foreign Primary Dealers are not part of a Bank Holding Company regulated by Basel III, and therefore excluded from the following analysis. We start the sample in August 2009, after the crisis-era liquidity facilities targeted to Primary Dealers were unwound, and we end it in July 2016. After that, many large foreign banks need to form an Intermediate Holding Company for their US operations to be subject to the US implementation of the LCR.

4.2.1 Financing Inventories

Table 5 displays some adjustments to the introduction of the LCR rule. US dealers significantly cut their reliance on the repo market to finance Treasuries after the US LCR is phased in at the 80% level. Relative to foreign dealers, US dealers finance 28% less Treasury inventories on the repo market.[22] This move is consistent with a tendency of US dealers to finance high-quality assets with internal cash, so that such Treasuries remain unencumbered and count towards HQLA; had those Treasuries been financed in the repo market, they would become encumbered and not qualify as HQLA. A similar adjustment occurs in the financing of Agency MBS right after the US LCR is announced. This adjustment is however only significant at the 10% level, suggesting that some heterogeneity in the way US dealers

[22] Pre-LCR, both foreign and domestic dealers would finance between 30% and 40% of Treasury inventories with overnight repos. As a reference point, 50% to 60% of Treasuries were financed in the repo market prior to the 2007-09 crisis – see Table 9.

adjusted their financing of Agency MBS inventories.

4.2.2 Intermediation and Collateral Upgrades

In the pre-LCR world, US dealers took advantage of the spread between agency MBS and Treasury repos by reversing in agency MBS while repoing out Treasuries (not shown here); similar trades can also be used by dealers to provide collateral upgrades to their clients (an upgrade from the clients' point of view). However, this collateral upgrade service becomes expensive for an LCR perspective, because it involves delivering Level 1 assets (carrying 0% haircuts) in exchange for Level 2A assets (carrying 15% haircuts); US dealers therefore significantly scale down these trades (Table 5, columns 1 and 2, row 5), while foreign dealers fill in this gap and increase the amount of Agency MBS reverse repos associated with Treasury repos (not shown here). Table 6 (row 3, column 1) further shows that such cutback in collateral upgrades occurred in the overnight tenor.

There are two additional adjustments occurring around the time of the US LCR announcement. First, US dealers slightly reduce the amount of Treasuries reversed in overnight that are funded by repoing out Agency MBS overnight, relative to foreign dealers (Table 6 – row 1, column 3). This paring back by US dealers has a small negative impact on LCR, but is more than compensated by the previously-mentioned reduction in agency MBS swapped for Treasuries. On the other hand, reducing such collateral swap (Treasury for Agency MBS) improves dealers' net interest margins.

Another change in intermediation that is linked to LCR incentives is the increase by US dealers in the amount of term Corporate reverse repos financed with term Corporate repos (Table 6 – column 6, row 6); this shift (in tenors and securities) towards a "matched-book" model reduces the liquidity risk associated with intermediation.

4.3 Endogenous De-risking

Prior to the crisis, a significant amount of corporate debt inventories, including private label MBS, were financed in the repo market (Iyer and Macchiavelli (2017)); the crisis exposed the weakness of such strategy: when those repos did not roll, dealers may have had to sell those securities, which they were not able to finance anymore, at fire-sale prices. The deleveraging induced by the crisis, and the reassessment of several risks, led dealers to finance less corporate debt inventories (private label MBS almost disappearred) and to rely less and less on the repo market to finance them. This de-risking happened right after the crisis, and before the LCR had been announced, as shown in the last two columns of Table 8. In that table, the baseline coefficients pertain to the pre-crisis period (January 2004 to July 2007). The post-crisis coefficients capture the additional post-crisis effect, and the post-LCR coefficients estimate the incremental effect on top of the post-crisis one. We focus on the last two columns that pertain the repo financing of corporate debt collateral. Pre-crisis, foreign dealers repo out just 10% of their corporate inventories, while US dealers repo out about 42% of them (or 32% more): US dealers took significantly more risk than their foreign counterparties.

We purposefully drop the crisis period between August 2007, when BNP Paribas halts redemptions from three affiliated funds, to July 2009, when the Federal Reserve unwinds both of its liquidity programs to sustain Primary Dealers. Indeed, this period was very chaotic, with a major deleveraging among dealers culminating with Lehman's bankruptcy, followed by a sizable liquidity intervention aimed at supporting dealers (Acharya et al. (2017)).

After these liquidity facilities unwound, US dealers are more conservative than they used to be prior to the crisis; in the post-crisis but pre-LCR period, US dealers repo out just about 10% of their corporate inventories, compared with about 40% pre-crisis. The last two rows then show the additional post-LCR effects. Foreign dealers (captured in the baseline effect) increase their reliance on the repo market to fund corporate inventories, while US

dealers keep their behavior constant to the post-crisis period (hence undoing the increased reliance by foreign dealers).

4.4 Cash versus Collateral Rollover Risk

Tables 9 to 13 use the more granular post-2013 FR2004 data that allows to break down securities in and out by overnight, two to thirty days, and more than thirty days tenors; this is especially helpful to trace maturity mismatch in the dealers' core function of intermediating securities. These tables display the degree of maturity mismatch within each collateral type; in particular, rows five to seven can be interpreted as an "input-output" matrix: the diagonal elements (in bold font) estimate how much of the securities reversed in at a certain tenor are repoed out at the same tenor. For instance, Table 9 shows that 79% of overnight Treasury reverse repos are associated with overnight Treasury repos, 41% of Treasuries coming in at 2-to-30 day maturity are repoed out at 2-to-30 day maturity, and finally 43% of Treasuries reversed in at more than 30 days tenor are repoed out at more than 30 days tenor. Therefore, larger diagonal elements suggest a higher degree of matching maturity in intermediation of securities (similar to the idea of a matched-book). On the other hand, off-diagonal elements suggest some degree of maturity mismatch. Rows eight to ten display the additional pass-throughs for US dealers.

4.4.1 Cash Rollover Risk

The lower-triangular elements (in the rows-five-to-seven block) involve financing longer-term reverse repos with shorter term repos. Table 9 suggests that dealers take significant risk – cash rollover risk – in intermediating Treasuries. Indeed, 45% of both Treasuries reversed in at more than 30 days and between two and 30 days are repoed out (financed) overnight; in these instances, dealers provide a cash loan for several days in exchange for collateral and come up with the needed cash by repoing out the same collateral overnight, then rolling over

the overnight repo until the reverse repo matures. This service provided by dealers to clients operates very smoothly in normal times, but could lead to significant rollover risks during times of stress.

Table 10 replicates the same exercise for Agency MBS collateral; dealers take as much cash rollover risk in the Agency MBS space as in the Treasury space – just discussed. Noteworthy, about 60% of reverse repos maturing in more than 30 days are funded via overnight repos. Once again, while feasible in normal times, this strategy may expose dealers to significant risk in the event of a sudden credit crunch. The LCR, indeed, requires these entities to hold enough HQLA to deal with exactly this rollover risk.

Finally, Tables 11, 12 and 13 reproduce the analysis for lower quality collateral, namely corporate debt, private label CMOs, and equities. Here the picture is a bit more complex. Among foreign dealers – captured in the baseline coefficients – there is some degree of cash rollover risk in the corporate debt space (47% of more-than-30-day reverse repos funded with overnight repos), and very little cash rollover risk in both private label and equity space. On the other hand, US dealers take significantly more cash rollover risk in the private label and equity space. Of note, not penalized by the LCR but still subject to cash rollove risk, US dealers fund almost 100% of the 2-to-30-day reverse repos with overnight repos in the equity space – Table 13, row seven in column 1.

4.4.2 Collateral Rollover Risk

A different type of risk arises by reversing in collateral at short tenors while repoing it out at longer terms; in these trades, captured in the upper-triangular elements of rows 5 to 7 in Tables 9 to 13, collateral is locked in a term repo and needs to be sourced at higher frequency by rolling over the associated reverse repo or sec borrowing trade (used to reverse in the collateral). If the shorter-term reverse repo (or sec borrowing) does not roll over during the life of the longer-term repo, the dealer has to deliver the collateral back to the reverse

repo party while that collateral is still locked on the repo counterparty account; therefore, the dealer has to borrow (or buy) the same collateral from a third party to deliver to the reverse repo party for the remaining life of the repo, or else the dealer will fail to deliver the collateral and pay the fails charge until the collateral is delivered.

The collateral rollover risk associated with a potential run by reverse repo counterparties could materialize in a stress scenario where clients of a troubled dealer demand their collateral back to potentially move their business to another dealer. There are some anecdotes of this happening to Lehman Brothers prior to its bankruptcy.[23]

Tables 9 and 10 show a statistically significant albeit moderate collateral rollover risk in both Treasury and Agency MBS space: for instance, 16% of the Agency MBS reversed in overnight are funded by repos at 2-to-30-day tenors, while 8% of them are funded by repos at more-than-30-day tenors. It is likely that these trades involve bilateral repos (or sec lending) where the dealer's client is interested in borrowing a certain security for a few weeks, and the dealer sources (reverses in) that specific security overnight. Importantly, this 8% of overnight agency MBS reverse repos funded by more-than-30-day repos is not penalized by the LCR rule; on the contrary, it improves the LCR. Indeed, on the repo side, 100% of the cash is locked in for more than 30 days while, on the reverse side, it is assumed that only 85% of the cash is locked out, leading to a net inflow over the 30-day horizon.

On the other hand, there is little or no collateral rollover risk in lower-quality-collateral space (corporate debt, private label or equities), as shown in Tables 11 to 13. There also no significant difference between US and foreign dealers in terms of collateral rollover risk. Since this more granular data is not available prior to April 2013, what we cannot establish is whether either cash or collateral rollover risk has been affected by the LCR rule.

[23] See a July 2008 Reuters article. See also Infante and Vardoulakis (2018) for a theory of collateral runs.

5 Conclusion

This paper identifies and quantifies changes in the behavior of Primary Dealers as a result of post-crisis liquidity regulation. We use the fact that the US implementation of the LCR is more stringent than that of other foreign jurisdictions, to show the differential response of US dealers relative to foreign ones to the introduction of the LCR rule. We deliver several new results. First, US dealers – more strongly affected by the rule than foreign ones – significantly increase the maturity of their lower-quality-collateral repos relative to foreign dealers. On the other hand, no maturity structure effect is estimated for repos backed by high-quality collateral, in line with the fact that the LCR treats these repos are cash (0% haircuts). Second, the LCR induces dealers to reduce their reliance on repos to finance inventories of high-quality liquid assets, specifically Treasuries; as a result, additional Treasuries are considered unencumbered and count towards HQLA, improving the LCR. Third, the LCR leads dealers to cut back on some trades that effectively downgrade their own available collateral, and are thus penalized by the LCR rule.

Are these changes de-risking dealers' operations? The reduced reliance on repos to finance Treasuries does not represent a material improvement, as repo financing of such liquid assets was not a vulnerability during the crisis. On the other hand, relying on repos to finance illiquid inventories proved extremely problematic during the crisis. To this end, we show that US dealers greatly reduce their reliance on repos to fund less-liquid assets right after the crisis, before the LCR is even announced, suggesting some degree of endogenous de-risking. Finally, the reduction in collateral upgrades for clients may amount to a drop in the liquidity services provided by dealers.

References

Acharya, Viral V, Michael J Fleming, Warren B Hrung, and Asani Sarkar, 2017, Dealer financial conditions and lender-of-last-resort facilities, *Journal of Financial Economics* 123, 81–107.

Adrian, Tobias, Nina Boyarchenko, and Or Shachar, 2017, Dealer balance sheets and bond liquidity provision, *Journal of Monetary Economics* 89, 92–109.

Allahrakha, Meraj, Jill Cetina, and Benjamin Munyan, 2016, Supplementary leverage ratio and repo supply .

Anbil, Sriya, and Zeynep Senyuz, 2016, Window-dressing and trading relationships in the tri-party repo market .

Anderson, Mike, and René M Stulz, 2017, Is post-crisis bond liquidity lower? .

Bao, Jack, Maureen O'Hara, and Xing Alex Zhou, 2016, The volcker rule and market-making in times of stress .

Bessembinder, Hendrik, Stacey E Jacobsen, William F Maxwell, and Kumar Venkataraman, 2017, Capital commitment and illiquidity in corporate bonds .

Carlson, Mark, and Marco Macchiavelli, 2018, Emergency collateral upgrades and the broker of last resort .

Copeland, Adam, Antoine Martin, and Michael Walker, 2014, Repo runs: Evidence from the tri-party repo market, *The Journal of Finance* 69, 2343–2380.

Dick-Nielsen, Jens, Peter Feldhütter, and David Lando, 2012, Corporate bond liquidity before and after the onset of the subprime crisis, *Journal of Financial Economics* 103, 471–492.

Duffie, Darrell, and Arvind Krishnamurthy, 2016, Passthrough efficiency in the fed's new monetary policy setting, in *Designing Resilient Monetary Policy Frameworks for the Future. Federal Reserve Bank of Kansas City, Jackson Hole Symposium*, 1815–1847.

Goldstein, Michael A, and Edith S Hotchkiss, 2017, Providing liquidity in an illiquid market: Dealer behavior in us corporate bonds .

Gorton, Gary, Toomas Laarits, and Andrew Metrick, 2017, The run on repo and the fed's response .

Gorton, Gary, and Andrew Metrick, 2012, Securitized banking and the run on repo, *Journal of Financial Economics* 104, 425–451.

Infante, Sebastian, and Alexandros Vardoulakis, 2018, Collateral runs .

Iyer, Rajkamal, and Marco Macchiavelli, 2017, Primary dealers' behavior during the 2007-08 crisis .

Keating, Thomas, and Marco Macchiavelli, 2017, Interest on reserves and arbitrage in post-crisis money markets .

Krishnamurthy, Arvind, Stefan Nagel, and Dmitry Orlov, 2014, Sizing up repo, *The Journal of Finance* 69, 2381–2417.

Munyan, Benjamin, 2017, Regulatory arbitrage in repo markets .

Schultz, Paul, 2017, Inventory management by corporate bond dealers .

Trebbi, Francesco, and Kairong Xiao, 2017, Regulation and market liquidity, *Management Science* .

6 Figures and Tables

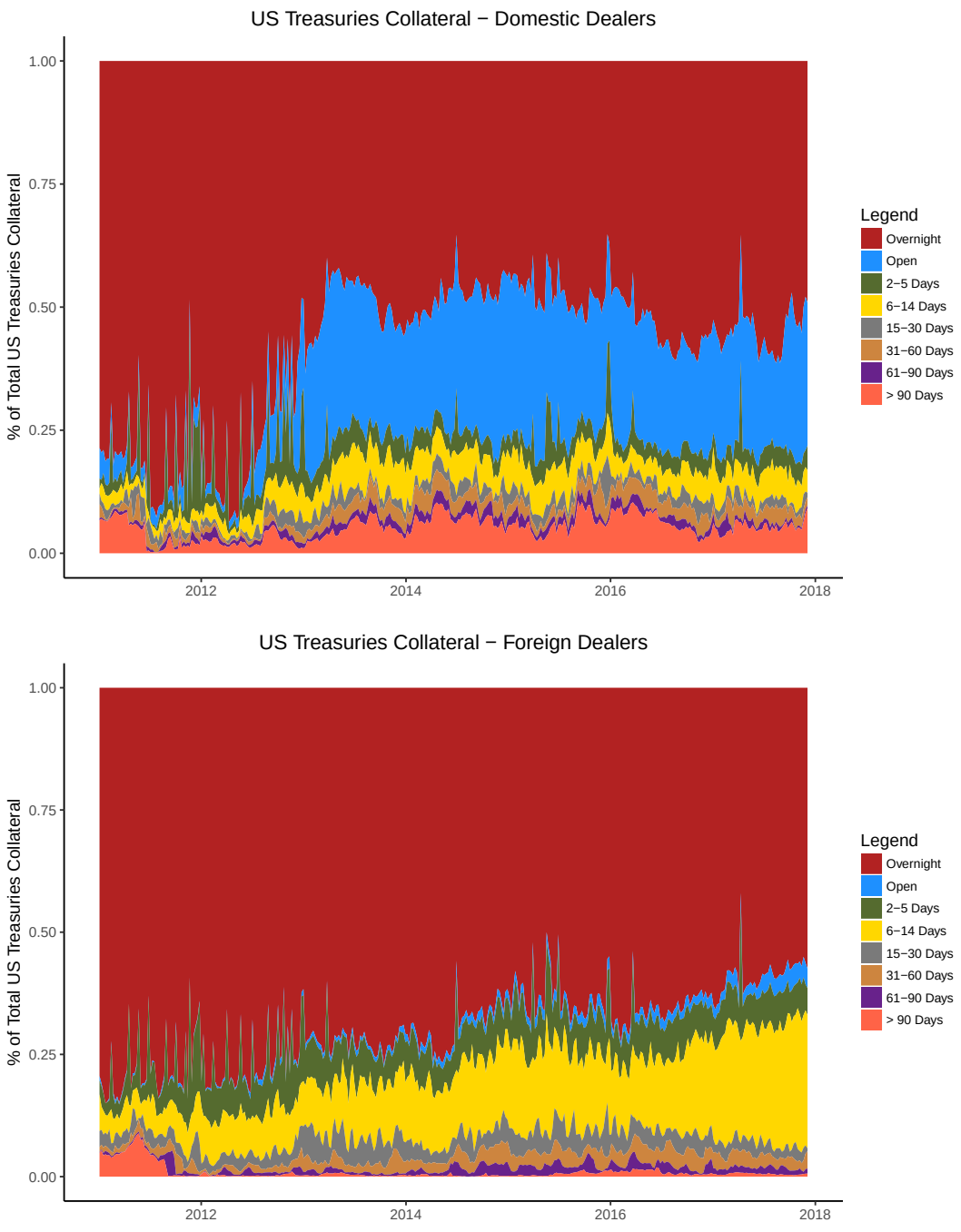

Figure 1: Maturity Structure of Treasury Tri-party Repos – Domestic vs. Foreign

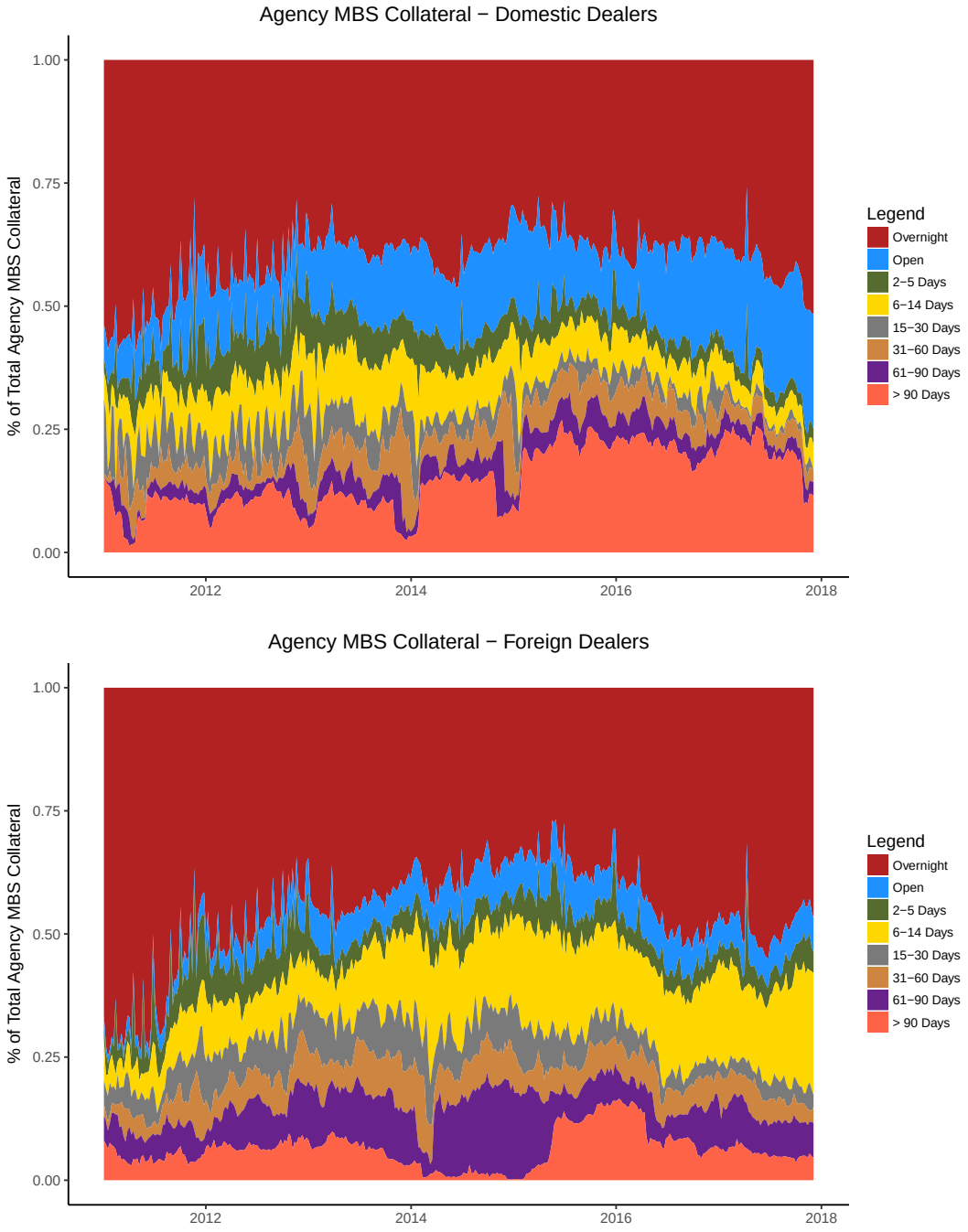

Figure 2: Maturity Structure of Agency MBS Tri-party Repos – Domestic vs. Foreign

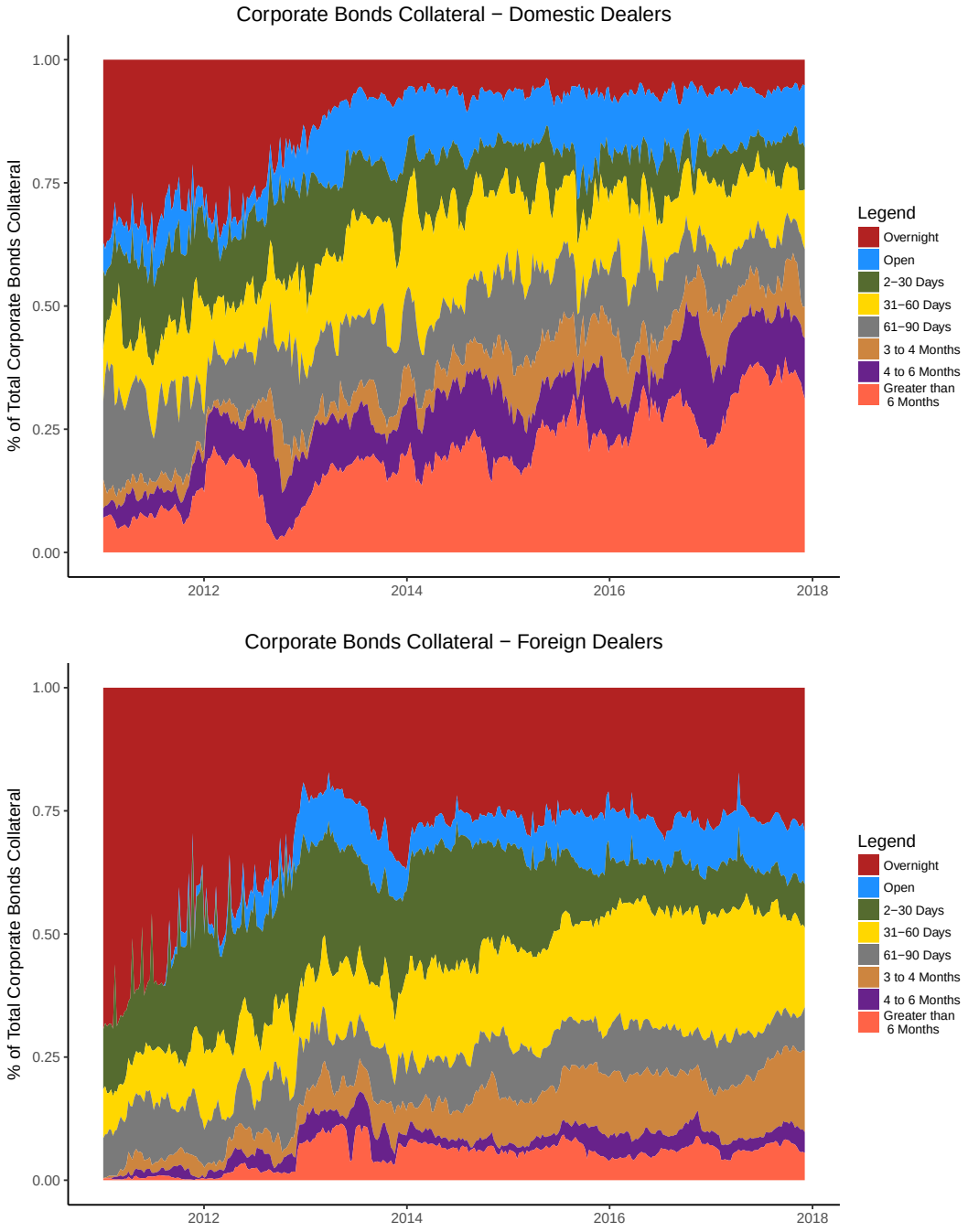

Figure 3: Maturity Structure of Corporate Bond Tri-party Repos – Domestic vs. Foreign

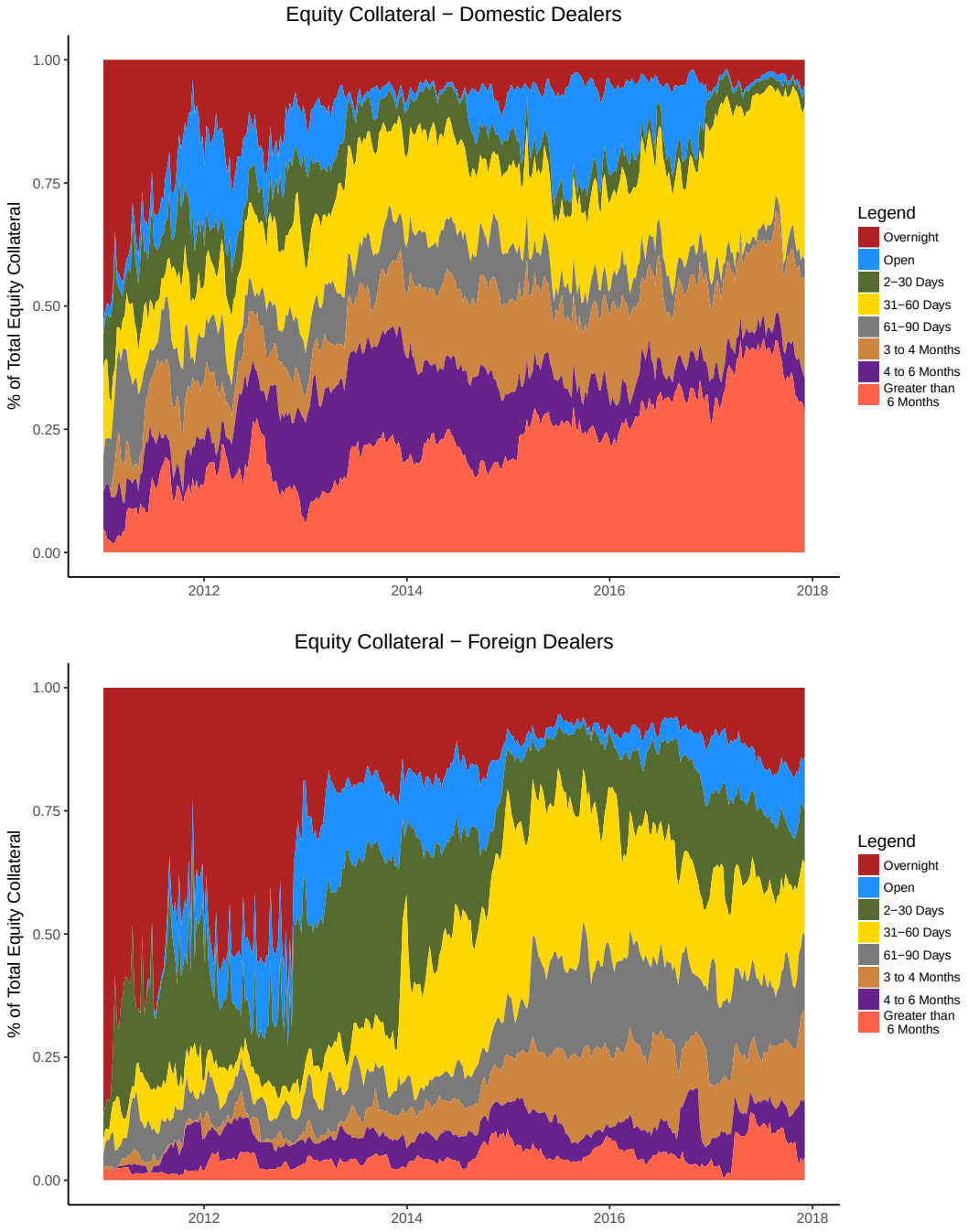

Figure 4: Maturity Structure of Equity Tri-party Repos – Domestic vs. Foreign

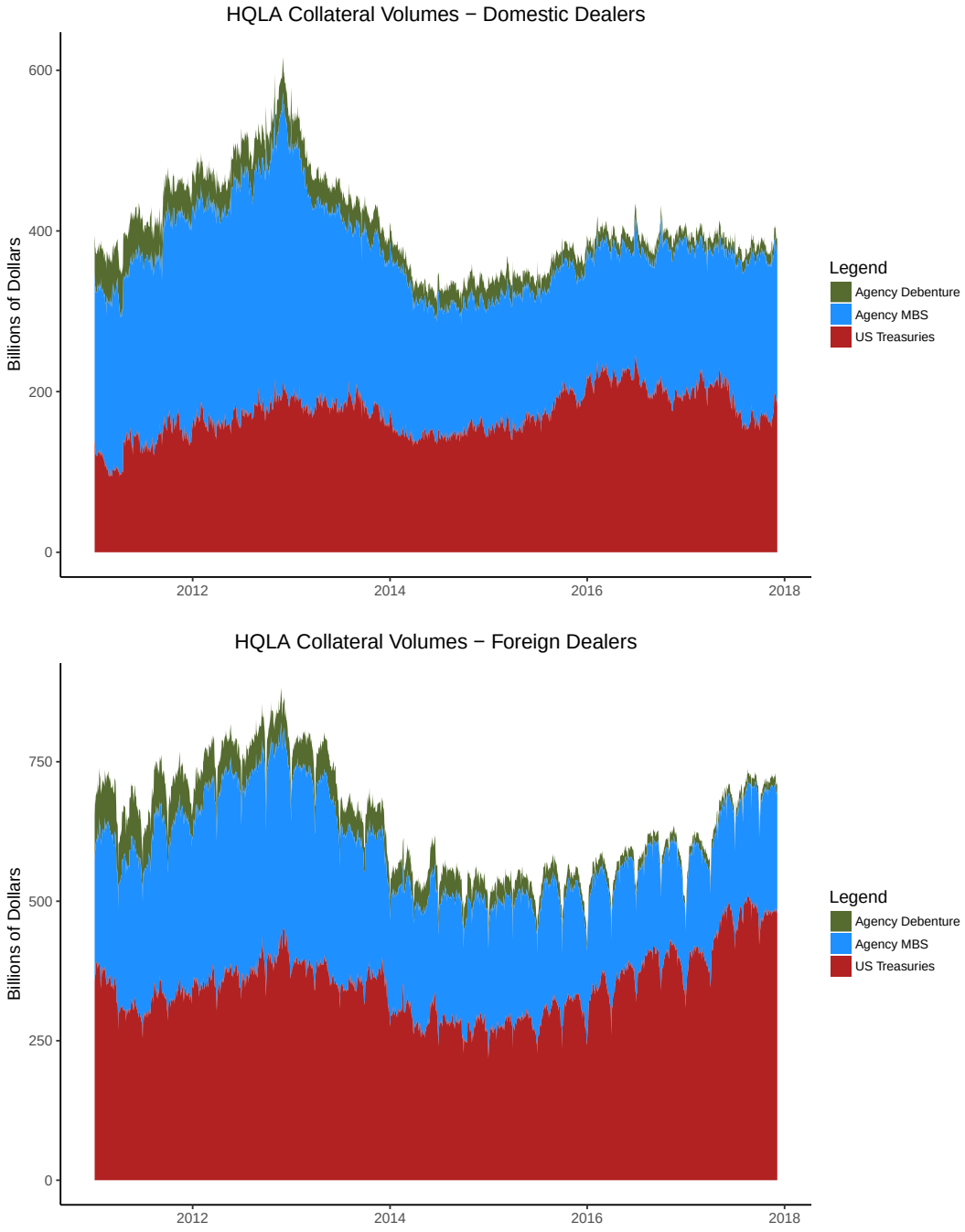

Figure 5: Evolution of HQLA Tri-party Repo Books – Domestic vs. Foreign

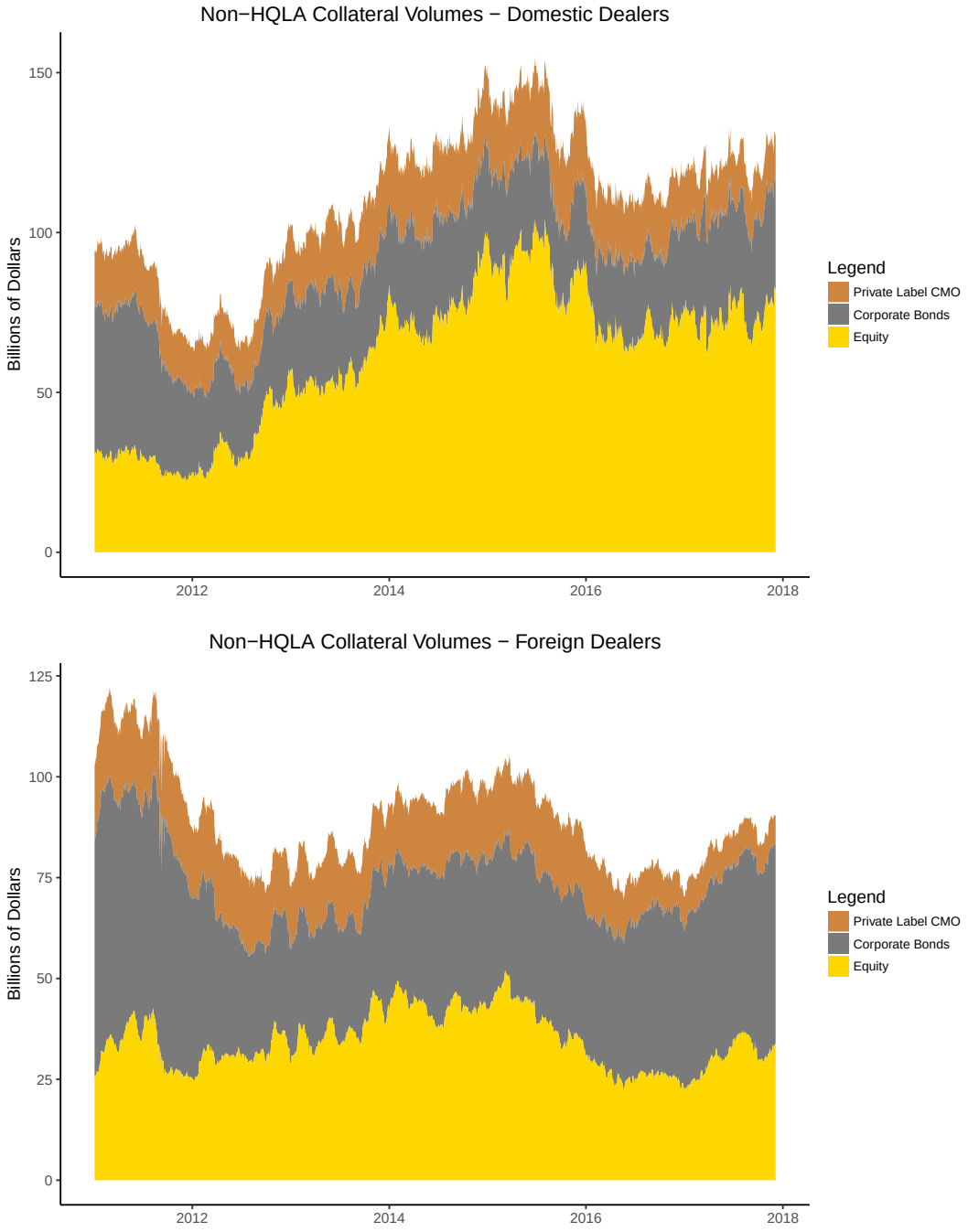

Figure 6: Evolution of non-HQLA Tri-party Repo Books – Domestic vs. Foreign

Table 1: LCR Effects on Treasury Repos

The sample goes from Jan 03, 2011 (start of the Tri-party data) to Jun 15, 2016. Post LCR1 equals one after the U.S. implementation of the LCR is announced (Dec 01, 2011); Post LCR2 equals one after the adoption of the final rule in the U.S. (Sep 01, 2014); Post LCR3 equals one after the U.S. LCR is 80% phased-in (Jan 01, 2015). US refers to the U.S. dealers subject to the U.S. LCR; Basel refers to all the dealers subject to the LCR. Standard errors are two–way clustered at the dealer and day level.
***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1) Share ON	(2) Share Open	(3) Share [1,30]	(4) Share >30	(5) Share >90
Panel A: Post LCR1					
Post LCR1	-0.063	-0.008	-0.026	0.034	0.023
	(0.042)	(0.011)	(0.025)	(0.026)	(0.022)
Post LCR1 X US	-0.103	0.132	-0.148	0.016	0.007
	(0.089)	(0.084)	(0.095)	(0.025)	(0.022)
Post LCR1 X Basel	-0.063	0.020	-0.008	-0.011	-0.014
	(0.049)	(0.022)	(0.035)	(0.032)	(0.028)
Panel B: Post LCR2					
Post LCR2	-0.099***	-0.025	-0.020	0.045	0.027
	(0.029)	(0.025)	(0.014)	(0.027)	(0.024)
Post LCR2 X US	-0.095	**0.122***	**-0.156****	0.034	0.015
	(0.069)	(0.064)	(0.067)	(0.031)	(0.013)
Post LCR2 X Basel	-0.020	0.030	-0.007	-0.023	-0.017
	(0.040)	(0.028)	(0.023)	(0.029)	(0.027)
Panel C: Post LCR3					
Post LCR3	-0.088***	-0.031	-0.014	0.045	0.033
	(0.030)	(0.030)	(0.015)	(0.032)	(0.029)
Post LCR3 X US	-0.077	0.113*	-0.133**	0.020	0.006
	(0.063)	(0.062)	(0.063)	(0.027)	(0.021)
Post LCR3 X Basel	-0.032	0.031	-0.012	-0.019	-0.016
	(0.041)	(0.031)	(0.023)	(0.035)	(0.034)
Panel D: Post LCR1 and Post LCR3					
Post LCR1	-0.041	0.001	-0.023	0.023	0.014
	(0.041)	(0.004)	(0.026)	(0.025)	(0.021)
Post LCR3	-0.080***	-0.031	-0.010	0.041	0.031
	(0.029)	(0.029)	(0.016)	(0.032)	(0.029)
Post LCR1 X US	-0.083	0.103	-0.113	0.010	0.005
	(0.080)	(0.070)	(0.084)	(0.026)	(0.023)
Post LCR1 X Basel	-0.055	0.012	-0.005	-0.007	-0.010
	(0.049)	(0.019)	(0.034)	(0.030)	(0.025)
Post LCR3 X US	-0.056	**0.090***	**-0.107****	0.018	0.005
	(0.053)	(0.047)	(0.049)	(0.028)	(0.022)
Post LCR3 X Basel	-0.020	0.028	-0.011	-0.018	-0.015
	(0.041)	(0.030)	(0.021)	(0.034)	(0.032)
Obs.	51405	51405	51405	51405	51405
N. of Dealers	56	56	56	56	56
N. of Days	1241	1241	1241	1241	1241
Dealer FE	Yes	Yes	Yes	Yes	Yes

Table 2: LCR Effects on Agency MBS Repos

The sample goes from Jan 03, 2011 to Jun 15, 2016. Post LCR1 equals one after the U.S. implementation of the LCR is announced (Dec 01, 2011); Post LCR2 equals one after the adoption of the final rule in the U.S. (Sep 01, 2014); Post LCR3 equals one after the U.S. LCR is 80% phased-in (Jan 01, 2015). US refers to the U.S. dealers subject to the U.S. LCR; Basel refers to all the dealers subject to the LCR. Standard errors are two–way clustered at the dealer and day level.
***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1) Share ON	(2) Share Open	(3) Share [1,30]	(4) Share >30	(5) Share >90
Panel A: Post LCR1					
Post LCR1	-0.142	-0.025	-0.081	0.106	0.053
	(0.089)	(0.028)	(0.068)	(0.066)	(0.049)
Post LCR1 X US	-0.049	0.093	-0.106	0.013	0.022
	(0.085)	(0.066)	(0.078)	(0.037)	(0.026)
Post LCR1 X Basel	0.005	0.006	0.036	-0.042	-0.038
	(0.108)	(0.060)	(0.089)	(0.072)	(0.053)
Panel B: Post LCR2					
Post LCR2	-0.082**	-0.014**	-0.091*	0.104**	0.075
	(0.035)	(0.007)	(0.046)	(0.046)	(0.056)
Post LCR2 X US	-0.044	**0.060****	**-0.143****	**0.084***	0.058
	(0.066)	(0.024)	(0.056)	(0.049)	(0.046)
Post LCR2 X Basel	0.008	-0.007	0.102*	-0.095*	-0.075
	(0.047)	(0.020)	(0.057)	(0.053)	(0.061)
Panel C: Post LCR3					
Post LCR3	-0.068**	-0.011**	-0.073	0.084*	0.058
	(0.033)	(0.006)	(0.048)	(0.048)	(0.047)
Post LCR3 X US	-0.053	0.052**	-0.154**	0.101*	0.071
	(0.066)	(0.022)	(0.060)	(0.052)	(0.053)
Post LCR3 X Basel	0.011	-0.011	0.099	-0.088	-0.058
	(0.046)	(0.019)	(0.059)	(0.055)	(0.054)
Panel D: Post LCR1 and Post LCR3					
Post LCR1	-0.128	-0.023	-0.063	0.086	0.038
	(0.087)	(0.028)	(0.069)	(0.066)	(0.044)
Post LCR3	-0.045*	-0.008**	-0.062	0.069	0.052
	(0.026)	(0.003)	(0.049)	(0.047)	(0.044)
Post LCR1 X US	-0.035	0.082	-0.062	-0.020	-0.001
	(0.088)	(0.067)	(0.081)	(0.043)	(0.028)
Post LCR1 X Basel	0.001	0.009	0.007	-0.016	-0.023
	(0.107)	(0.061)	(0.090)	(0.071)	(0.049)
Post LCR3 X US	-0.042	0.034	-0.138**	0.104*	0.071
	(0.068)	(0.021)	(0.063)	(0.057)	(0.055)
Post LCR3 X Basel	0.015	-0.012	0.099*	-0.087	-0.054
	(0.040)	(0.018)	(0.058)	(0.054)	(0.053)
Obs.	52727	52727	52727	52727	52727
N. of Dealers	55	55	55	55	55
N. of Days	1249	1249	1249	1249	1249
Dealer FE	Yes	Yes	Yes	Yes	Yes

Table 3: LCR Effects on Corporate Debt Repos

The sample goes from Jan 03, 2011 to Jun 15, 2016. Post LCR1 equals one after the U.S. implementation of the LCR is announced (Dec 01, 2011); Post LCR2 equals one after the adoption of the final rule in the U.S. (Sep 01, 2014); Post LCR3 equals one after the U.S. LCR is 80% phased-in (Jan 01, 2015). US refers to the U.S. dealers subject to the U.S. LCR; Basel refers to all the dealers subject to the LCR. Standard errors are two–way clustered at the dealer and day level.
***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1) Share ON	(2) Share Open	(3) Share [1,30]	(4) Share >30	(5) Share >90
Panel A: Post LCR1					
Post LCR1	0.051	-0.174**	0.037	0.137**	0.035
	(0.087)	(0.080)	(0.094)	(0.068)	(0.022)
Post LCR1 X US	-0.172	-0.027	-0.126	**0.153****	**0.116****
	(0.125)	(0.057)	(0.089)	(0.069)	(0.046)
Post LCR1 X Basel	-0.156	0.237***	-0.221**	-0.016	0.060
	(0.121)	(0.086)	(0.108)	(0.086)	(0.038)
Panel B: Post LCR2					
Post LCR2	-0.035	-0.129*	-0.011	0.140*	0.083
	(0.028)	(0.066)	(0.026)	(0.072)	(0.059)
Post LCR2 X US	-0.092	0.045	-0.115	0.070	0.104
	(0.077)	(0.058)	(0.082)	(0.067)	(0.074)
Post LCR2 X Basel	-0.027	0.101	-0.075	-0.026	-0.016
	(0.058)	(0.073)	(0.062)	(0.086)	(0.069)
Panel C: Post LCR3					
Post LCR3	-0.050**	-0.131	-0.022	0.153*	0.093
	(0.022)	(0.080)	(0.018)	(0.083)	(0.079)
Post LCR3 X US	-0.073	0.046	-0.094	0.048	0.095
	(0.072)	(0.055)	(0.081)	(0.069)	(0.072)
Post LCR3 X Basel	-0.018	0.101	-0.066	-0.036	-0.029
	(0.055)	(0.087)	(0.061)	(0.098)	(0.087)
Panel D: Post LCR1 and Post LCR3					
Post LCR1	0.063	-0.150*	0.043	0.107*	0.016
	(0.088)	(0.086)	(0.094)	(0.063)	(0.027)
Post LCR3	-0.059**	-0.108	-0.029*	0.137	0.091
	(0.023)	(0.084)	(0.015)	(0.083)	(0.082)
Post LCR1 X US	-0.160	-0.044	-0.104	**0.148****	**0.093****
	(0.118)	(0.058)	(0.078)	(0.062)	(0.045)
Post LCR1 X Basel	-0.153	0.227**	-0.209*	-0.018	0.064*
	(0.120)	(0.095)	(0.106)	(0.081)	(0.037)
Post LCR3 X US	-0.034	0.053	-0.064	0.011	0.071
	(0.062)	(0.056)	(0.075)	(0.065)	(0.073)
Post LCR3 X Basel	0.008	0.064	-0.028	-0.036	-0.041
	(0.055)	(0.093)	(0.060)	(0.097)	(0.089)
Obs.	40039	40039	40039	40039	40039
N. of Dealers	48	48	48	48	48
N. of Days	1239	1239	1239	1239	1239
Dealer FE	Yes	Yes	Yes	Yes	Yes

Table 4: LCR Effects on Equity Repos

The sample goes from Jan 03, 2011 to Jun 15, 2016. Post LCR1 equals one after the U.S. implementation of the LCR is announced (Dec 01, 2011); Post LCR2 equals one after the adoption of the final rule in the U.S. (Sep 01, 2014); Post LCR3 equals one after the U.S. LCR is 80% phased-in (Jan 01, 2015). US refers to the U.S. dealers subject to the U.S. LCR; Basel refers to all the dealers subject to the LCR. Standard errors are two–way clustered at the dealer and day level.
***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1) Share ON	(2) Share Open	(3) Share [1,30]	(4) Share >30	(5) Share >90
Panel A: Post LCR1					
Post LCR1	-0.140	-0.066	-0.135	0.201**	0.081
	(0.085)	(0.116)	(0.080)	(0.074)	(0.049)
Post LCR1 X US	-0.060	0.087	-0.213	0.126	0.080
	(0.123)	(0.082)	(0.139)	(0.113)	(0.050)
Post LCR1 X Basel	-0.074	0.019	0.045	-0.064	0.023
	(0.131)	(0.132)	(0.151)	(0.124)	(0.067)
Panel B: Post LCR2					
Post LCR2	-0.044**	-0.265*	-0.082**	0.348***	0.126
	(0.018)	(0.134)	(0.037)	(0.105)	(0.177)
Post LCR2 X US	0.185***	0.112	0.105	-0.217***	-0.029
	(0.065)	(0.088)	(0.094)	(0.078)	(0.060)
Post LCR2 X Basel	-0.261***	0.163	-0.149	-0.013	-0.005
	(0.059)	(0.150)	(0.095)	(0.122)	(0.183)
Panel C: Post LCR3					
Post LCR3	-0.058	-0.282*	-0.077**	0.359**	0.158
	(0.036)	(0.161)	(0.035)	(0.136)	(0.197)
Post LCR3 X US	0.194***	0.132	0.121	-0.252***	-0.044
	(0.065)	(0.097)	(0.096)	(0.079)	(0.068)
Post LCR3 X Basel	-0.248***	0.169	-0.161	-0.007	-0.028
	(0.067)	(0.179)	(0.096)	(0.148)	(0.204)
Panel D: Post LCR1 and Post LCR3					
Post LCR1	-0.131	0.012	-0.120	0.108	0.040
	(0.087)	(0.104)	(0.084)	(0.072)	(0.031)
Post LCR3	-0.031	-0.284*	-0.052	0.337**	0.150
	(0.035)	(0.162)	(0.036)	(0.139)	(0.200)
Post LCR1 X US	-0.114	0.053	**-0.254***	**0.200***	**0.093***
	(0.126)	(0.078)	(0.135)	(0.104)	(0.046)
Post LCR1 X Basel	-0.008	-0.029	0.093	-0.064	0.033
	(0.132)	(0.125)	(0.149)	(0.116)	(0.051)
Post LCR3 X US	**0.214*****	0.122	**0.166***	**-0.289*****	-0.061
	(0.070)	(0.097)	(0.097)	(0.077)	(0.068)
Post LCR3 X Basel	-0.250***	0.174	-0.181*	0.007	-0.033
	(0.067)	(0.182)	(0.096)	(0.150)	(0.206)
Obs.	25062	25062	25062	25062	25062
N. of Dealers	29	29	29	29	29
N. of Days	1238	1238	1238	1238	1238
Dealer FE	Yes	Yes	Yes	Yes	Yes

Table 5: Adjustments in Financing and Intermediation to LCR Implementation

The sample goes from Jul 15, 2009 (end of liquidity programs) to Jun 15, 2016, and contains all the Primary Dealers subject to the Basel LCR rule. US refers to the U.S. dealers subject to the U.S. LCR; LCR Implem equals one after the U.S. implementation of the LCR is announced (Dec 01, 2011), and LCR 80% equals one after the U.S LCR is 80% phased in (Jan 01, 2015). Standard errors are two–way clustered at the dealer (21) and week (360) level. ***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Δ Securities Out		Δ Securities Out		Δ Securities Out	
Collateral:	Treasury		Agency MBS		Corporate Debt	
			Financing Inventories			
LCR Implem X US X Δ Net Pos	0.027	0.007	**-0.740***	**-0.747***	-0.161	-0.171
	(0.085)	(0.125)	(0.413)	(0.412)	(0.101)	(0.107)
LCR 80% X US X Δ Net Pos	**-0.279****	**-0.279****	0.205	0.181	0.047	-0.055
	(0.105)	(0.108)	(0.162)	(0.174)	(0.144)	(0.163)
			Intermediation			
LCR Implem X US X Δ Sec In Tsy	0.042	0.147	-0.078**	-0.099**	0.005	0.006
	(0.113)	(0.144)	(0.032)	(0.037)	(0.010)	(0.010)
LCR 80% X US X Δ Sec In Tsy	0.008	-0.045	0.037	0.048	0.007	0.007
	(0.078)	(0.087)	(0.037)	(0.038)	(0.013)	(0.016)
LCR Implem X US X Δ Sec In AgyMBS	**-0.527*****	**-0.502*****	0.156	0.161	0.008	0.005
	(0.132)	(0.145)	(0.153)	(0.143)	(0.006)	(0.010)
LCR 80% X US X Δ Sec In AgyMBS	-0.131	-0.159	-0.252	-0.287	0.044	0.043
	(0.195)	(0.249)	(0.182)	(0.179)	(0.048)	(0.056)
LCR Implem X US X Δ Sec In Corp	0.742	1.050	0.359	0.575	0.210	0.164
	(0.731)	(0.817)	(0.371)	(0.464)	(0.226)	(0.251)
LCR 80% X US X Δ Sec In Corp	0.349	0.018	-0.174	-0.272	0.289*	0.293*
	(1.041)	(1.028)	(0.260)	(0.271)	(0.168)	(0.156)
Obs.	6648	6648	6648	6648	6648	6648
Adj, R^2	0.728	0.742	0.360	0.366	0.191	0.236
Dealer FE	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes
US X Week FE	No	Yes	No	Yes	No	Yes

Table 6: LCR Effects on Intermediation (Overnight vs Term)

The sample goes from Jul 15, 2009 (end of liquidity programs) to Jun 15, 2016, and contains all the Primary Dealers subject to the Basel LCR rule. US refers to the U.S. dealers subject to the U.S. LCR, and LCR equals one after the U.S. implementation of the LCR is announced (Dec 01, 2011). Standard errors are two–way clustered at the dealer (21) and week (360) level. ***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Δ Securities Out		Δ Securities Out		Δ Securities Out	
Collateral:	Treasury		Agency MBS		Corporate Debt	
Tenor:	ON	Term	ON	Term	ON	Term
LCR X US X Δ Sec In Tsy ON	0.100	0.098	**-0.115****	0.011	0.011	-0.000
	(0.108)	(0.081)	(0.049)	(0.032)	(0.008)	(0.008)
LCR X US X Δ Sec In Tsy Term	-0.017	0.112	-0.059	0.029	-0.005	0.015*
	(0.177)	(0.128)	(0.076)	(0.049)	(0.010)	(0.008)
LCR X US X Δ Sec In AgyMBS ON	**-0.369*****	-0.189	0.153	-0.043	0.020	0.001
	(0.119)	(0.142)	(0.112)	(0.103)	(0.014)	(0.012)
LCR X US X Δ Sec In AgyMBS Term	-0.330	0.135	0.413*	-0.151	-0.046	0.031
	(0.384)	(0.334)	(0.238)	(0.146)	(0.039)	(0.026)
LCR X US X Δ Sec In Corp ON	0.232	0.882	-0.057	-0.073	0.324	-0.160
	(1.386)	(1.050)	(0.500)	(0.413)	(0.189)	(0.117)
LCR X US X Δ Sec In Corp Term	1.178	0.001	1.942	-0.822	0.548	**0.545****
	(1.888)	(1.412)	(1.129)	(0.605)	(0.341)	(0.226)
Obs.	6648	6648	6648	6648	6648	6648
Adj. R^2	0.464	0.496	0.207	0.128	0.200	0.195
Dealer FE	Yes	Yes	Yes	Yes	Yes	Yes
US X Week FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 7: LCR Effects on Financing and Intermediation of Securities

The sample goes from Jul 15, 2009 (end of liquidity programs) to Jun 15, 2016, and contains all the Primary Dealers subject to the Basel LCR rule. US refers to the U.S. dealers subject to the U.S. LCR, and LCR equals one after the U.S. implementation of the LCR is announced (Dec 01, 2011). Standard errors are two–way clustered at the dealer (21) and week (360) level. ***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Δ Securities Out		Δ Securities Out		Δ Securities Out	
Collateral:	Treasury		Agency MBS		Corporate Debt	
			Financing Net Positions			
Δ Net Pos	**0.326*****	**0.288*****	-0.438	-0.399	0.151	0.154
	(0.051)	(0.051)	(0.325)	(0.351)	(0.092)	(0.096)
US X Δ Net Pos	0.021	0.079	0.593*	0.624	-0.051	-0.063
	(0.081)	(0.070)	(0.323)	(0.362)	(0.101)	(0.102)
LCR X Δ Net Pos	0.032	0.056	0.458	0.418	**0.180*****	**0.195*****
	(0.053)	(0.048)	(0.373)	(0.394)	(0.053)	(0.060)
LCR X US X Δ Net Pos	-0.029	-0.051	-0.682	-0.700	-0.140	**-0.185****
	(0.082)	(0.121)	(0.397)	(0.409)	(0.093)	(0.084)
			Pre-LCR Intermediation			
Δ Sec In Tsy	**0.869*****	**0.896*****	0.051*	0.047*	0.002	0.003
	(0.049)	(0.041)	(0.028)	(0.026)	(0.003)	(0.003)
US X Δ Sec In Tsy	-0.312**	-0.403***	0.034	0.046	0.002	0.004
	(0.119)	(0.116)	(0.035)	(0.036)	(0.004)	(0.004)
Δ Sec In AgyMBS	-0.089***	-0.077***	**0.373*****	**0.376*****	0.009**	0.009**
	(0.025)	(0.021)	(0.121)	(0.117)	(0.004)	(0.004)
US X Δ Sec In AgyMBS	**0.494*****	**0.440*****	0.024	0.023	-0.012	-0.014
	(0.084)	(0.086)	(0.166)	(0.165)	(0.007)	(0.009)
Δ Sec In Corp	0.381	0.483**	0.189	0.205	**0.986*****	**0.988*****
	(0.251)	(0.202)	(0.197)	(0.208)	(0.229)	(0.235)
US X Δ Sec In Corp	-0.659*	-0.754	0.145	-0.015	-0.747***	-0.740***
	(0.382)	(0.446)	(0.359)	(0.449)	(0.208)	(0.227)
			Changes in Intermediation Post-LCR			
LCR X Δ Sec In Tsy	0.052	0.024	-0.014	-0.009	-0.003	-0.004
	(0.045)	(0.036)	(0.017)	(0.018)	(0.003)	(0.004)
LCR X US X Δ Sec In Tsy	0.045	0.134	**-0.069****	**-0.087****	0.007	0.009
	(0.101)	(0.126)	(0.028)	(0.034)	(0.007)	(0.008)
LCR X Δ Sec In AgyMBS	**0.221*****	**0.202*****	0.285***	0.280***	-0.004	-0.003
	(0.031)	(0.023)	(0.051)	(0.052)	(0.006)	(0.006)
LCR X US X Δ Sec In AgyMBS	**-0.542*****	**-0.524*****	0.120	0.122	**0.015****	0.013
	(0.135)	(0.145)	(0.151)	(0.138)	(0.006)	(0.010)
LCR X Δ Sec In Corp	-0.486	-0.602	-0.391	-0.423	-0.181	-0.158
	(0.434)	(0.395)	(0.264)	(0.268)	(0.240)	(0.247)
LCR X US X Δ Sec In Corp	0.918	1.060	0.287	0.455	0.370	0.323
	(0.546)	(0.620)	(0.340)	(0.443)	(0.221)	(0.241)
Obs.	6648	6648	6648	6648	6648	6648
Adj. R^2	0.728	0.742	0.358	0.364	0.178	0.225
Dealer FE	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes
US X Week FE	No	Yes	No	Yes	No	Yes

Table 8: Regulation or Market Discipline? Pre-Crisis, Post-Crisis and Post-LCR.

The sample goes from Jan 07, 2004 to Jun 15, 2016, excluding the crisis period (Aug 01, 2007 to Jul 15, 2009) and contains all the Primary Dealers subject to the Basel LCR rule. US refers to the U.S. dealers subject to the U.S. LCR. PostCrisis equals one after the Federal Reserve liquidity programs for Primary Dealers are unwound (July 15, 2009), and LCR equals one after the U.S. implementation of the LCR is announced (Dec 01, 2011). Observations in which the dealer is non operating in the respective collateral type are dropped. Standard errors are two–way clustered at the dealer (22) and week (545) level. ***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Δ Securities Out		Δ Securities Out		Δ Securities Out	
Collateral:	Treasury		Agency MBS		Corporate Debt	
Δ Net Pos	0.556***	0.541***	-0.105	-0.131	0.095**	0.102***
	(0.051)	(0.053)	(0.078)	(0.078)	(0.034)	(0.033)
US X Δ Net Pos	0.032	0.047	-0.100	-0.092	**0.340***	**0.315***
	(0.089)	(0.095)	(0.150)	(0.144)	(0.087)	(0.078)
Post-Crisis X Δ Net Pos	-0.229***	-0.253***	-0.165	-0.073	0.056	0.053
	(0.060)	(0.067)	(0.190)	(0.194)	(0.108)	(0.111)
Post-Crisis X US X Δ Net Pos	-0.011	0.032	0.512**	0.473**	**-0.392***	**-0.379***
	(0.105)	(0.118)	(0.207)	(0.225)	(0.130)	(0.126)
Post-LCR X Δ Net Pos	0.032	0.056	0.318	0.261	0.178***	0.193***
	(0.053)	(0.048)	(0.269)	(0.270)	(0.053)	(0.061)
Post-LCR X US X Δ Net Pos	-0.029	-0.051	-0.504	-0.487	-0.139	-0.183**
	(0.083)	(0.121)	(0.308)	(0.295)	(0.093)	(0.085)
Obs.	9584	9584	7033	7026	8730	8730
Adj. R^2	0.781	0.793	0.411	0.421	0.186	0.211
Dealer FE	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes
US X Week FE	No	Yes	No	Yes	No	Yes

Table 9: Maturity Transformation within Treasuries – 2013 to 2016

The sample goes from Apr 13, 2013 (beginning of more granular data) to Jun 15, 2016, and contains all the Primary Dealers subject to the Basel LCR rule. US refers to the U.S. dealers subject to the U.S. LCR. Dealer-week pairs with no repo activity are dropped. Standard errors are two–way clustered at the dealer (21) and week (167) level. ***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
		Δ Securities Out		
	Total	ON	[2,30]	> 30
		Financing Net Positions		
Δ Net Pos	0.357***	0.402***	0.009	-0.059
	(0.049)	(0.075)	(0.054)	(0.057)
US X Δ Net Pos	0.063	0.048	0.019	-0.004
	(0.119)	(0.144)	(0.059)	(0.065)
		Intermediation		
Δ Sec In	0.936***			
	(0.019)			
US X Δ Sec In	-0.072			
	(0.059)			
Δ Sec In ON		**0.787*****	0.105***	0.030***
		(0.027)	(0.034)	(0.008)
Δ Sec In [2,30]		0.458***	**0.405*****	0.083**
		(0.075)	(0.064)	(0.033)
Δ Sec In > 30		0.449***	0.104**	**0.430*****
		(0.102)	(0.048)	(0.114)
US X Δ Sec In ON		-0.086	-0.015	0.011
		(0.063)	(0.048)	(0.016)
US X Δ Sec In [2,30]		-0.110	0.106	0.034
		(0.111)	(0.101)	(0.047)
US X Δ Sec In > 30		-0.126	0.222	-0.099
		(0.150)	(0.142)	(0.110)
Obs.	3297	3297	3297	3297
Adj. R^2	0.802	0.552	0.356	0.328
Dealer FE	Yes	Yes	Yes	Yes
US X Week FE	Yes	Yes	Yes	Yes
Δ Sec In (other collat)	Yes	Yes	Yes	Yes

Table 10: Maturity Transformation within Agency MBS – 2013 to 2016

The sample goes from Apr 13, 2013 (beginning of more granular data) to Jun 15, 2016, and contains all the Primary Dealers subject to the Basel LCR rule. US refers to the U.S. dealers subject to the U.S. LCR. Dealer-week pairs with no repo activity are dropped. Standard errors are two–way clustered at the dealer (21) and week (167) level. ***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
		Δ Securities Out		
	Total	ON	[2,30]	> 30
		Financing Net Positions		
Δ Net Pos	0.075	-0.063	0.077	0.061
	(0.094)	(0.087)	(0.074)	(0.071)
US X Δ Net Pos	-0.109	0.044	-0.080	-0.071
	(0.096)	(0.098)	(0.081)	(0.073)
		Intermediation		
Δ Sec In	0.814***			
	(0.034)			
US X Δ Sec In	-0.093			
	(0.073)			
Δ Sec In ON		**0.550*****	0.158***	0.082***
		(0.059)	(0.034)	(0.024)
Δ Sec In [2,30]		0.467***	**0.260*****	0.135***
		(0.068)	(0.063)	(0.029)
Δ Sec In > 30		0.589***	0.107*	**0.211*****
		(0.081)	(0.061)	(0.057)
US X Δ Sec In ON		-0.206*	0.010	0.051
		(0.113)	(0.099)	(0.055)
US X Δ Sec In [2,30]		0.230	-0.201**	-0.052
		(0.186)	(0.072)	(0.046)
US X Δ Sec In > 30		-0.130	-0.165	0.179**
		(0.129)	(0.115)	(0.079)
Obs.	3217	3217	3217	3217
Adj. R^2	0.559	0.228	0.097	0.117
Dealer FE	Yes	Yes	Yes	Yes
US X Week FE	Yes	Yes	Yes	Yes
Δ Sec In (other collat)	Yes	Yes	Yes	Yes

Table 11: Maturity Transformation within Corporate Debt – 2013 to 2016

The sample goes from Apr 13, 2013 (beginning of more granular data) to Jun 15, 2016, and contains all the Primary Dealers subject to the Basel LCR rule. US refers to the U.S. dealers subject to the U.S. LCR. Dealer-week pairs with no repo activity are dropped. Standard errors are two–way clustered at the dealer (20) and week (167) level. ***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
		Δ Securities Out		
	Total	ON	[2,30]	> 30
		Financing Net Positions		
Δ Net Pos	0.413***	0.331***	0.035***	0.049
	(0.058)	(0.034)	(0.010)	(0.062)
US X Δ Net Pos	-0.310***	-0.263***	-0.034**	-0.013
	(0.100)	(0.074)	(0.012)	(0.067)
		Intermediation		
Δ Sec In	0.833***			
	(0.157)			
US X Δ Sec In	-0.770***			
	(0.176)			
Δ Sec In ON		**0.810*****	0.042**	0.033
		(0.152)	(0.017)	(0.026)
Δ Sec In [2,30]		0.298*	**0.170****	0.125
		(0.169)	(0.062)	(0.116)
Δ Sec In > 30		0.466***	0.063	**0.119**
		(0.148)	(0.039)	(0.089)
US X Δ Sec In ON		-0.792***	-0.036*	0.003
		(0.162)	(0.019)	(0.040)
US X Δ Sec In [2,30]		-0.118	-0.006	0.123
		(0.297)	(0.083)	(0.228)
US X Δ Sec In > 30		-0.560	-0.174	0.387
		(0.427)	(0.117)	(0.368)
Obs.	2953	2953	2953	2953
Adj. R^2	0.296	0.195	0.014	0.042
Dealer FE	Yes	Yes	Yes	Yes
US X Week FE	Yes	Yes	Yes	Yes
Δ Sec In (other collat)	Yes	Yes	Yes	Yes

Table 12: Maturity Transformation within Private Label – 2013 to 2016

The sample goes from Apr 13, 2013 (beginning of more granular data) to Jun 15, 2016, and contains all the Primary Dealers subject to the Basel LCR rule. US refers to the U.S. dealers subject to the U.S. LCR. Dealer-week pairs with no repo activity are dropped. Standard errors are two–way clustered at the dealer (20) and week (167) level. ***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
		Δ Securities Out		
	Total	ON	[2,30]	> 30
		Financing Net Positions		
Δ Net Pos	0.007	-0.076	0.147	-0.067
	(0.063)	(0.083)	(0.111)	(0.072)
US X Δ Net Pos	0.252*	0.346**	-0.170	0.063
	(0.137)	(0.145)	(0.119)	(0.082)
		Intermediation		
Δ Sec In	0.831***			
	(0.078)			
US X Δ Sec In	-0.265***			
	(0.075)			
Δ Sec In ON		**0.091**	0.142	0.171
		(0.073)	(0.102)	(0.100)
Δ Sec In [2,30]		0.117	**0.829****	-0.154
		(0.070)	(0.202)	(0.224)
Δ Sec In > 30		0.219**	0.367*	**0.334**
		(0.079)	(0.192)	(0.230)
US X Δ Sec In ON		0.420***	-0.156	-0.170
		(0.068)	(0.106)	(0.099)
US X Δ Sec In [2,30]		0.587***	-0.848***	0.101
		(0.153)	(0.192)	(0.239)
US X Δ Sec In > 30		0.645***	-0.346*	-0.147
		(0.134)	(0.190)	(0.243)
Obs.	2823	2823	2823	2823
Adj. R^2	0.281	0.266	0.076	0.062
Dealer FE	Yes	Yes	Yes	Yes
US X Week FE	Yes	Yes	Yes	Yes
Δ Sec In (other collat)	Yes	Yes	Yes	Yes

Table 13: Maturity Transformation within Equities – 2013 to 2016

The sample goes from Apr 13, 2013 (beginning of more granular data) to Jun 15, 2016, and contains all the Primary Dealers subject to the Basel LCR rule. US refers to the U.S. dealers subject to the U.S. LCR. Dealer-week pairs with no repo activity are dropped. For equity collateral only, net positions are not reported, hence net positions financing is missing from this table. Standard errors are two–way clustered at the dealer (14) and week (167) level. ***,**,* indicate statistical significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
		Δ Securities Out		
	Total	ON	[2,30]	> 30
		Intermediation		
Δ Sec In	0.695***			
	(0.126)			
US X Δ Sec In	-0.335*			
	(0.159)			
Δ Sec In ON		**0.741*****	0.000	-0.008
		(0.107)	(0.004)	(0.014)
Δ Sec In [2,30]		-0.118	**0.867*****	-0.090
		(0.149)	(0.076)	(0.107)
Δ Sec In > 30		-0.313*	-0.011	**0.527*****
		(0.149)	(0.014)	(0.081)
US X Δ Sec In ON		-0.331**	0.004	-0.018
		(0.131)	(0.010)	(0.045)
US X Δ Sec In [2,30]		1.108**	-0.519***	0.087
		(0.495)	(0.131)	(0.307)
US X Δ Sec In > 30		0.292	-0.027	-0.346
		(0.288)	(0.053)	(0.217)
Obs.	1800	1800	1800	1800
Adj. R^2	0.307	0.319	0.272	0.117
Dealer FE	Yes	Yes	Yes	Yes
US X Week FE	Yes	Yes	Yes	Yes
Δ Sec In (other collat)	Yes	Yes	Yes	Yes