The Internal Capital Markets of Global Dealer Banks

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Federal Reserve System: Board of Governors

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The Internal Capital Markets of Global Dealer Banks

Arun Gupta

Abstract

This study uncovers the existence of a trillion-dollar internal capital market that played a central role in the financing of dealer banks during the 2007–09 Global Financial Crisis. Hand-collecting a novel set of dealer microdata at the subsidiary level, I present a unique set of facts on the evolution of inter-affiliate loans between US primary dealers and their (primarily foreign) siblings. First, the aggregate size of these dealer internal capital markets quadrupled from $335 billion in 2001 to $1.2 trillion by 2007. Second, 25 percent of total repurchase agreements and 62 percent of total securities lending reported on US primary dealer balance sheets were sourced internally from sibling dealers by year-end 2007. Third, internal securities lending collapsed by 55 percent during the 2007–09 crisis. These facts suggest that incorporating internal capital market dynamics may be fruitful for future research on dealer behavior and market liquidity.

Keywords: Broker-dealers, global financial institutions, internal capital markets, securities lending, shadow banking

JEL Classification: E44, F23, G01, G20, G23, G24

1 Federal Reserve Board (email: arun.gupta@frb.gov, 20th Street and Constitution Avenue, NW, Washington, DC, 20551). The views expressed in this paper are solely the responsibility of the author and should not be interpreted as reflecting the views of the Federal Reserve Board, its staff, or any other person associated with the Federal Reserve System. Any errors or omissions are my own.
I. Introduction

The 2007-09 financial crisis highlighted the central role that dealer banks play in issues concerning market liquidity, global financial stability, and the real economy. Compared to the volume of empirical studies covering traditional commercial banks and nonfinancial firms, the academic literature is relatively young in its exploration of dealer bank behavior. To this end, it is important to establish a set of key observables and empirical patterns that characterize dealer balance sheets. Utilizing a novel set of hand-collected data, this paper reveals that a surprisingly large share of dealer liabilities is funded through the internal capital markets. This comprises all forms of financing (for example, repo, securities lending) that take place between the United States and foreign subsidiaries of global dealer organizations. To the best of my knowledge, there has been no prior literature on this topic. In particular, the largest single counterparty of a US primary dealer is its (typically foreign) dealer sibling—not an external party, as is assumed a priori. By year-end 2007, US primary dealers, on average, financed 35 percent of their balance sheet using internal loans from sibling dealers. The majority of these internal loans took the form of securities lending and repurchase agreements, implying the cross-border transfer of collateral inside each dealer organization. These activities aggregate to a $1.2 trillion internal capital market (as of fourth quarter 2007) that was previously invisible to the academic literature because of netting in the consolidated 10-Q and 10-K reports filed by broker-dealers. I uncover these facts using disaggregated subsidiary-level balance sheets, presenting a fuller picture of the modern-day liquidity management practices of global dealer banks. Given the importance of US primary dealers to various facets of the US financial system (for example, open market operations as well as market making of corporate bonds, money market instruments, and derivatives), these facts suggest that studying the incentives, trade-offs, and constraints driving internal capital market allocations within dealer organizations would be particularly fruitful for future research.

This paper contributes to two threads of literature. First, these facts add to a growing literature on dealer behavior. While there have been, over the past several decades, significant theoretical contributions (Amihud and Mendelson 1980; Brunnermeier and Pedersen 2009; Dang, Gorton, and Holmstrom 2020; Gorton and Ordoñez 2014; Ho and Stoll 1983; Infante 2020; Stoll 1978), historical limitations on the availability of public data have restricted the ability to build empirical tests. In the past decade, however, several papers have made large empirical strides by employing proprietary data sources. For example, Gorton and Metrick (2012) utilized proprietary industry data to reveal that, while fragilities in the housing market may have been a trigger, it was widespread runs on repurchase agreements at the largest dealer banks that transformed a housing crash into a global crisis.

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2 Primary dealers are US broker-dealer subsidiaries (owned by either domestic or foreign parents) that act as market makers of US government securities in the context of open market operations.
systemic crisis. Goldberg (2020) utilizes confidential regulatory data to establish the connection between dealer banks and the real economy, showing that declines in dealer liquidity supply predict reduced debt issuance and investment by nonfinancial firms, in addition to reduced aggregate economic activity. Using similar confidential regulatory data, Carlson and Macchiavelli (2020) show that the 2008 emergency lending facilities alleviated dealers’ funding pressures, helping avoid potential fire sales in addition to providing better liquidity to the bond markets. As a complement to this growing literature, I present several new stylized facts about dealer banks that are fundamental to their funding model. In particular, the hand-collected data presented in this paper reveal the surprising importance that internal capital markets hold for dealer banks. Given that roughly 25 percent of all repurchase agreements and 62 percent of all securities loans on US primary dealer balance sheets are funded internally through sibling institutions, theories of dealer financing and liquidity would greatly benefit from an exploration of the dynamics driving dealer internal capital markets.

Second, this paper contributes more generally to the literature on the internal capital markets of financial intermediaries and, in particular, highlights the need to differentiate the literature into two distinct categories: the internal capital markets of branches versus the internal capital markets of subsidiaries. Evidence on the existence of internal capital markets in deposit-taking commercial banks has been well documented, for example, Campello (2002), Cetorelli and Goldberg (2012a and 2012b), and Gilje, Loutskina, and Strahan (2016). These studies document the dynamics of internal flows between branches within the same commercial bank. In this way, the commercial bank reallocates excess deposits between domestic and foreign branches based on local funding needs. These internal capital markets tend to be frictionless, as evidenced by several distinct features:

- Unlike subsidiaries, branches are, by definition, not financed through equity and thus are legally the same entity as the commercial bank parent. Branches cannot fail independently from the parent.

- Internal loans between branches of the same commercial bank are subject to minimal regulatory interference.

In contrast, dealer internal capital markets comprise loans between subsidiaries (in other words, legally distinct entities). The internal capital markets of subsidiaries differ significantly from the internal capital markets of branches within the same commercial bank subsidiary in several ways:

- Unlike branches, subsidiaries of an organization each have their own subsidiary-level equity capital and are legally separate entities. As described in Bliss (2003), as well as Bliss and Kaufman (2006), each subsidiary can fail independently from the rest of

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3 Copeland, Martin, and Walker (2014), Krishnamurthy, Nagel, and Orlov (2014), and Martin, Skeie, and von Thadden (2014) provide additional empirical evidence that financial institutions can face risk from their secured wholesale funding lenders.

4 Rather than internal lending, Houston, James, and Marcus (1997) study the capital ratios of subsidiaries versus the consolidated organization.
the organization and can be subject to separate insolvency regimes.\textsuperscript{5}

- The majority of dealer internal loans are \textit{collateralized}.

- Subsidiaries located in different countries can be subject to varying degrees of regulatory costs based on local jurisdiction, such as regulatory capital charges and ring-fencing measures (Goldberg and Gupta 2013).

The remainder of the paper is structured as follows. Section II covers the data source and description. Section III provides an overview of the institutional details surrounding the different types of holding company structures. Section IV presents new stylized facts on the inter-affiliate exposures between a US primary dealer subsidiary and its (primarily foreign) siblings from 2001 to 2014. Section V concludes.

II. Data

Data on US primary dealer (subsidiary only) balance sheets are hand-collected from public annual audited report Form X-17A-5 PDFs, which all registered US broker-dealers file annually with the Securities and Exchange Commission (SEC), and which are publicly searchable on the SEC EDGAR database.\textsuperscript{6} Individual dealer filings can be found by entering central index key (CIK) identifiers provided on the SEC web page titled “Company Information about Active Broker-Dealers.”\textsuperscript{7} Note that this should not be confused with an entirely different confidential data set that has the same name (X-17A-5 report) and that features a completely different set of reporting fields. It is also different from the well-known 10-Q and 10-K filings, which represent (netted) financial information for the \textit{consolidated} organization (as opposed to subsidiary level).

I define “affiliates,” “related parties,” or “sibling institutions” as subsidiaries that are wholly owned by the same parent holding company. Financial securities in the internal capital market consist of any form of lending extended between siblings within the same organization. Examples include repurchase agreements, securities loans, short-term uncollateralized loans, long-term subordinated debt, and brokerage receivables/payables. The public Form X-17A-5 reports publish information on each US broker-dealer subsidiary’s outstanding loan and borrowing exposures \textit{vis-à-vis} affiliates as of the end of each year. In this study, I focus on the 10 largest \textit{primary} dealers, which have significant international operations. \textit{Primary} dealers are US broker-dealer subsidiaries (possibly owned by domestic or foreign parents) that act as market makers of US government securities during the open market operation process. Although these reported sibling exposure figures could technically be \textit{vis-à-vis} any sibling (US or foreign), they are most likely with respect to foreign siblings, since the balance sheets of US non-primary dealer siblings are not big enough to account for the large internal exposures reported on US primary dealer filings.

\textsuperscript{5} Though post-2008 regulations have made the independent failure of subsidiaries less clear.

\textsuperscript{6} https://www.sec.gov/edgar/searchedgar/companysearch.html.

\textsuperscript{7} https://www.sec.gov/help/foiodocsbdfoiahtm.html.
While it is not possible to know which foreign siblings are the internal counterparties, London tends to house a large presence of dealer operations for the major global dealer banks. (Other locations could span financial hubs such as Hong Kong, Frankfurt, Singapore, and Zurich.)

Please note that all numbers presented in Section IV are stock variables, not flows. This means, for example, that dealer internal capital markets consisted of $1.2 trillion of internal debt outstanding (US primary dealers’ liabilities that face sibling counterparties) as of December 31, 2007. Also, because of its 2008 bankruptcy, Lehman Brothers has been excluded from the sample to ensure that all figures in Section IV represent balance sheet adjustments, as opposed to filers dropping out of the sample. Aside from this, the panel is mostly balanced except for Credit Suisse, which did not file in 2001, and JPMorgan Chase & Co., which did not file in 2002, 2004, 2005, or 2006.

III. Holding Company Level

In this section, I provide an overview of the internal capital markets of a typical global financial institution, in addition to outlining the variety of regulatory restrictions imposed on internal lending flows. These US primary dealer subsidiaries can be housed inside organizations with differing corporate structures:

(1) Bank Holding Companies (BHCs): Citigroup, JPMorgan Chase, Bank of America.

(2) US global BHCs are typically composed of (at least) a parent holding company, a US commercial bank subsidiary insured by the Federal Deposit Insurance Corporation (FDIC), a US broker-dealer subsidiary, and a foreign broker-dealer subsidiary. Section 23A of the Federal Reserve Act (details are provided at the end of Section III) imposes strict limitations on the ability of commercial banks to provide internal loans to their nonbank siblings and their parent holding company. The purpose behind this is to restrict a leak of the federal subsidy into non-depository institutions.\(^8\)

(3) Investment Banks (IBs): Goldman Sachs, Merrill Lynch, Bear Stearns, Morgan Stanley.

(4) US global IBs are typically composed of (at least) a parent holding company, a US broker-dealer subsidiary, and a foreign broker-dealer subsidiary. In the pre-crisis period, there were minimal regulatory restrictions on internal funding flows between dealer siblings. Although Goldman Sachs and Morgan Stanley became bank holding companies post-crisis, I categorize them as IBs because their business model is still predominantly that of an investment bank.

(5) Foreign Banking Organizations (FBOs): Barclays, BNP Paribas, Credit Suisse.

(6) FBOs have historically followed the universal banking model, where no regulatory ring fence existed between insured commercial bank deposits and broker-dealer siblings. This has begun to change post-crisis (Goldberg and Gupta 2013).

Each organization typically has thousands of subsidiaries in its hierarchy, and the vast majority are special-purpose vehicles and other shell corporations. In this study, I will focus on the main operating subsidiaries, which I have outlined in Figure 1.

**Figure 1: Stylized Diagram of the Bank Internal Capital Markets**

This diagram provides a stylized illustration of the various segments of the internal capital market within a banking organization.

![Stylized Diagram of the Bank Internal Capital Markets](image)

*Source: Author’s illustration.*

Ultimately, all internal capital market funds derive from external funds entering at different points in the organization. These entry points are as follows:

1. Publicly traded stock at the parent holding company
2. Commercial paper and long-term unsecured debt issued at the parent holding company
3. Collateralized and other wholesale funding at the US and foreign broker-dealer subsidiaries
4. FDIC-insured domestic deposits or uninsured foreign deposits at the commercial bank subsidiary
Mirroring the aforementioned external funding categories, internal funds (comprising the internal capital markets of BHCs) can be categorized into four types, as shown in Figure 2.

**Figure 2: Four Segments of the Bank Internal Capital Markets**

This table summarizes the four major segments of the internal capital market within a banking organization.

<table>
<thead>
<tr>
<th>Type</th>
<th>Internal Loan Type</th>
<th>Secured?</th>
<th>Sourced from Which External Funding?</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Internal capital allocation</td>
<td>No</td>
<td>Equity shares issued to market</td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>Parent hold co. loans to subs</td>
<td>No</td>
<td>Parent comm. paper and corp. bonds</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>Internal repo and sec lending</td>
<td>Yes</td>
<td>External repo and sec lending at each</td>
<td>Driven by clients</td>
</tr>
<tr>
<td></td>
<td>between dealer siblings</td>
<td></td>
<td>dealer sibling</td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td>Inter-branch loans</td>
<td>No</td>
<td>Commercial bank deposits</td>
<td>Section 23A of FR Act places a ring fence between bank deposits and nonbank siblings</td>
</tr>
</tbody>
</table>

Sources: Federal Reserve FR Y9-LP; FFIEC 031/041 forms; author's table.

In reference to segments (1) and (2) in Figure 1 and Figure 2, parent holding companies do not typically perform any external business on their own, but raise a variety of non-deposit unsecured funding (commercial paper, long-term corporate bonds, and equity) from wholesale markets and downstream them to subsidiaries. Parent holding companies present a single face to the debt and equity markets, allowing market stakeholders to have a claim on the full organization (deriving income from all subsidiaries). While the parent holding company may appear to be a trivial shell corporation at first glance, studying its behavior is key to understanding segments (1) and (2) of the internal capital market. That is because the CFO resides at the parent holding company and can implement policy affecting operations in all subsidiaries downstream. (However, the degree of centralized versus decentralized control can vary across institutions.)

Regarding segment (3), the gross amount of internal repo and securities lending among US primary dealers and their siblings expanded tremendously pre-crisis. While the reasoning is difficult to identify, existing narratives suggest that, prior to the 2007–08 crisis, US primary dealers were known to take collateral posted by their US clients and finance it wherever it was globally cheapest. Because of the lax leverage limits and cheap funding available in locations like the UK (Aitken and Singh, 2010), US clients gave permission for their collateral to be internally rehypothecated anywhere, which likely contributed to the pre-crisis rise in internal repo and securities lending.

Lastly, with respect to segment (4), the use of commercial bank deposits to finance any nonbank siblings is strictly limited by Section 23A of the Federal Reserve Act, which imposes a strict one-way ring fence. Enacted in 1933 in the aftermath of the Great Depression, Section 23A of the Federal Reserve Act was implemented by regulators to prevent the transfer of the federal subsidy to non-depository financial institutions. This law imposes quantitative

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9 Section 23B of the Federal Reserve Act requires that internal rates for BHCs follow arm's-length pricing.
limitations and collateral requirements on commercial bank extensions of credit to nonbank subsidiaries, with certain exemptions. Specifically, it states the following:

- The aggregate amount of internal loans to any one nonbank sibling of the member bank should not exceed 10 percent of the Tier 1 and 2 capital of the member bank.
- The aggregate amount of internal loans to all nonbank siblings of the member bank should not exceed 20 percent of the Tier 1 and 2 capital of the member bank.

IV. US Primary Dealer Subsidiary Level

This section presents novel facts on the dynamics of dealer internal capital markets from the perspective of US primary dealer subsidiaries (all based in New York). Included in the sample are 10 large US primary dealer subsidiaries, listed in Figure 3.

Figure 3: US Primary Dealer Subsidiaries

This table presents the identities of the US primary dealer subsidiaries that constitute the reporting sample.

<table>
<thead>
<tr>
<th>Owned by an Investment Bank</th>
<th>Owned by a US Bank Holding Co.</th>
<th>Owned by a Foreign Banking Org.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merrill Lynch, Pierce, Fenner &amp; Smith</td>
<td>Banc of America Securities LLC</td>
<td>Credit Suisse Securities (USA) LLC</td>
</tr>
<tr>
<td>Morgan Stanley &amp; Co. LLC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: SEC Form X-17A-5 for each institution examined.

Fact 1: Internal liabilities of US primary dealers nearly quadrupled over the pre-crisis period, to $1.2 trillion in the fourth quarter of 2007. On average, dealer subsidiaries financed 35 percent of their balance sheet vis-à-vis sibling counterparties.¹⁰

A new contribution to the literature is that internal liabilities made up a surprisingly large share of the US primary dealer subsidiary’s funding model. Looking at more traditional sources of dealer data, such as 10-Q and 10-K reports filed with the SEC, hides this surprising statistic (because of the netting of internal exposures in the consolidated balance sheet). Figure 4 illustrates a simplified view of the US primary dealer subsidiary balance sheet, where all assets and liabilities can be categorized as “internal” or “external,” depending on whether or not the counterparty is a sibling institution. These internal assets and liabilities in red constitute financial instruments in the internal capital market for global dealer bank organizations. Figure 5 takes the liability side (right side) of the balance sheet and aggregates the internal and external liabilities outstanding across the 10 US primary dealers in the sample. I find that, previously unknown to the literature, internal liabilities make up a

¹⁰ Sources: SEC Form X-17A-5 for each institution examined.
surprisingly large share of the US primary dealer funding model. Figure 6 shows that US primary dealers’ reliance on inter-affiliate funds for financing gradually increased from 26 percent in 2001 to 37 percent by 2014, suggesting that the importance of internal capital markets to the funding of dealer banks is not just a pre-crisis phenomenon. Last, Figure 7 shows a consistent pattern across all organization types that US primary dealers typically maintained a net borrowing relationship vis-à-vis their affiliates.

**Figure 4: Simplified Balance Sheet View, US Primary Dealer Subsidiaries**

![Image of simplified balance sheet view](image)

*Source: Author’s illustration.*
Figure 5: Funding Model, US Primary Dealer Subsidiaries

This figure presents the dollar amount of liabilities that face external counterparties versus internal counterparties, aggregated across US primary dealer subsidiaries.

Sources: SEC Form X-17A-5 for each institution examined.
Figure 6: Internal Liability Share, US Primary Dealer Subsidiaries

This figure presents inter-affiliate liabilities as a share of total liabilities, aggregated across US primary dealer subsidiaries.

Figure 7: Internal Assets (Liabilities) as a Share of Total Assets (Liabilities)

This table presents the average share of internal assets (liabilities) for US primary dealer subsidiaries as of the fourth quarter of 2007.

<table>
<thead>
<tr>
<th>Type</th>
<th>Internal Asset Share</th>
<th>Internal Liability Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>IB</td>
<td>16%</td>
<td>32%</td>
</tr>
<tr>
<td>US BHCs</td>
<td>23%</td>
<td>34%</td>
</tr>
<tr>
<td>FBOs</td>
<td>24%</td>
<td>39%</td>
</tr>
<tr>
<td>Average</td>
<td>20%</td>
<td>35%</td>
</tr>
</tbody>
</table>

As Gorton and Metrick (2012) discuss, evidence that a run on external repurchase agreements occurred during the 2007–09 Global Financial Crisis, Figure 5 (and later, Figure 9) show that internal liabilities collapsed in a very similar stride. The collapse in external liabilities (blue line, Figure 5) is explained by rising uncertainty about the true value of mortgage-backed securities underlying these external repurchase agreements. But a separate narrative may be needed to explain the complementary collapse in internal...
liabilities. In particular, it is not clear why siblings’ counterparties would reduce exposures
to one another, since both are wholly owned by the same ultimate parent and set of
shareholders. A few possible narratives (though not exhaustive) are introduced in the text
after Fact 3.

**Fact 2: Nearly 66 percent of internal capital market instruments came in the form of
repo and securities lending.**

In Figure 8, I provide a more elaborate view of the subsidiary-level balance sheets within a
global dealer bank. Internal liabilities can be broken down into internal repo and securities
lending, internal brokerage payables, internal short-term unsecured debt, and internal long-
term unsubordinated debt. Figure 9 aggregates each internal liability subcategory across the
sample and finds that the majority of these internal liabilities took the form of internal repo
and securities lending instruments. The remaining categories, such as long- and short-term
unsecured internal loans between siblings as well as internal brokerage payables, were
unaffected during the crisis.

**Figure 8: Internal Repo and Securities Lending, Detailed Balance Sheet View**

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*Source: Author's illustration.*

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11 Sources: SEC Form X-17A-5 for each institution examined.
12 Internal brokerage accounts refer to the case when a dealer owns its own proprietary hedge fund or asset
management operation.
Figure 9: Composition of Internal Liabilities, US Primary Dealer Subsidiaries

This graph provides a time series of the dollar amounts for each type of internal liability from Figure 8, aggregated across US primary dealer subsidiaries.

![Internal Liability Composition Graph](image)

**Sources:** SEC Form X-17A-5 for each institution examined.

Fact 2 shows that dealer subsidiaries reduced internal exposures to one another during the crisis. Cetorelli and Goldberg (2012b) find the opposite effect in the context of commercial bank branches (represented in the bottom-left box in Figure 1), where foreign branches sacrificed local loan opportunities to provide emergency (internal) loans to US branches during the crisis. This difference is likely because the majority of internal dealer financing decisions are derived from activities driven by clients/creditors.

**Fact 3:** During the crisis, 25 percent of primary dealers’ total repo and 62 percent of their total securities lending activities occurred with siblings (Figure 10). This makes siblings their largest counterparty exposure. Inter-affiliate securities lending collapsed by 55 percent during the 2007–09 crisis.13

Consistent with this, the Lehman Brothers examiner report (United States Bankruptcy Court 2010) confirms that, prior to entering bankruptcy, Lehman’s US dealer subsidiary obtained as much as 63 percent of its repo and securities lending from siblings. Facts 2 and 3 establish that internally sourced repo and securities lending was an industrywide practice. Several

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13 Sources: SEC Form X-17A-5 for each institution examined.
interesting trends emerge. First, securities lending vis-à-vis affiliates outpaced those vis-à-vis external counterparties pre-crisis (Figure 11), though it was vice versa for repurchase agreements (Figure 12). Second, these inter-affiliate securities loans collapsed by 55 percent in 2008, while inter-affiliate repo remained relatively stable. One difference between these two types of collateralized lending is that repurchase agreements tend to involve (safer) fixed-income securities, while securities lending typically involves equities in addition to fixed income. Without more granular information on the type of collateral underlying this inter-affiliate lending, the conclusions one can make from this are conjectural at best. However, given its association with riskier asset classes, one possibility is that inter-affiliate securities lending may have been driven by the cross-border demand for speculative trading activities, as opposed to a demand for safe assets.

**Figure 10: Internal Repo (Sec. Lending) as a Share of Total Repo (Sec. Lending)**

This table presents the average share of inter-affiliate repo (securities lending) for US primary dealer subsidiaries as of the fourth quarter of 2007.

<table>
<thead>
<tr>
<th>Type</th>
<th>Internal Repo Share</th>
<th>Internal Securities Lending Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>IB</td>
<td>23%</td>
<td>73%</td>
</tr>
<tr>
<td>US BHCs</td>
<td>23%</td>
<td>46%</td>
</tr>
<tr>
<td>FBOs</td>
<td>31%</td>
<td>63%</td>
</tr>
<tr>
<td>Average</td>
<td>25%</td>
<td>62%</td>
</tr>
</tbody>
</table>

*Sources: SEC Form X-17A-5 for each institution examined.*
Figure 11: Internal versus External Securities Lending

This figure presents the dollar amount of inter-affiliate versus external securities lending, aggregated across US primary dealer subsidiaries.

Sources: SEC Form X-17A-5 for each institution examined.
Figure 12: Internal versus External Repo

This figure presents the dollar amount of inter-affiliate versus external repo, aggregated across US primary dealer subsidiaries.

![Internal vs. External Repurchase Agreements](image)

Source: SEC Form X-17A-5 for each institution examined.

An alternative narrative that may relate to these facts is documented by Aitken and Singh (2010). Although Aitken and Singh (2010) do not explicitly attribute this to inter-affiliate versus external issues, one reason behind the cross-border rehypothecation of collateral is the difference in regulatory regimes across the United States and United Kingdom. In particular, the United Kingdom allowed for an unlimited amount of customer assets to be rehypothecated, whereas in the United States, broker-dealers were capped by Rule 15c3-3 when using customer securities to finance proprietary activities. However, the United States provides a defined set of customer protection rules for rehypothecated assets, whereas the United Kingdom does not. This difference meant that when Lehman’s UK dealer subsidiary filed for insolvency, customers who allowed reuse of their collateral received little statutory protection.

A general theme is that, in the pre-crisis period, dealer banks maintained global settlement systems, for example, the collateral of US dealer clients was funded globally wherever it was cheapest. This was implemented by internally rehypothecating US client collateral from the United States to foreign dealer siblings. As quoted in Braithwaite (2014),

“...the group [Lehman] was ‘organised in functional and market areas, rather than by legal entity’ and on a day to day basis it was ‘managed and run mainly along global
product lines, rather than as separate entities’ . . . LBIE [Lehman’s UK dealer sub] also played a pivotal role in proprietary trading and diverse intra-group transactions. Moreover, ‘it was a main repository for the property of its affiliates in connection with their activities in Europe’ . . . In the ordinary course of events, dealings between LBIE and affiliates and clients took place, it seemed, without a great deal of attention often being paid to the precise ownership or location of property. This all changed with the onset of insolvency. Now, LBIE’s counterparts rushed to establish their proprietary rights in order to extract their assets from the administration and thereby avoid the fate facing unsecured creditors. As the Court of Appeal pointed out in the ‘Rascals’ decision, complex arrangements whose legal effects had mattered little when the group was solvent were now subject to interpretation on a ‘strict’ basis . . . The Lehman Brothers group’s collapse triggered a global scramble to establish property rights, so that counterparts could avoid the fate of unsecured creditors.”

Connecting this narrative to the figures in Fact 3, one could conjecture that US clients may have become concerned with the financial condition of their own non-Lehman dealer after learning about the bankruptcy of Lehman and thus wanted to internally shift their collateral back within US borders as a preemptive measure. In this way, global rehypothecation chains would have broken along geographical borders. While the collapse of inter-affiliate securities lending in Figure 11 is consistent with this, it is unclear why inter-affiliate repurchase agreements remained stable during the crisis (Figure 12). Resolving this discrepancy would be fruitful for future research because it could reveal more about the economic mechanisms driving inter-affiliate instruments, as well as dealer funding decisions more generally. An interesting research question is whether this collapse in inter-affiliate securities lending further exacerbated troubles at US primary dealers during the crisis.

**Fact 4: During the crisis, US primary dealer internal claims on sibling institutions collapsed far less than their internal liabilities.**

Figure 13 provides a disaggregated balance sheet view of an internal reverse repurchase agreement or securities borrowing transactions between siblings. Figure 14 demonstrates that the asset side of a US primary dealer subsidiary balance sheet has historically had higher exposure to external counterparties as compared to the liability side. Most of the collateral rehypothecated into US primary dealer books on the asset side comes from external counterparties (that is, likely US-based clients), while far less collateral is internally rehypothecated from sibling subsidiaries. Instead, as shown in Figure 15, the direction of collateral movement pre-crisis was typically going abroad, consistent with the regulatory arbitrage story (Aitken and Singh, 2010). Figure 15 also shows a strong reversal post-crisis, where collateral is internally repatriated back onto US shores.

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14 Sources: SEC Form X-17A-5 for each institution examined
Figure 13: Internal Reverse Repo and Securities Borrowing, Detailed Balance Sheet View

Source: Author’s illustration.

Figure 14: Internal versus External Assets

This figure presents the dollar amount of assets that face external counterparties versus internal counterparties, aggregated across US primary dealer subsidiaries.

Internal vs. External Assets
US Primary Dealers (subsidiary only), Aggregate

Lehman Bankruptcy

External

Internal

Year-End


Trillions USD

0 1 2 3

Annual Frequency
Includes only Credit Suisse, Barclays, BNP, JPM, Citi, BoA, Goldman, Morgan Stanley, Bear, Merrill

Sources: SEC Form X-17A-5 for each institution examined.
**Figure 15: Net Internal Exposure**

This figure presents the netted amount of internal assets (a.k.a. internal assets – internal liabilities), aggregated across US primary dealer subsidiaries. As the majority of this is collateralized, a negative value implies that collateral travels, on net, from the US primary dealer outward to affiliates.

![Net Internal Exposure Graph](image)

*Sources: SEC Form X-17A-5 for each institution examined.*

**Fact 5: The median subsidiary-level leverage reached as high as 87 and has historically been much higher than the leverage of the consolidated organization. This discrepancy can be partly explained by the large size of dealer internal capital markets from Fact 1, suggesting that the growth (and fall) in primary dealer size were partly fueled by internal leveraging (and subsequent deleveraging).¹⁵*

Because internal capital markets net out in consolidation when reported in SEC 10-Q and 10-K filings, the leverage of the consolidated dealer organization masks the actual leverage of its operating dealer subsidiaries. Given that subsidiaries could fail independently from the rest of the firm pre-crisis, and that subsidiaries, unlike branches, are typically not liable for the external debt of any other nonbank sibling, subsidiary-only leverage ratios do matter for understanding the riskiness of the dealer. As illustrated in Fact 1, US primary dealer subsidiaries raised a significant portion of their liabilities from internal sources, partly explaining why the *actual* leverage of the primary dealer subsidiary (which includes internal

¹⁵ Sources: SEC Form X-17A-5 and annual reports for each institution examined.
and external debt) has traditionally been higher than that of the entire organization (Figure 16).

**Figure 16: Subsidiary-Level versus Consolidated Leverage**

This figure shows the median amount of leverage on the subsidiary-level balance sheet versus that on the consolidated organization balance sheet. Note that organization leverage is represented as risk-weighted assets (RWA)/Tier 1 capital for BHCs and FBOs and as total assets/total equity for IBs (since IBs did not report Tier 1 capital and RWAs pre-crisis), while subsidiary leverage is total assets/total equity (since dealers do not report Tier 1 capital and RWAs).

![Subsidiary-Level vs. Consolidated Leverage](image)

*Source: SEC Form X-17A-5 and annual reports for each institution examined.*

To illustrate how the discrepancy between subsidiary and organizational leverage ratios can arise through simple reallocation of existing resources, take an example where two sibling subsidiaries exist. Each subsidiary has financed itself through $1 of equity capital and $1 of external debt and has invested the $2 (on the asset side) with external counterparties. Thus, the leverage ratios of subsidiary A, subsidiary B, and the consolidated firm are all identically 2. Let’s say subsidiary A reallocates one of its two dollars on the asset side and internally lends it to B. In this case, subsidiary A’s leverage ratio is still 2, and the leverage ratio of the consolidated firm is also still 2 (as this $1 of internal lending gets netted out in consolidation). However, the leverage ratio of subsidiary B has now grown to 3, as B’s fixed equity of $1 is now supporting $1 of external debt and $1 of internal debt. The subtle point here is that, since dealer subsidiaries can fail independently from the rest of the organization,
internal debt is not really that different from external debt. Especially if subsidiaries A and B exist in different jurisdictions, they would be subject to competing bankruptcy proceedings and pools of creditors if the global organization were to ever fail. While an internal loan may have been treated differently from external debt before the bankruptcy, the creditors of subsidiary A will exercise their legal claim on B’s assets as if it were an external claim. Given that an average of 35 percent of US primary dealer subsidiary balance sheets were internally financed via sibling counterparties in 2007, the example just provided is by no means a trivial phenomenon in the liquidity management practices of global dealer bank organizations.16

The results of my study have implications for the cross-border resolution of dealer banks as well as ongoing policy debates surrounding regulatory actions that place ring fences along business line and geographical borders. Goldberg and Gupta (2013) overview some measures of regulatory “home bias” and financial protectionism being implemented internationally. As stated in Gorton, Laartis, and Muir (2022), “regulatory changes to the financial architecture in the post-crisis era have aimed to make collateral immobile, most notably with the BIS [Bank for International Settlements] Liquidity Coverage Ratio for banks.” Figure 15 suggests that, during the pre-crisis period, a surprisingly large volume of collateral was intermediated across geographical borders within each dealer organization. The economic importance of these large yet invisible global flows (as well as the unintended consequences of regulatory restrictions on them) should be understood prior to the implementation of new regulations. These issues pose many open questions for future research.

V. Conclusion

This study uncovers details on the internal capital markets of global dealer banks. This paper’s key contribution to the literature on shadow banking is that a substantial volume of cash and collateral is intermediated entirely inside holding companies, which nets out in consolidated balance sheet data. Unraveling these sibling flows reveals a number of new findings about the funding decisions, liquidity management practices, and nature of sibling relationships inside dealer bank organizations. Many open questions arise regarding the implications of subsidiary-level funding dynamics on dealer default risk, asset prices, and the real economy.

16 Adrian, Etula, and Muir (2014) use an aggregate subsidiary-level dealer leverage measure taken from FRED Flow of Funds data to explain a significant amount of variation in asset prices. The dynamics of inter-affiliate exposures, which drive the difference between consolidated and subsidiary-level leverage, may have significant implications for variation in asset prices.
VI. References


https://web.stanford.edu/~jbulow/Lehmandocs/origIndex.html

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