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The Secondary Market for Syndicated Loans

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Abstract

We document an active secondary market for shares in syndicated term loans using confidential supervisory data. While most of the literature examines trades near origination, this paper is the first to study the secondary market throughout the life cycle of a syndicated term loan. We establish novel empirical facts about the post-origination trading of loan shares and identify key participants and their trading patterns. We characterize the determinants of an active secondary market, the turnover of lender shares, and the resulting credit exposure allocations. Increased non-bank participation correlates with increased trading activity during the life cycle of a syndicated loan.

JEL Classification: G21, G18, L14.
Keywords: Syndicated lending, loan sales, non-bank financial institutions, OTC markets, originate-to-distribute.

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1 Introduction

The shift from traditional banking, in which banks originate and hold loans, to an originate-to-distribute (OTD) model, in which banks sell —partially or fully — the loans they originate to non-bank financial institutions (NBFIs), represents one of the most fundamental changes in the financial system in recent decades (Buchak et al., 2024). The syndicated loan market, a key part of the US corporate credit market, was an early example of the OTD model. By the end of 2023, the syndicated loan market had reached approximately $6.4 trillion in commitments, including credit lines and term loans, and $3.1 trillion in outstanding borrowing for both non-financial and financial corporate borrowers.[1]

The syndicated loan market has received significant attention in the literature, including early influential contributions by Sufi (2007) and Ivashina (2009) as well as a large number of subsequent papers. Because of limitations in publicly available data, the existing empirical literature has focused on the primary market for syndicated lending, when a loan is originated by an agent bank or set of co-agent banks and then distributed to other lenders willing to participate at origination. The primary market usually takes several weeks to settle. However, the typical syndicated loan has a maturity of about five years, and many of the participating investors have heterogeneous and time-varying risk-bearing capacities, liquidity constraints, and trading strategies that might lead them to adjust their exposures before the loan matures or is refinanced. As a result, an active over-the-counter secondary market has emerged in which investors can trade in loan shares.

The secondary market is an important part of the syndicated loan market, with an overall turnover of around $826 billion in 2022, as reported by the trade association Loan Syndications and Trading Association (LSTA). Past literature has examined some aspects of the secondary market. For example, Elkamhi and Nozawa

[1] See Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, and Office of the Comptroller of the Currency, 2024.

(2022) document that collateralized loan obligations (CLOs), the largest investor class in the syndicated loan market today, rely on the secondary market to buy and sell loans when managing their portfolios. Giannetti and Meisenzahl, 2023 examine how banks and CLOs are more likely to sell loan shares following a downgrade of a borrower. Blickle et al., 2020 document that in about a third of loan syndicates, the agent bank sells its entire holding of the syndicated loan shortly after origination. However, the existing literature has predominantly focused on the role of the agent bank or the trading behavior of a subset of entities, and none of the existing papers examines the market for syndicated loan shares in its entirety, both over the full life cycle of loans and across all syndications and participating lenders.

This paper presents a first step to fill this gap in the literature by employing confidential supervisory information collected by the Shared National Credit Program (SNC) run by the three primary federal banking regulators: the Federal Reserve, the Office of the Comptroller of the Currency (OCC), and the Federal Deposit Insurance Corporation (FDIC). The SNC collects information quarterly on the loan shares owned by all entities in a loan syndicate throughout the life of the loan. We use these quarter-end balances reported in the SNC data to construct the implied trading of loan shares among lenders over the entire life cycle for all syndicated term loans in our sample. We then document that about 8 percent of the outstanding syndicated term loans (representing around $112 billion in loans) change hands in any given quarter.

We establish several novel stylized facts about the secondary market trading in syndicated loans. First, we show that following a notable spike in trading activity in the first year following origination, loan shares continue to actively change hands over the entire life of a loan. Second, we study which factors determine whether a syndicated loan has an active secondary market and what drives the intensity of trading. Our results suggest that elevated trading activity is associated with increased participation of NBFIs, such as CLOs, loan mutual funds, hedge funds,

insurance companies, and other non-banks.

Third, we study the trading patterns of the main lender categories active in the secondary market. We show that CLOs, loan mutual funds, and banks account for the largest share of trading in terms of gross participation in the secondary market. Hedge funds are also important participants that tend to be active following downgrades of a loan from investment grade to below investment grade or when secondary market liquidity is impaired. Fourth, we study the net participation by lender category and show that mutual funds tend to be net sellers of shares in the secondary market, while CLOs tend to act as net buyers, increasing their shares on net. Banks, which participate in a large share of transactions, do not change their net positions by much, suggesting that banks act as counterparties for NBFIs on either side of the market and help to intermediate between buyers and sellers.

The remainder of the paper has the following structure. In Section 2, we place our contributions in the context of the empirical literature that has studied loan syndications. Section 3 describes our data construction. Section 4 outlines the transition between the primary and secondary market in syndicated loans and how it is captured in our data. Section 5 explains how we infer purchasing and selling activity. Section 6 presents the stylized facts on the secondary loan market. Section 7 concludes.

2 Related literature

Our work is based on several strands of the literature. First, we contribute to a large literature that has studied the syndicated loan market. The loan syndication process involves several lenders sharing parts of a loan, facilitating the provision of credit to often risky corporate borrowers. One key mechanism explored in earlier papers is the information asymmetry between the agent bank originating the loan, which typically has an established relationship with the borrower and a better un-

derstanding of the credit risk of the loan, and the other participating lenders, which often do not have access to the same information. The resulting adverse selection and moral hazard problems can be solved by the agent bank continuing to monitor the borrower and retaining a sufficient share in the loan (Sufi, 2007; Ivashina, 2009). Other important contributions have studied the syndicated loan market and how it responds to changes in financial conditions, including financial crises (Ivashina and Scharfstein, 2010), monetary policy (Paligorova and Santos, 2017), and bank capital regulation (Irani et al., 2021). Ongena, Osberghaus, and Schepens, 2024 propose that banks are more likely to syndicate loans if their risk-bearing capacity is limited and if banks face costs of screening and monitoring borrowers. Most existing work studies the market at origination, partly driven by limitations of the commonly used DealScan data, which contain information on syndicated loans at origination only.

Relatively recent literature has begun to investigate what happens to the shares that lenders hold in syndicated loans after origination. For example, Blickle et al. (2020) use regulatory data from the SNC program to show that the lead arranger in syndicated loans often sells most — if not all — of its share within a few quarters following origination. In about a third of all syndicated loans, the agent bank completely sells its participation. This new result contrasts with findings from earlier research that posited that retained shares by the lead arranger were critical for the syndicate to be able to address informational asymmetries in the relationship between the agent bank and other syndicate lenders (Sufi, 2007; Ivashina, 2009). In particular, the authors document that syndicates with no retained share by the agent bank performed better than syndicates in which the agent bank kept a significant share.

Studying the secondary market also offers an opportunity to better understand how this important credit market responds to shocks to the economy or to individual borrowers, such as ratings downgrades (Giannetti and Meisenzahl, 2023). Lee

et al. (2019) show that the composition of the lender pool varies between both the loan types, such as credit lines and term loans, and the days since the origination and the first observation in the SNC data at the end of the quarter. Irani et al. (2021) examine the effect of tighter capital constraints on non-bank lending. They show that tighter bank regulations lead to greater secondary market loan sales and an increasing role of NBFIs. Other papers study the pricing and liquidity of syndicated loans. Beyhaghi and Ehsani (2016) use indicative price quote data to analyze the expected returns of syndicated loans. Using similar data supplemented with trade reports from CLOs, Kessler and Mählmann (2022) focus on the cost of trading in syndicated loans and test different theories of market microstructure. Our analysis builds on these recent papers but instead focuses on the trading flows across all lenders and develops a set of novel facts about trading activity throughout the life cycle of syndicated loans.

Second, our work is related to the theoretical literature that studies loan sales. Key contributions in this area include Pennacchi (1988), Gorton and Pennacchi (1995), and Parlour and Plantin (2008). These papers analyze some of the issues involved in banks selling loans that they originate and possible avenues to overcome them. In a recent contribution, Gryglewicz, Mayer, and Morellec (2024) show that in a continuous time dynamic contract, gradual loan sales can be incentive compatible with screening and monitoring by the lead bank as time passes since origination. In contrast to these papers, our paper empirically examines sales of loans not only of banks but also of non-banks following origination. Furthermore, we show that banks act as intermediaries facilitating the secondary market sales.

Finally, our empirical results are of importance to the literature on market microstructure initiated by the seminal works of Demsetz (1968) and Grossman and Miller, 1988, who aim to understand the role of transaction costs and liquidity in determining secondary market prices and the matching of sellers and buyers. Empirical contributions have focused on centralized stock exchange markets, where

data were readily available. More recently, research has focused on understanding decentralized exchanges and over-the-counter (OTC) markets. Duffie, Gârleanu, and Pedersen, 2005 and Lagos and Rocheteau, 2009 emphasize the role of search frictions in price formation and liquidity in OTC markets. Alternative models of OTC markets emphasize the role of trading relationships, dealers, and dealer networks in mitigating search frictions and minimizing price impacts. Hugonnier, Lester, and Weill, 2025 provide a comprehensive summary of the theoretical literature on OTC markets. Empirical work on OTC markets has been limited due to data limitations but recent empirical studies have examined different financial markets such as the market for municipal bonds (Li and Schurhoff, 2019), corporate bonds (Feldhütter, 2012, Hendershott et al., 2020, Kargar et al., 2023), credit default swaps (CDS) (Oehmke and Zawadowski, 2016, Eisfeldt et al., 2023), and repo markets (Han, Nikolaou, and Tase, 2022). We offer the first comprehensive empirical analysis of trade flows in the OTC market for syndicated term loans.

3 Data construction

Our primary dataset is derived from confidential supervisory reports collected by the Shared National Credit (SNC) program. SNC data collection is jointly administered by the three federal banking regulatory agencies: the Federal Reserve, the Federal Deposit Insurance Corporation (FDIC) and the Office of the Comptroller of the Currency (OCC). SNC has collected information on syndicated loans since the 1970s, but reporting prior to 2010 was primarily done at annual frequency. Starting in 2010Q1 SNC began collecting information on syndicated loans at quarterly frequency from select agent banks.

Our initial data include all quarterly SNC reports on syndicated loans from 2010Q1 until 2022Q3. The data include over 100,000 unique syndicates that provide credit to over 29,000 financial and non-financial corporate borrowers. Because

SNC collects information on syndicated loans that have total committed amounts exceeding $100 million, those borrowers are also some of the largest public and private corporations in the United States. The loan syndicates are arranged by a lead arranger, also referred to as the agent bank. The designated agent bank is the reporting bank to one of the three regulatory agencies. The data include 273 such agent banks. However, only 17 of the largest agent banks have reported consistently at quarterly frequency since the beginning of 2015, while the rest of the agent banks report at either annual or at mixed frequencies. For the purposes of our analysis, we select only agent banks with consistent quarterly reports. Our second selection criterion is to include only loan syndications that involve term loans with assigned CUSIP identifiers. This selection leaves us with around 10,143 term loan syndications that involve over 1,700 domestic and foreign banks and over 21,000 other non-bank financial lenders providing credit to over 6,000 corporate borrowers over the period from 2015Q1 to 2022Q3.

Table 1: Summary statistics of the SNC sample of syndicated term loans

	mean	s.d.	5	25	50	75	95
Committed amount ($ million)	424.2	568.1	8	60.5	200	541.8	1,715
Maturity at origination (years)	5.7	2.4	1.9	4.7	5.1	7.0	10.0
Remaining maturity (years)	2.1	1.6	0.2	0.8	1.8	3.1	5.2
Share of investment-grade	20	40	0	0	0	0	100
Number of lenders	131.8	214.3	2	3	11	195	629
Lender commitment ($ million)	50.0	55.0	3.6	16.9	34.1	61.7	156.0
HHI of lender shares	27.0	28.6	0.6	2.2	17.4	50	100
Agent bank share (percent)	23.4	23.6	0	0.7	15.6	43.8	66.7

NOTE: The sample includes information on 10,143 syndicated term loans to 6,388 corporations from the first quarter of 2015Q1 to 2022Q3. SOURCE: Shared National Credit (SNC)

Summary statistics of our sample are presented in Table 1. The average committed amount of a term loan in our sample exceeds $400 million and the median is $200 million, with some significant variation. The standard deviation is more than $500 million and the 5th percentile loan is $8 million, whereas the 95th per-

centile loan is $1.7 billion.[2] The average and median syndicated term loan in our sample has maturity at origination exceeding five years, whereas the average loan has remaining maturity of about two years. We focus on both leveraged below-investment-grade loans and loans with an investment-grade rating, which form about 20 percent of our sample. The syndicated term loans involve a large number of lenders. The average syndication has over 131 lenders involved over the life of the loan. However, the distribution is highly right skewed, with the median syndicate involving about 11 lenders and the 95th percentile syndicate involving over 600 lenders. The average lender share in a term loan is about $50 million, and for the median loan, it is $ 17 million. Lender shares are relatively dispersed with the average syndicate Herfindahl-Hirschman Index (HHI) at 27 percent and the median HHI at 17.4 percent. The average syndicate share of the agent bank is 23 percent and slightly less than 16 percent for the median syndicate. Note that consistent with stylized facts in Blickle et al., 2020, in more than a quarter of our observations, the agent bank retains virtually no share in the loan.

Summary statistics on the consolidated balance sheets and income statements of this sample of agent banks are presented in Table 2. We can see that there is significant heterogeneity across banks in size, asset composition, regulatory capital levels, profitability, and reliance on stable forms of funding such as insured deposits.

4 From primary to secondary market

In this section, we explain the transition from the primary to the secondary market, and how that transition is reflected in our data. Figure 1 illustrates the life cycle of a typical syndicated term loan. A loan is originated at some date t_0 by the agent bank

[2]There are at least two reasons why the sample includes loans with total committed amounts below the reporting threshold of $100 million. First, before 2017, the reporting limit was $20 million. Second, some loans are amortizing, and their outstanding amounts decline over their life. Because the size distribution of loans is highly right skewed, the aggregate volume of term loans below $100 million is small.

Table 2: Summary statistics of the agent banks in our sample

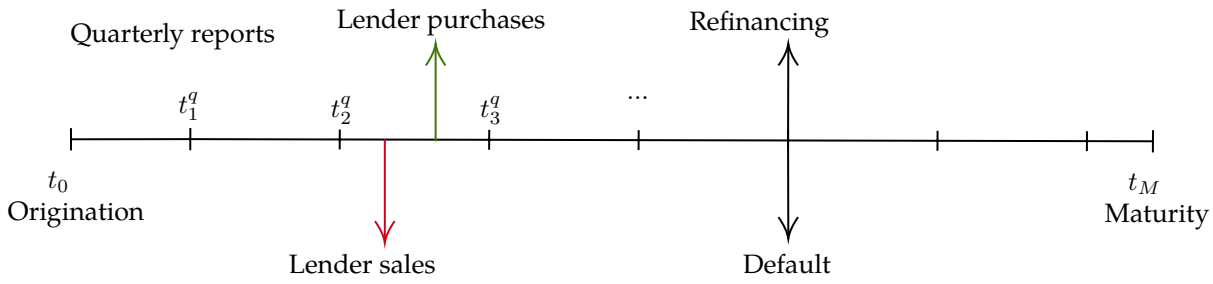
	mean	s.d.	5	25	50	75	95
Assets ($ billions)	1,747	1,228	116	381	2,256	2,610	3,744
HQLA-to-Assets	20.9	6.2	9.5	17.6	20.8	23.4	32.0
CET1 ratio	12.9	3.6	9.7	11.3	12.0	13.1	23.5
Return on assets (ROA)	0.9	0.5	0.1	0.8	1.0	1.2	1.4
Share of insured deposits	28.2	10.6	9.6	22.5	25.3	35.2	44.1

NOTE: The sample includes 17 agent banks, which are FR Y-9C filers. HQLA stands for high-quality liquid assets and is the sum of reserves held at the Federal Reserve, Treasuries, and government agency debt, as well as agency mortgage-backed securities. The definition is a proxy for the liquidity coverage ratio (LCR) regulatory liquidity requirements banks are subject to. The CET1 ratio stands for the common equity tier 1 ratio and is the regulatory capital measure that is the ratio of common equity capital scaled by a measure of risk-weighted assets. Return on assets is the annualized quarterly flows of net income scaled by the average total assets. The summary statistics include the quarterly balance sheet and income statements of those banks over the period from 2015Q1 to 2022Q3. SOURCE: Public filings FR Y-9C.

or several co-lead (agent) banks. Origination can be as either an underwritten loan or on a best-effort basis. If the lead bank underwrites the loan, it commits to providing a certain amount of credit to the borrower at a specified credit spread over a benchmark rate. Such commitments resemble the underwriting commitments of dealers when corporate bonds are issued. The lead bank then starts the syndication process during which it invites participation from other lenders, who can take shares in the syndicate. In an underwritten syndication, the agent bank effectively insures the borrower against low participation or higher credit spreads demanded by the bidders for participation shares in the syndicate. If participation in the syndication is low, the agent bank could be required to absorb higher shares of the loans than anticipated. This exposure is referred to in the literature as "pipeline risk" (Bruche, Malherbe, and Meisenzahl, 2020). Alternatively, the lead bank can originate the loan on a best-effort basis, which lacks the firm commitment by the lead bank and leaves the borrower exposed to the pipeline risk if loan demand is weaker than expected. Following syndication, the borrower receives access to its committed amounts and begins regular payments, that is, interest and principal,

on its obligations. Participating lenders receive a fraction of those payments in proportion to their pro-rata shares. As the loan term proceeds, the composition of the syndicates can change, and lenders can buy or sell their loan shares. The loan matures at time t_M, but syndicated loans can be refinanced before their maturity and, at this point, a new syndicate is formed. Similarly, some borrowers may default on their loans before maturity.

Figure 1: Life cycle of a syndicated loan



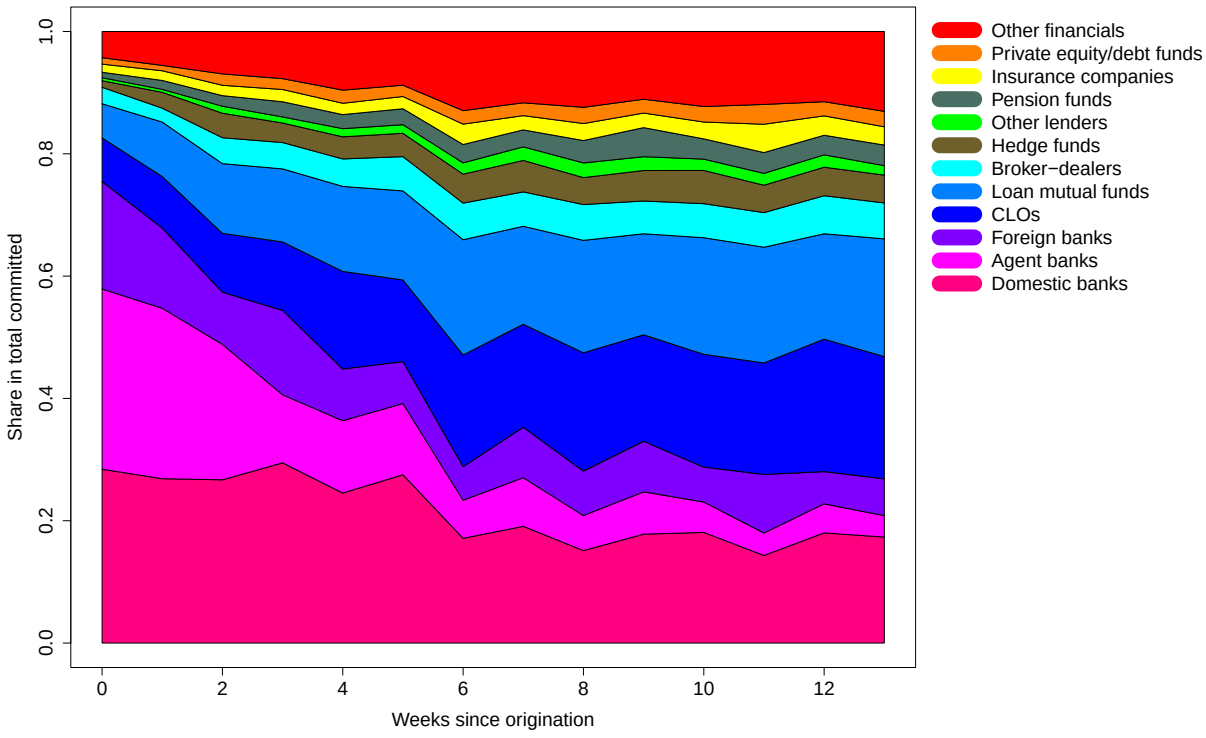
NOTE: Note that the days between the origination date of a syndicated loan t_0 and the first SNC quarterly report can vary from 0 to 92 days, depending on the exact origination date relative to the quarter-end.

In our data we observe a sequence of snapshots of loan shares from origination to maturity. The DealScan data provide a list of lenders at origination t_0. Then, for subsequent quarter-ends $t_1^q, t_2^q, t_3^q, \ldots, t_M$, the SNC provides snapshots capturing the evolution of the syndicate at regular quarterly intervals. The selling and buying of shares could occur on any trading day during the quarter. While we do not observe the exact date and the terms of those transactions, we can measure the changes in the participation shares ,including exit and entry of lenders in the syndicate at quarter-ends, and use those to infer buying and selling activity as described in the next section.

The primary market in syndicated loans refers primarily to the syndication process at origination, while the secondary market describes any subsequent trades. Having said that, for the purposes of our study we exclude from the secondary

market any transaction between origination as reported in DealScan and the first quarterly report in SNC. This is because offshore vehicles such as many CLOs take ownership of their loan shares only after origination is complete, through prearranged transactions under a special "primary assignment" mechanism, to avoid tax penalties they would incur when purchasing loans in the primary market. Indeed, the SNC data provide evidence suggesting that the DealScan data observed for t_0 do not fully describe the "final" syndicate arrangement. Instead, syndicate composition often changes notably between what is reported in DealScan for t_0 and the first observation in the SNC data t_1^q.

Figure 2: Lender shares in the first quarter following origination



NOTE: The lender shares are weighted by the total committed amount and are computed over the first 13 weeks from the reported date of origination and the first quarterly report in SNC. The sample includes all leveraged term loans over the period 2015Q1–2022Q3.
SOURCE: SNC, DealScan, and authors' calculations.

To see this change, consider Figure 2, which is based on our merged DealScan and SNC sample. It shows the weighted average shares of lenders grouped in 12 groups of entities, including the share retained by the agent bank. The first observation at time 0 reflects shares reported in DealScan. The subsequent weekly observations come from the SNC data, and each reflects a different sub-sample of loans that report their first quarter-end within the given number of weeks since origination. So, for example, if a loan originates on March 25th and is then reported in the SNC data for quarter-end March 31st, that loan is part of the data used to create the observation for week 1, and so on for all subsequent weeks. This analysis is based on Lee et al. (2019), who used the annual SNC, and we adapt their approach for our quarterly SNC sample.

As Figure 2 shows, the composition of the syndicates changes notably in the first 12 weeks after origination. On average, these changes reflect sales from the set of banks, including in particular the agent bank, to a variety of non-bank financial institutions, such as CLOs and loan mutual funds. Thus, for the purposes of our analysis in this paper, we consider transfers that occur prior to the first SNC observation to be part of the primary market, and we do not include them in our study. The secondary market we study includes transactions that take place between the first and the second quarter reported in SNC as well as all subsequent transactions. However, as we will see below, even this SNC-only sample still reflects some pre-arranged primary market transfer activity, in particular, in cases where a loan was originated close to the quarter-end.

Non-bank financial institutions have played an increasingly important role in the secondary market for syndicated loan shares. Table 3 presents a snapshot of the typical composition of lender types in our sample of syndicated term loans. Over a quarter of our sample is composed of loan syndicates in which banks, including the agent bank, do not retain a share and offload the loan to non-bank financial firms, such as CLOs and loan mutual funds. The reduction in the lead arranger's shares

over time shown in Figure 2 and across syndicates as shown in Table 3 implies a different understanding about the role of lead arrangers from the earlier literature, and is explored further in Blickle et al. (2020). In our paper, we focus on secondary market trading and how non-bank participation affects the trading activity we observe in the data.

Table 3: Shares of non-bank financial institutions in loan syndications.

	mean	s.d.	5	25	50	75	95
Share of domestic banks	33.1	39.5	0	0	6.9	71.4	100
– Agent bank share	23.1	23.3	0	0.7	15.5	43.2	66.7
Share of foreign banks	10.6	19.9	0	0	0	13.8	50.4
Share of non-bank lenders	56.4	45.2	0	0	84.2	100	100
– CLOs	7.4	13.4	0	0	0	9.1	38.4
– Loan mutual funds	5.7	9.5	0	0	0	10.1	26.7
– Broker-dealers	2.8	5.6	0	0	0	4.6	12.4
– Pension funds	0.8	1.6	0	0	0	0.5	4.6
– Hedge funds	2.1	5.5	0	0	0	1.9	10.6
– Insurance companies	1.6	6.6	0	0	0	0.9	6.1
– Other lenders	1.0	3.3	0	0	0	0.4	4.9
– Private equity/debt	0.8	2.3	0	0	0	0	4.8
– Other financial entities	5.6	9.9	0	0	0	11.3	23.2

SOURCE: SNC and authors' calculations.

5 Measuring secondary market buying and selling

In this section, we describe how we construct the buying and selling activity in the secondary market from the quarterly SNC data. First, we introduce some notation. Let us index a potential lender as ℓ as part of a set of lenders $\ell \in \mathcal{L}$ participating in any of the collection of loan syndicates $\mathcal{S} = \{S_i\}_{i=1}^{K}$ in our data. A loan syndicate i is a collection of lenders $S_i = \{\ell_0, \ell_1, \ell_2, \ldots, \ell_{N_i}\} \subset \mathcal{L}$ that own a share in the total amount committed to the borrower at any point in time over the life of the syndicate loan, where we always index lender 0 to be the syndicate lead arranger (agent

bank). The total number of non-agent lenders that own shares in the syndicated loan at any point in time is N_i. Without loss of generality, assume that each borrower obtains funding from a single syndicate. Therefore, the syndicate index i is also the borrower index.

The SNC data record the amount owned by each syndicate member at quarter-end. The total dollar loan amount is $L_{i,t}$ and each lender holds a dollar amount $L_{\ell,i,t}$. The share of each lender in the syndicate is denoted by $\pi_{\ell,i,t} = \frac{L_{\ell,i,t}}{L_{i,t}}$. To back out the purchasing and selling actions of lenders within each quarter interval, we first separate the changes in the loan amounts for each lender from changes in the total amount committed to the borrower. Changes in the total amount of the loan occur for various reasons. For example, some term loans are amortizing, and thus the amount outstanding shrinks over time, whereas in other situations the borrower and the syndicate can negotiate an increase or decrease in the loan amount. To adjust for such changes, we work with the baseline assumption that the share of a loan that is held by a given lender remains unchanged — unless that lender takes action to buy or sell loan shares. That is, we can compute the baseline loan amount $\pi_{\ell,it-1} \times L_{i,t}$ that would be extended by a lender ℓ in period t without any buying or selling. Then lender ℓ's buying and selling activity in syndicate S_i is identified as a deviation from this baseline

$$b_{\ell,i,t} = \max\left\{0, L_{\ell,i,t} - \pi_{\ell,it-1} \times L_{i,t}\right\} \tag{1}$$

$$s_{\ell,i,t} = \max\left\{0, -\left(L_{\ell,i,t} - \pi_{\ell,it-1} \times L_{i,t}\right)\right\}. \tag{2}$$

By definition, all purchases and sales computed in that way add up to zero across lenders for each syndicate and time period.

Measuring trading activity from a sequence of snapshots of holdings has limitations. If a loan share was bought and then sold within a quarter, we would not be able to record such transactions in the data. We only observe the original owner at the previous quarter-end and the final owner at the next quarter-end. Furthermore,

we do not directly capture which lender sold to whom, but only see whose lender shares increase and whose shares decrease consistent with active buying and selling. For example, if there are multiple buyers and multiple sellers trading equal amounts, we cannot ascertain who sold to whom. Nonetheless, we argue that our approach can give meaningful insights into trading patterns and reallocations in the secondary market for syndicated loans that have not been documented before.

6 Stylized facts on the secondary market

With our data on loan share purchases and sales at hand, we next develop a set of stylized facts of secondary market trading in syndicated loans. We study the level of overall activity in the secondary market as well as the gross and net trading activity of different lender groups active in the market.

6.1 Secondary market turnover

We begin with the basic question of how much trade takes place in syndicated loans. The LSTA reports that based on its own data sources at an aggregate level in 2022 a total of almost $824 billion exchanged hands in the segment. In this section we study trade activity using our regulatory loan-level data. We use a measure of trade turnover as a share of total volume, also called "churn," that is inspired by employee turnover measures used in the labor literature (e.g., Burgess, Lane, and Stevens, 2000, and others). For syndicated loan i and quarter t, compute the dollar amount of loan shares that changed hands as a percentage of the average dollar amount outstanding by adding across each lender ℓ the dollar value of both purchases and sales

$$\mathcal{C}_{i,t} = \frac{\sum_{\ell \in S_i} (b_{\ell,i,t} + s_{\ell,i,t})}{2 \times L_{i,t}} \in [0, 1] \,. \tag{3}$$

Note that in this measure there is double counting both in the numerator (every dollar traded presents one dollar bought and one dollar sold) and in the denominator, which ensures that the measure of turnover will be a share measure bounded within the interval $[0, 1]$. The specific expression in equation 3 shows how to compute turnover for a single loan in a single quarter. We can aggregate across different sets of loans or periods as desired by computing both the numerator and the denominator as a sum across the relevant set.

Panel A of Figure 3 plots the time series of different points in the distribution of the churn measure across our sample. It reveals a dichotomy. On the one hand, more than half the syndicates in our sample show little to no secondary market trades, as shown by the median line hugging the x-axis of the chart. On the other hand, the size-weighted average syndicate trades about 8 percent of the loan amount outstanding. The size of the syndicated loan market for term loans is about $1.2 trillion, which means that, on average, the syndicates with active secondary markets trade about $100 billion term loans per quarter. Panel A of Figure 3 does not show a change in the volume of trade during the COVID-19 crisis in 2020. However, as the corresponding Panel A of Figure 4 shows, the deteriorating conditions in the corporate credit market caused by the pandemic and associated lockdowns had an effect on secondary market liquidity. The median bid-ask spread for syndicated loans matched to the LSTA price data spiked from less than 100 basis points to more than 200 basis points. Taken together the market appears to have continued to support trade in syndicated loans, but at worse pricing conditions than prior to 2020.

Turning to the secondary market turnover during the life cycle of a loan, Figure 3 Panel B examines how the turnover in syndicated loans varies with the age of the syndicate, measured here by the number of quarters since origination. Note that to construct the turnover measure in equation 3 for a given quarter, we need an observation for the previous quarter, and thus we cannot compute turnover for

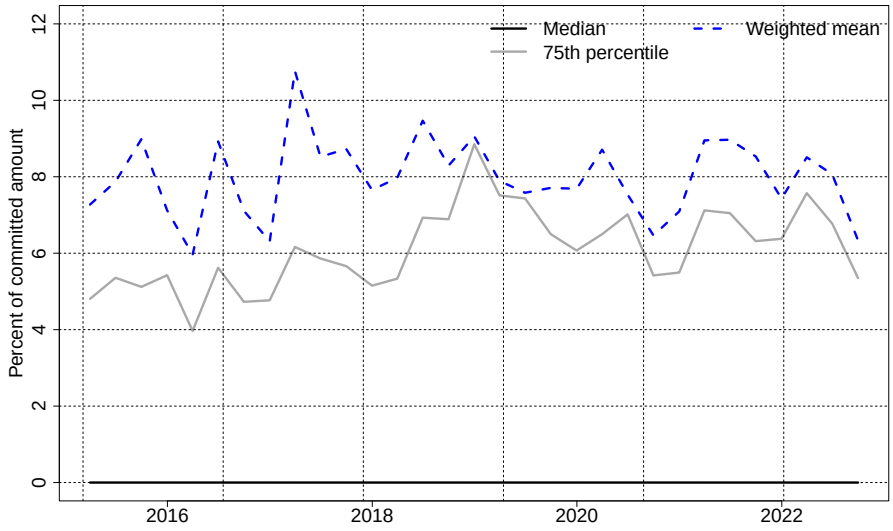
the first quarterly report in SNC. Therefore, the x-axis of quarters since origination starts from the second quarter. We truncate the chart at the 20th quarter or five years, which is a typical maturity for a term loan. There is a distinct age dependence of the turnover measure. The size-weighted average amount of trading spikes at age two, that is, between the first and second quarter observed in the SNC data, exceeding 15 percent of the outstanding loan amounts, and it drops to about 10 percent and below from there. This initial spike reflects the allocation of loan shares as the syndicate is formed over the first few weeks of its existence as shown in Figure 2 and thus can be attributed more to the primary than to the secondary market. After that initial spike, turnover drops quickly and then gradually declines with age. By the 5th quarter since origination, the turnover measure stabilizes to around 5 and 10 percent of the outstanding committed amount for the syndicate in 75th percentile and the weighted mean. Market liquidity, as measured by the LSTA bid-ask spread, mirrors the age profile of market turnover as shown in Panel B of Figure 4. Spreads are lowest for the newest loans and then gradually increase with the median loan spread, increasing from about 60 bps in the first couple of quarters when turnover is highest to around 100bps after 20 quarters when we observe lower turnover in our data.

6.2 Determinants of secondary market activity

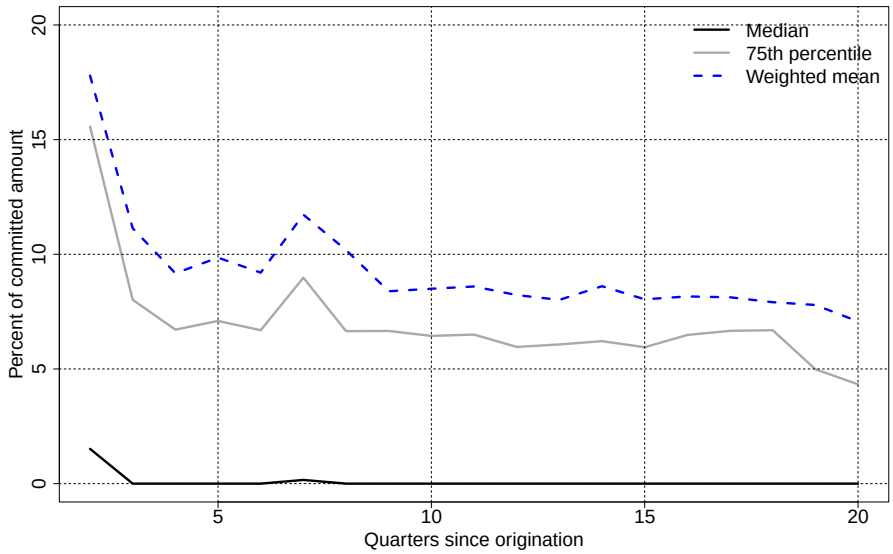
We next examine what determines whether there is an active secondary market. Examine Figure 5, which shows a strong association between non-bank participation and trade volumes. The chart splits our sample of syndicated loans into above- and below-median participation of non-bank lenders and compares trading volumes across the two groups. Turnover in syndicated loans with above-median non-bank participation is significantly larger than for loans with below-median non-bank participation. The turnover is close to 10 percentage points higher for the above-median sample, especially for recently originated loans.

Figure 3: Measures of syndicate turnover

A. Time series



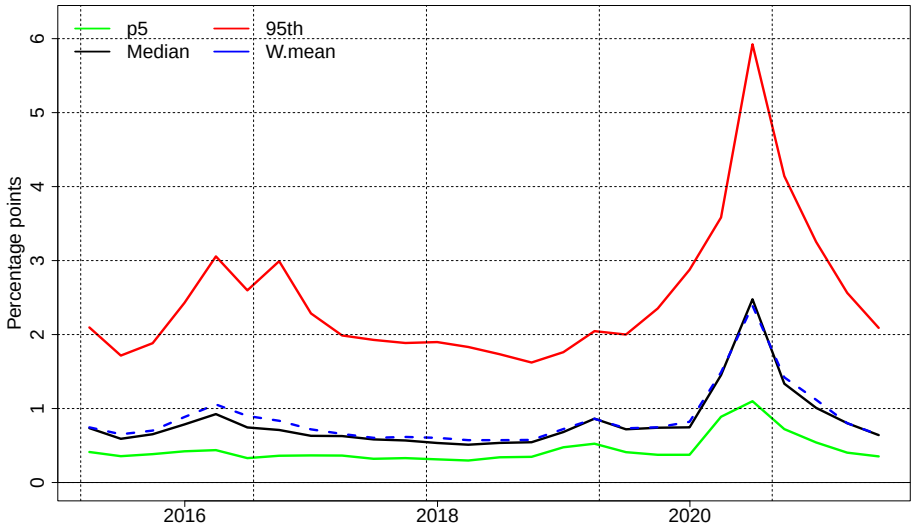
B. Syndicate age



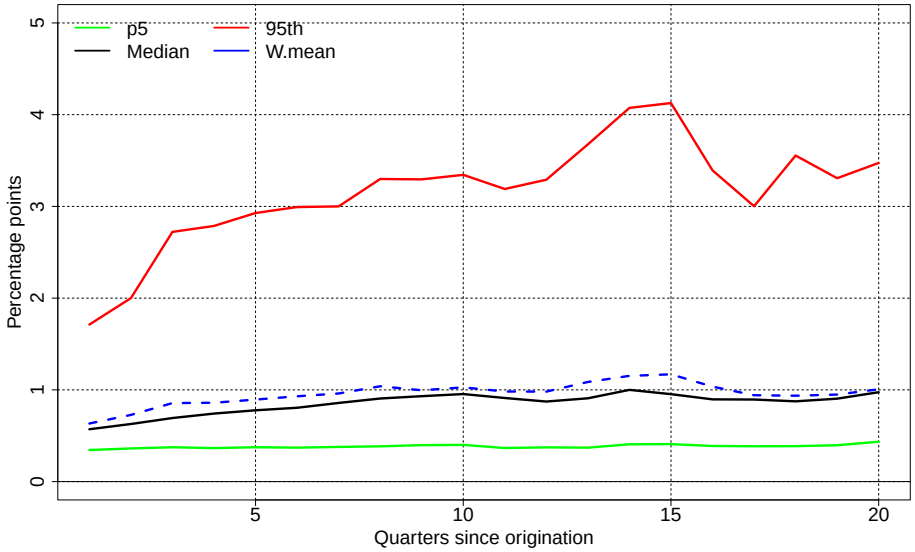
Source: SNC and authors' calculations.

Figure 4: Average bid-ask spreads on dealer quotes

A. Time series

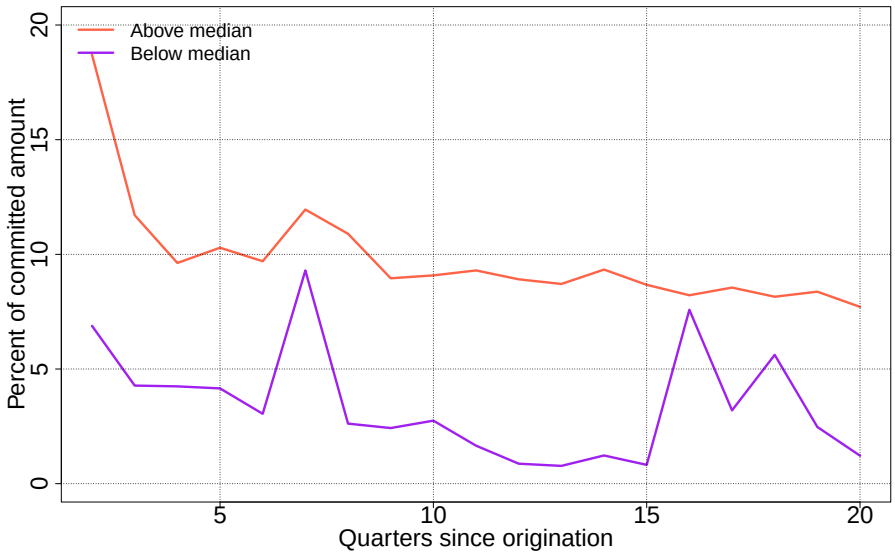


B. Syndicate age



SOURCE: SNC, Refinitiv LSTA, and authors' calculations.

Figure 5: Measures of syndicate turnover by non-bank participation



Source: SNC and authors' calculations.

Non-bank lenders have significantly less stable sources of funding than the insured retail deposits of bank lenders. As a result, funding shocks are more likely for those entities, and outflows of funds tend to result in the need for such entities to sell assets. For example, loan mutual funds may have to offload loans when they experience redemptions, whereas, due to their institutional design, non-bank lenders such as CLOs may have a greater need for secondary market access than other groups such as banks. CLOs operate under leverage constraints that can force loan sales if loan quality in a portfolio deteriorates below certain thresholds. Elkamhi and Nozawa (2022) show that such constraints can force CLOs to sell syndicated loans at times when they are close to violating the constraints.

We next take this suggestive evidence to a regression framework. We first examine a simple probit model with outcome variable equal to one if our turnover measure is positive for a given syndicate and quarter. In particular, we analyze how the composition of lenders in the syndicate, the retained share of the agent

bank, the capitalization and liquidity position of the agent bank, as well as changes in the credit riskiness of the borrower affect the secondary market. Results from this analysis of the extensive margin of secondary market trade are summarized in Table 4.

Table 4: Determinants of an active secondary market

	Dependent variable:			
	Active secondary market $\mathbb{I}\{C_{i,t} > 0\}$			
	(1)	(2)	(3)	(4)
log(N lenders)	0.213***	0.180***	0.197***	0.190***
	(0.006)	(0.007)	(0.009)	(0.009)
HHI lender shares	−1.472***	−1.659***	−1.834***	−1.876***
	(0.043)	(0.049)	(0.062)	(0.062)
Agent share	0.754***	0.779***	0.747***	0.744***
	(0.043)	(0.043)	(0.054)	(0.054)
$\mathcal{I}\{\text{Agent share} = 0\}$	0.268***	0.226***	0.144***	0.252***
	(0.019)	(0.020)	(0.024)	(0.027)
Share of nonbanks		0.159***	0.089***	0.103***
		(0.019)	(0.023)	(0.023)
Prob.default			0.003***	0.004***
			(0.0003)	(0.0004)
Non-investment grade			0.047***	0.057***
			(0.016)	(0.016)
Downgrade to non-IG			0.297***	1.202***
			(0.073)	(0.339)
Share of nonbanks × Downgrade to non-IG			0.375***	
			(0.116)	
Agent CET1 ratio				−0.018***
				(0.002)
Agent HQLA-to-assets				0.006***
				(0.001)
Downgrade to non-IG × Agent CET1 ratio				−0.043***
				(0.013)
Downgrade to non-IG × Agent HQLA-to-assets				−0.007
				(0.010)
Constant	−0.074***	−0.007	−0.062*	0.024
	(0.028)	(0.029)	(0.036)	(0.057)
Observations	52,412	52,412	39,408	39,352
Log Likelihood	−27,567.530	−27,531.480	−19,806.810	−19,734.300
Akaike Inf. Crit.	55,145.050	55,074.960	39,633.610	39,494.610

Source: SNC and authors' calculation. *p<0.1; **p<0.05; ***p<0.01

The first column of Table 4 indicates that syndications with a larger set of participating lenders and lower concentrations of lender shares are more likely to have an active secondary market. Furthermore, the agent bank share has two opposing effects. A higher agent bank share predicts larger turnover, likely related in part to the agent bank selling shares to other lenders. However, all else equal, syndicates in which the agent bank completely offloads its participation in the syndicated loan

and has a zero share are more likely to have an active secondary market.

Next, in columns (2) and (3), we examine the role of non-bank financial institutions. A higher share held by non-bank lenders predicts higher turnover, consistent with the suggestive evidence in Figure 5. In column (3), we also condition on the credit quality of the borrower. Higher default risk, measured by the reported expected probability of default on the loan, predicts the existence of an active secondary market. Furthermore, downgrades from investment-grade to below-investment-grade status also result in an active secondary market, especially in syndications with higher participation of non-bank lenders.

Finally, column (4) examines if the agent bank's capital and liquidity position affect the secondary market. We measure bank capital with the regulatory common equity tier 1 (CET1) ratio and bank liquidity with the ratio of high-quality liquid assets as a share of total assets. The regression results show that less capitalized agent banks are more likely to have an active secondary market. Agent banks with higher liquidity are also likely to have active secondary markets. These results are supported by the notion that less capitalized banks face capital constraints limiting their holding of shares in risky corporate loans and have more incentives to sell shares to other banks or non-bank financial institutions. However, all else equal, agent banks that are more liquid have the capacity to intermediate secondary market trades. The effect of binding capital constraints is also present when borrowers are downgraded from investment grade to below investment grade. In those situations, less capitalized banks are more likely to have active secondary markets.

We next examine the intensive margin of lender share turnover, that is, the question of what determines how much a given syndicate is traded. Table 5 summarizes results from a set of panel regressions with fixed effects characterizing the determinants of the size of the lender share turnover. Column (1) documents the strong syndicate age effects of turnover, similar to those seen in Panel B of Figure 3 as well as Figure 5. The age effects diminish and become insignificant after about one year

following origination. Aside from age, we find that loan turnover increases with the number of lenders and the share of non-bank lenders. Agent bank share has a positive but statistically insignificant effect. In column (2) we replace the age variables with syndicate age fixed effects, which does not affect the other coefficients. Column (3) adds coefficients for downgrades, which amplify the positive effect of non-bank participation on trade. Finally, column (4) also adds coefficients for agent capitalization and liquidity. Neither of those is positively correlated with the amount of turnover we observe.

Table 5: Determinants of lender share turnover

	Dependent variable:			
	Lender shares turnover $\mathcal{C}_{i,t}$			
	(1)	(2)	(3)	(4)
Share of nonbanks,t-1	1.813***	1.812***	1.764***	1.795***
	(0.271)	(0.276)	(0.265)	(0.278)
Share of nonbanks, t-1, × Downgrade to non-IG, t			1.499**	1.509**
			(0.586)	(0.588)
Agent bank share, t-1, × Downgrade to non-IG, t			4.011	3.980
			(4.797)	(4.799)
Downgrade to non-IG, t			0.459	0.490
			(1.186)	(1.185)
$\mathcal{I}\{$Agent share, t-1 $= 0\}$	2.206**	2.214**	2.221*	2.193*
	(0.989)	(0.989)	(1.001)	(0.982)
log(N lenders), t-1	1.820***	1.816***	1.793***	1.788***
	(0.465)	(0.466)	(0.455)	(0.460)
Agent share, t-1	3.174	3.133	2.874	2.878
	(3.028)	(3.044)	(2.863)	(2.873)
Agent CET1, t-1				−0.072
				(0.297)
Agent HQLA-to-assets, t-1				0.123
				(0.119)
Age t_q=2	3.962***			
	(0.903)			
Age t_q=3	0.810***			
	(0.181)			
Age t_q=4	0.710***			
	(0.207)			
Age t_q=5	0.441*			
	(0.204)			
Age	0.022			
	(0.021)			
Agent bank fixed effects	Y	Y	Y	Y
Quarterly time fixed effects	Y	Y	Y	Y
Syndicate age fixed effects	N	Y	Y	Y
Observations	32,268	32,268	32,268	32,224
R^2	0.151	0.152	0.154	0.154
Adjusted R^2	0.150	0.150	0.151	0.151

Source: SNC and authors' calculation. *p<0.1; **p<0.05; ***p<0.01

6.3 Secondary market participation by lender category

Secondary market trading results in reallocation of the initial lender shares documented in Figure 2 to different lenders and lender types over time. In this section, we examine two additional concepts related to secondary market activity. The first is gross participation, which measures how much a lender or a group of lenders trade either as a buyer or as a seller. The second is net participation, which measures whether the participation involves the buying or the selling of shares.

The gross participation measure is computed as the total trading activity of a lender as a share of overall trade activity. For this analysis we compute the dollar amount of trades in loan i that lender ℓ was involved in during period t as a share of the total amount of dollars traded as follows

$$\mathcal{P}^{\text{gross}}_{\ell,i,t} = \frac{b_{\ell,i,t} + s_{\ell,i,t}}{b_{i,t} + s_{i,t}} \in \left[0, \frac{1}{2}\right], \tag{4}$$

where $b_{i,t} = \sum_\ell b_{\ell,i,t}$ and $s_{i,t} = \sum_\ell s_{\ell,i,t}$ are the total buying and selling activity, respectively, in loan i during period t. The measure is in the interval $\left[0, \frac{1}{2}\right]$, where 0 implies on net no trade activity, and $\frac{1}{2}$ implies that the lender is a counterparty for all dollar amounts traded either as the sole seller or as the sole buyer.

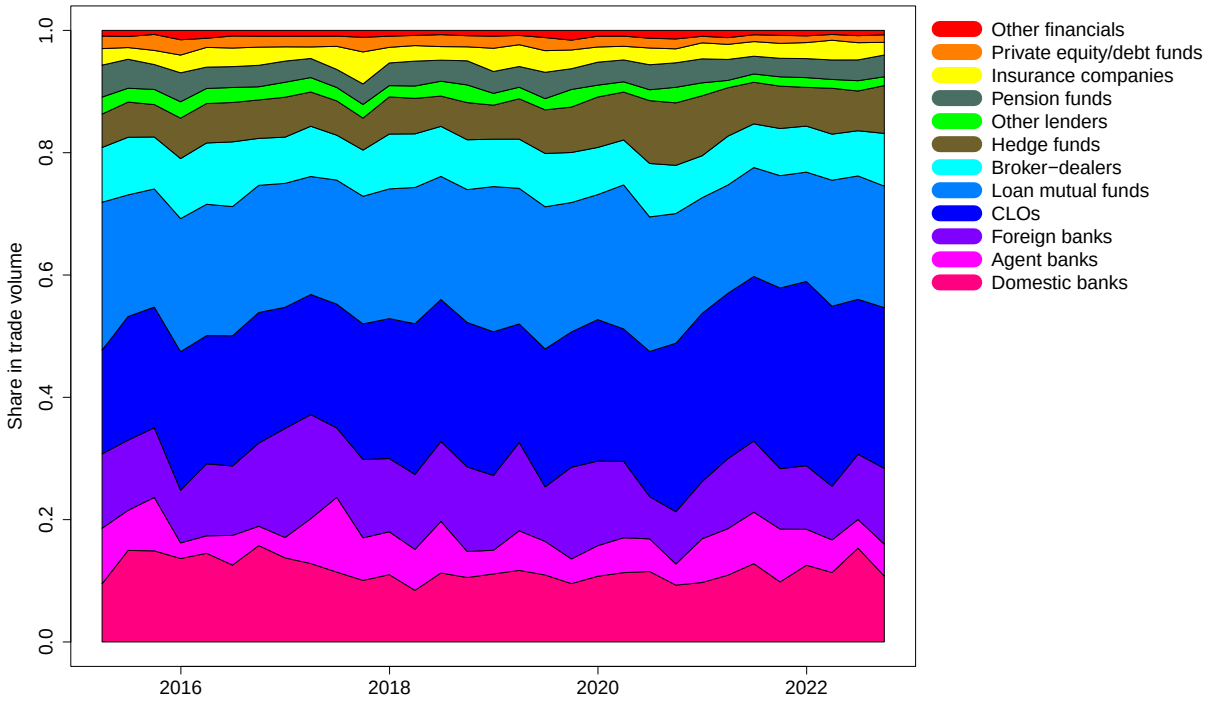
For our analysis below, we focus on the level of lender category; that is, we examine the participation of CLOs, mutual funds, hedge funds, banks, and so on, and across all loans in our sample. We implement this measure by computing the numerator and denominator as a sum across all the syndicated loans in our sample and the lenders within the same category. For a group of lenders $\mathcal{L} = \{\ell_1, \ell_2, ...\}$, gross participation in period t is then defined by

$$\mathcal{P}^{\text{gross}}_{\mathcal{L},t} = \frac{\sum_i \sum_{\ell \in \mathcal{L}} \left[b_{\ell,i,t} + s_{\ell,i,t}\right]}{\sum_i \left[b_{i,t} + s_{i,t}\right]}. \tag{5}$$

A measure of gross participation by loan age measured as quarters since origination

can be computed analogously.

Figure 6: Gross participation by lender category by time



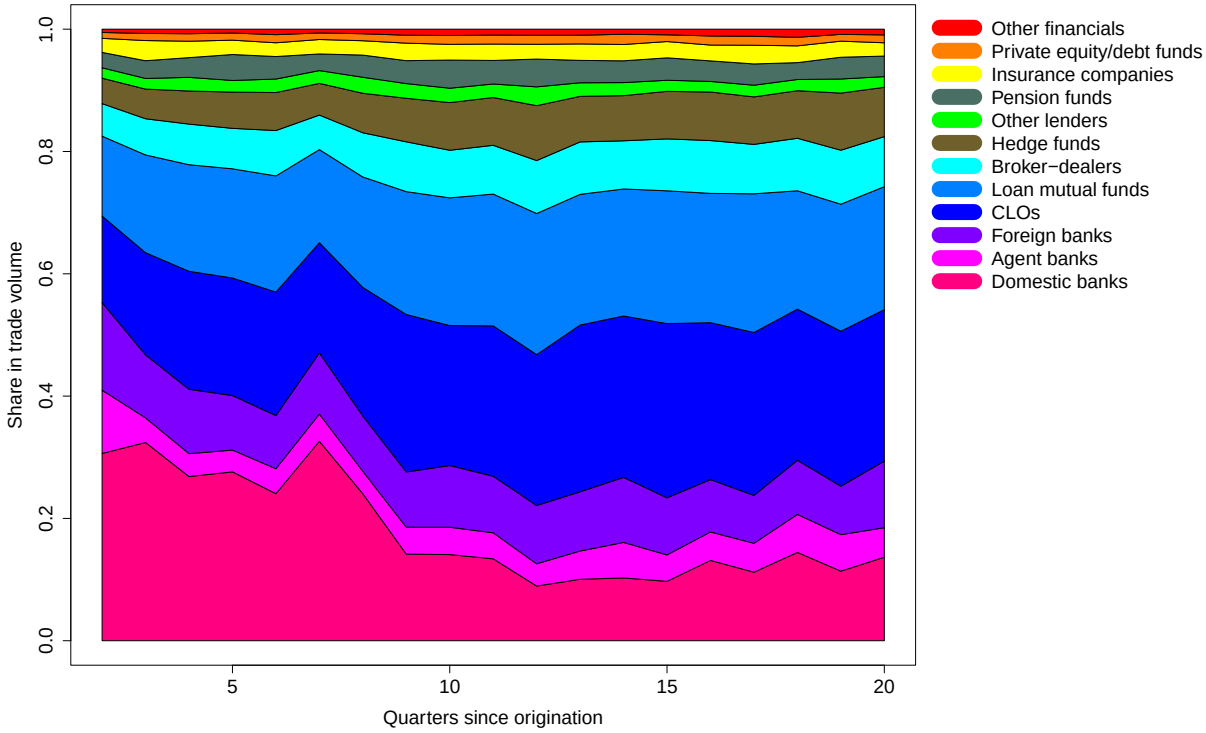
NOTE: This chart shows the participation in the gross trade volume by each lender category expressed as a share of the total gross trade volume. SOURCE: SNC and authors' calculation.

Figure 6 shows the aggregate measure over our sample period. The results highlight that in general the main trading parties include CLOs, loan mutual funds, and banks. Notably, the participation of hedge funds spiked during the COVID crisis, just as the liquidity of the loan segment declined, consistent with opportunistic investment by hedge funds providing liquidity in an otherwise stressed period.

Figure 7 shows the results across loan age since origination. Overall, the patterns across age are very stable and consistent with the previous chart. CLOs, loan mutual funds, and banks are the most active traders for much of the lifetime of a typical term loan. Agent banks are particularly active during the very first observation, corresponding to age 2 in our data. This is consistent with transition from the

primary to the secondary market, which we describe in Section 4 above and that still affects quarter 2 and possibly quarter 3 by age in our data.

Figure 7: Gross participation by lender category by syndicate age



NOTE: This chart shows the participation in the gross trade volume by each lender category expressed as a share of the total gross trade volume. SOURCE: SNC and authors' calculation.

Net participation measures the importance of a lender for the buy or sell side of the market, that is, the share of the gross volume of trades of a lender's buying or selling activity. For example, net participation in syndicated loan i, quarter t, and lender ℓ is

$$\mathcal{P}^{\text{net}}_{\ell,i,t} = \frac{b_{\ell,i,t} - s_{\ell,i,t}}{b_{i,t} + s_{i,t}} \in \left[-\frac{1}{2}, \frac{1}{2}\right]. \tag{6}$$

The lender net participation measures the net trading by lender ℓ as a fraction of total transactions over the period t, and the measure is an index in the interval

$[-\frac{1}{2}, \frac{1}{2}]$, where a lender with $\mathcal{P}^{\text{net}}_{\ell,i,t} = -\frac{1}{2}$ conducts all the sales and no purchases of loan i in period t and a lender with $\mathcal{P}^{\text{net}}_{\ell,i,t} = \frac{1}{2}$ conducts every purchase and no sales.

For our analysis, we aggregate again to the level of lender category $\mathcal{L}$ and across all loans. For each category $\mathcal{L}$ and period t, net participation is then given by:

$$\mathcal{P}^{\text{net}}_{\mathcal{L},t} = \frac{\sum_i \sum_{\ell \in \mathcal{L}} [b_{\ell,i,t} - s_{\ell,i,t}]}{\sum_i [b_{i,t} + s_{i,t}]}, \tag{7}$$

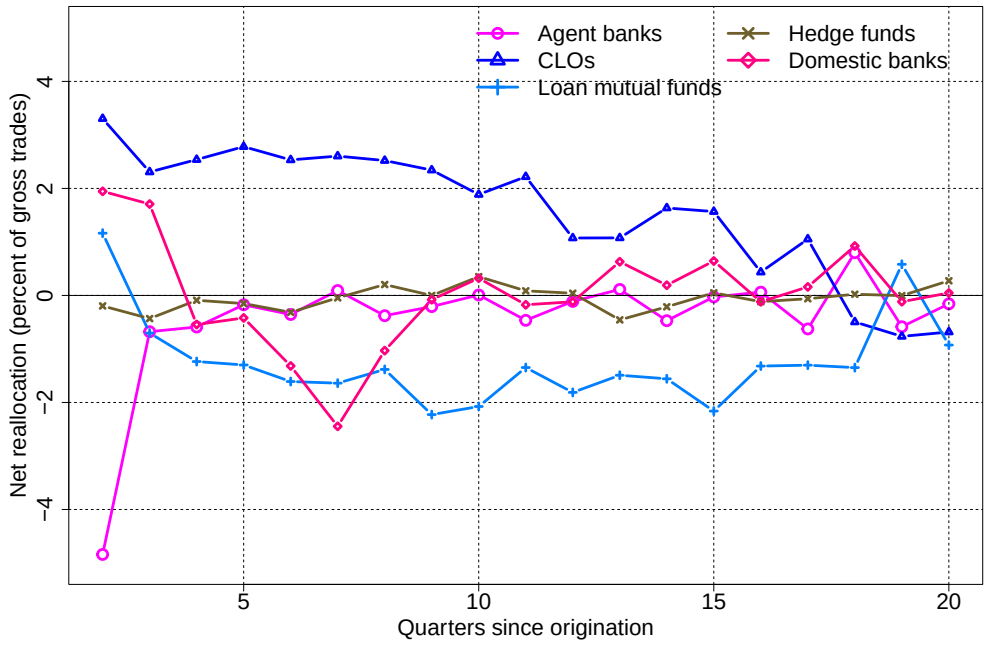
with net participation by quarter since origination defined analogously.

Figure 8 shows the result as a line chart across loan age with each lender category being displayed as a separate line. As with the gross participation measures, we aggregate lenders within the same category and across all the loans in our sample and show results by time since origination. The results allow us to assess which categories account for most of the buying and selling across the life cycle of a typical term loan.

The chart shows that CLOs tend to be the most consistent buyers in the secondary loan market, in particular in the first few quarters after origination. That feature is less prominent for older loans and disappears after around 16 quarters, that is, four years. Given that CLOs remain active in the secondary market for older loans as shown in Figure 7, our results imply that CLOs act both as buyers and as sellers of those loans. However, until about four years after origination, CLOs form the most consistent buyers of loans from investors in other categories. On the other side, loan mutual funds tend to act as sellers in all periods but the very first observation. Considering their likewise consistently high gross participation of similar magnitude, they appear to act almost exclusively as sellers after origination, and from about two years after origination, they are the most consistent seller of loans to other investor groups. This behavior is consistent with a model where such funds purchase loans at or directly after origination and then sell as needed. Interestingly, for banks the net participation statistic is very close to zero other than in the first transaction quarter. Considering this fact together with the relatively high level

of gross participation of banks in the secondary market across the loan age spectrum, it suggests that banks frequently act on both sides of the market, both buying and selling loan shares and thereby implicitly intermediating between buyers and sellers.

Figure 8: Net participation by lender category and syndicate age



Source: SNC and authors' calculations.

7 Conclusion

In this paper we have investigated the secondary market for syndicate loans. We propose a way to measure secondary market sales and purchases based on the sequential quarterly snapshots available in the regulatory SNC data and document novel stylized facts relating to the amount of trading and the factors associated with a greater level of secondary market activity. We also describe the trading patterns of the main lender categories, identifying both the gross participation of different

lender types in overall trade and their net trading directions. We show that while loan mutual funds tend to be sellers of syndicated loan shares and CLOs tend to be buyers, banks participate actively in the secondary market on both sides. In general, the secondary market and the ability of lenders to trade their shares after origination is an important part of the syndicate loan market and, as we have shown, it is of particular importance for loans with a large share of non-bank lenders. Our paper presents a new way to look at a commonly used dataset and a set of novel stylized facts. It also offers a pathway for future research into how the secondary market in syndicated loans interacts with the overall functioning of this important corporate credit market.

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A Data construction

A.1 SNC data

Our primary data source is the reports and exam data collected by the Shared National Credit (SNC) program. The data contain information on all the syndicated loans of $100 million or more, and the syndicate composition of participating lenders and their shares is tracked through the life of the loan. There are over 270 agent banks that report in SNC. However, only the largest 17 of those agent banks consistently submit SNC data at quarterly frequency throughout our sample period from 2015Q1 through 2022Q2. To ensure that we observe the dynamics of loan shares at a consistent quarterly frequency, we keep syndications reported by those 17 agent banks. We select a sample of all term loan syndications. The final sample consists of 6,388 borrowers, 1026 US-based banks, 697 non-US-based banks, and 21,089 non-bank financial lenders.

A.2 DealScan data

We complement the SNC data using Refinitiv DealScan (DS) available on Wharton Research Data Services (WRDS) to obtain additional information on the loan syndications at the time of origination. There are no consistent identifiers available in both datasets that would allow us to directly merge DealScan with SNC. To do the merge we combine different methods discussed in the literature (e.g. Cohen et al., 2021), which have been applied mostly to the annual SNC exam data. We apply these methods to the quarterly SNC data.

First, we construct a mapping between the borrowers in the two datasets. Both datasets contain information on many borrowers' 6-digit CUSIP. For any remaining unmatched borrowers, we attempt a merge on standardized borrower names using conservative fuzzy match parameters. We identify close to 15,000 unique SNC borrowers with term loans or roughly 50 percent of the unique borrowers with term

loans in SNC that match to a borrower in DealScan. Next, we examine the set of matched borrowers and match lending facilities within a borrower. We establish the set of all potential candidate matches. If an exact match is established, we stop. Our primary criterion for an exact match is based on the 9-digit CUSIPs of credit facilities provided in both DealScan and SNC.

If a CUSIP match is not established, then we prioritize exact matches on key loan characteristics such as loan type, amounts, origination date, and maturity date. For the cases with multiple candidate matches (e.g., 1:m, m:1, m:m), we loosen match identification criteria in an iterative process by allowing for differences in loan amounts, origination, and maturity date. We expand the set of unique matches in a way that prioritizes the best match. We drop candidate pairs that have origination dates more than five years apart or loan amounts that differ by more than 500 percent. Throughout these steps the greedy algorithm removes observations matched in the current step before moving to the next, looser criterion. This process is iterated until all observations are matched or we run into m:m cases that could not be uniquely reduced to a 1:1 pair based solely on CUSIP or key loan characteristics. It is this last step that eventually produces convergence. By then restricting the remaining sample to unmatched DS syndicates that are within DS deals with at least one syndicate match, and re-calculating the various cases (1:1, 1:m, m:1, m:m), we are able to re-run the greedy algorithm on this sub-sample to marginally improve the number of matches. After this process eventually reaches convergence, what remains is an m:m mapping that has been sufficiently reduced in size to feasibly apply a globally optimal solution using bipartite algorithms. We apply this algorithm to reduce any remaining m:m cases to unique matches by weighting candidates on their respective ranks. Using this iterative process allows us to match over 30,000 SNC syndicates to tranches reported in DealScan. Of those, 5,827 syndicated term loans to 3,520 borrowers are part of the SNC sample.

A.3 LSTA secondary market price quotes data

The secondary price quote data are sourced from the Refinitiv LSTA and LPC Mark-to-Market Pricing and Euro Pricing Service. The dataset contains information on bid and ask quotes for 3,590 term loans that we match to our common DealScan-SNC sample. The dataset contains daily information on the average bid and the average ask price over different quotes originated on that date. We collapse the daily data to a quarterly dataset. We match the quarterly dataset to the quarterly SNC sample using a combination of 9-digit CUSIPs and tranche permanent IDs, and we map them to loan identifiers provided in the LSTA dataset.